# APPENDIX E.

# U.S. Fish and Wildlife Service, Fish and Wildlife Coordination Act Report, June 2006.

Photograph by Antonio Bentivoglio, USFWS

**Draft**
**Fish and Wildlife Coordination Act Report**

**Ferry Terminal Improvements**
**at**
**Lahaina Small Boat Harbor**
**Maui, Hawaii**

**June 2006**

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**Fish and Wildlife Coordination Act Report**

**Ferry Terminal Improvements at Lahaina Small Boat Harbor**
**Maui, Hawaii**

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## INTRODUCTION

### Authority, Purpose and Scope

This is the draft report from the U.S. Fish and Wildlife Service (Service) on plans by the Hawaii Department of Land and Natural Resources (DLNR) to construct a new Ferry Terminal at the Lahaina Small Boat Harbor (LSBH) on the island of Maui, Hawaii. This report has been prepared under the authority of the Fish and Wildlife Coordination Act of 1934 [16 U.S.C. 661 *et seq.*; 48 Stat. 401], as amended (FWCA), and other authorities mandating Department of the Interior concern for environmental values. This report is also consistent with the National Environmental Policy Act of 1969 [42 U.S.C. 4321 *et seq.*; 83 Stat. 852], as amended (NEPA). The purpose of this report is to document the existing fish and wildlife resources at the proposed project site and to ensure that fish and wildlife conservation receives equal consideration with other proposed project objectives as required under the FWCA. The report includes an assessment of the significant fish and wildlife resources at the proposed project site, an evaluation of potential impacts associated with the proposed project design alternatives, including a Habitat Equivalency Analysis (HEA) for anticipated project impacts, and recommendations for fish and wildlife mitigation measures.

The proposed project is sponsored by the Federal Transit Administration (FTA) with the State of Hawaii, Department of Land and Natural Resources (DLNR) acting as the local sponsor. The LSBH engineering plans indicated that the project will involve placement of fill material into waters of the United States and thus will be subject to Rivers and Harbors Act section 10 and Clean Water Act section 404 regulations. Based on information from the DLNR, the estimated costs to construct the proposed project alternatives are between approximately 3 and 19 million dollars.

The purpose of the proposed project is to improve existing operating conditions at the LSBH by alleviating ship traffic and harbor congestion at the one existing pier. The existing pier is about 66 feet (ft) [20.1 meters (m)] wide and 120 ft (36.6 m) long and contains the harbor master's office, ferry kiosk, and diesel fuel dispensing and sewage pumping facilities. This pier is used for loading and unloading passengers onto recreational and commercial vessels, including cruise ship tenders (*i.e.*, shuttle craft) and inter-island ferry vessels. The pier also is used by surfers to gain access to nearby surf.

The inter-island ferry provides service between Maui (Lahaina), Lanai (Manele) and Molokai (Kaunakakai). The Lahaina/Manele ferry runs five daily round trips and the Lahaina/Kaunakakai ferry runs twice daily round trips on Monday through Saturday. On Sundays, the Lahaina/Kaunakakai ferry makes a one way trip from Kaunakakai to Lahaina. At times, the inter-island ferries are unable to load or unload their passengers in a timely manner due to cruse ship shuttle craft and local harbor traffic (related to fueling and sewage pumping activities at the pier). The proposed new ferry terminal pier should improve operating conditions at the LSBH.

**Coordination with Federal and State Resource Agencies**

Service biologists have discussed the proposed project with staff of the FTA, DLNR, National Oceanic and Atmospheric Administration Marine Fisheries Service (NOAA Fisheries Service), U.S. Environmental Protection Agency (USEPA), and the U.S. Army Corps of Engineers (Corps). A team of marine biologists from the Service, DLNR Division of Aquatic Resources (DAR), and the Bernice P. Bishop Museum (BPBM) collaborated on field surveys to collect the coral reef resource data that was used as the basis of this report. Concerns relative to the protection and conservation of important fish and wildlife resources at the LSBH expressed by these agencies are incorporated into the report. Copies of this draft report are being provided to all of the agencies.

Prior Fish and Wildlife Meetings, Studies and Reports:

December 2004 – The Service received a notice of intent to prepare an Environmental Impact Statement (EIS) for the proposed LSBH ferry pier improvements.

April 2005 – The FTA and DLNR requested information from the Service on the potential for a FWCA investigation for the proposed LSBH project.

May 2005 - The Service received a letter from FTA requesting initiation of a FWCA investigation.

September 2005 – The DLNR held a meeting and presented background information, timeframes and alternatives for the proposed LSBH project.

October 2005 – The Service provided DLNR with a Planning Aid Letter on the LSBH ferry pier improvement project and a Scope of Work for an associated FWCA investigation.

November 2005 – The Service provided DLNR with a concurrence letter on the key components of the Preliminary Draft EIS on the proposed project in accordance with the Memorandum of Understanding for the NEPA/CWA Integration Process for Surface Transportation Projects in the Sate of Hawaii.

December 2005 – Service, DAR, and BPBM staff conducted coral reef surveys at LSBH and Mala Wharf and discussed possible mitigation measures with the Lahaina harbor master.

February 2006 – The Service met with DLNR and LSBH project contractors to discuss preliminary results of a HEA performed on data collected in December 2005.

## DESCRIPTION OF THE PROJECT AREA

The Hawaiian Archipelago is located in the North Pacific Ocean, approximately 2,100 miles (mi) [3360 kilometers (km)] from California. Nineteen islands and atolls extending across a distance of 1,500 mi (2,400 km) comprise the Hawaiian Archipelago. The main islands are the eight high





islands at the southeastern end of the island chain. These islands are, from the northwest to southeast, Niihau, Kauai, Oahu, Molokai, Lānai, Kahoolawe, Maui and the Island of Hawaii. The proposed project area at Lahaina Small Boat Harbor is located at 156° 40' 39" W longitude and 20° 52' 20" N latitude.

Maui covers approximately 728 mi² (1185 km²). The island is a volcanic doublet, comprised of two connected volcanoes, Haleakala forming east Maui and Mauna Kahalauau forming west Maui. The highest elevation on Maui is the peak of Haleakala at 10,023 ft (3,050 m).

Due to oceanic influences, the sea level climate on Maui is remarkably stable, with temperatures generally ranging between 65° and 85° Fahrenheit (20 and 29° Centigrade). Rainfall is greater in the winter (November through April). However, because of the two volcanic mountains there is a wide range of climatic conditions depending on elevation and protection or exposure to the prevailing northeast tradewinds. The top of west Maui receives over 400 inches (in) (101.6 centimeters [cm]) of rainfall per year, whereas the coastal town of Kihei receives less than 10 in (25.4 cm) due to the rain shadow effect of Haleakala. Kahului airport has an average rainfall of about 19 in (48.3 cm), whereas Olinda, upslope from the airport, receives about 73 in (185 cm) of rain (2005, http://en.wikipedia.org/wiki/Maui).

Maui has an unusual weather feature known as the Maui vortex, an area of clear sky that often forms over Pukalani due to the swirling vortex of air as it enters the central valley after being forced around Haleakala. Maui, along with the other Hawaiian Islands, experiences a hurricane season in the late summer and fall. Tropical storms typically approach from the southeast (2005, http://en.wikipedia.org/wiki/Maui).

Lahaina Harbor is located in west Maui and is an ideal harbor site due to natural protection from the predominant tradewinds. Waters offshore of Lahaina are partially protected from both northern winter swells and southern summer swells by the islands of Lanai and Molokai. This results in a well-protected anchorage that was used by whaling ships in the early 1820s. A wharf was constructed at the site of the present pier in the early 1880s. A breakwater to protect the harbor basin was constructed in the 1950s, and the harbor basin and entrance channel were dredged beginning in the 1970s (Munekiyo and Hiraga, Inc. 2004).

**Coral Reef Resources**

Marine communities in Hawaii are comprised of thousands of plants and animals that are part of the greater coral reef ecosystem, which includes areas that may be dominated by live coral colonies, coralline algae, seagrass, macro-algae, and sand. Coral reefs are unique in that they are geological structures built by living communities. Coral polyps deposit calcium carbonate skeletons and grow upward as they continue to deposit new skeletal material from below. Many other organisms also deposit skeletons or shells on the reef. When corals or these other organisms die, their skeletal remains become part of the reef framework largely as a result of the cementing action of coralline algae. New corals settle on top of dead ones to continue the overall growth of the reef. Thus, the reef can be viewed as a thick framework of calcium carbonate rock covered with a fragile, thin veneer of life. The reef surface and underlying framework form an important complex of holes, tunnels, and elevated projections that provide a wide range of

shelter, foraging, and reproductive habitats for numerous species of fishes, invertebrates, and other organisms.

The most ubiquitous type of coral reef at Maui is the fringing reef. Fringing reefs are geologically young structures that extend a modest distance from the shoreline and represent the general growth pattern of the coral community around high tropical islands. The fringing reefs around Maui are relatively high-energy environments that have evolved to support complex communities of plants and animals.

Maui's fringing reefs are important because they provide extensive habitat that supports a wide variety of ecological functions. From a biological perspective, these functions include nesting and recruitment, foraging, resting, and sheltering from predators for highly diverse assemblages of species, including the federally listed threatened green sea turtle (*Chelonia mydas*) and endangered hawksbill sea turtle (*Eretmochelys imbricata*). Maintenance of coral reef habitats that support these ecological functions is dependent on protecting the thin, top layer of living coral, which requires clean, well-oxygenated, tropical seawater for maximum health. Although corals are fragile and can be broken by storm waves, healthy reefs can continually heal themselves from wave damage and other natural impacts.

Healthy fringing reefs provide other ecological functions such as buffering exposed coastal shorelines from strong oceanic swells and currents. They reduce and disperse storm wave energy over the reef flat, protecting shorelines from erosion. In turn, intact shorelines protect coastal vegetation and habitats for a wide variety of native terrestrial organisms, including sea turtles and migratory birds. Likewise, intact shorelines also help protect upland areas for human inhabitants.

Other ecological functions provided by healthy fringing reefs include the maintenance of intact marine communities in the near-shore environment that interact with pelagic or terrestrial species through complex predator, prey, or symbiotic relationships common in tropical ecosystems. Also, healthy coral reef resources directly benefit the residents of Maui by supporting human activities such as subsistence harvest/fishing, many recreational activities, tourism, and cultural practices.

Coral distribution is limited by numerous factors, including alteration of habitat, sedimentation, water quality, water temperature, predator outbreaks, and hurricanes. Dredging destroys entire coral colonies by direct removal. Sediment that becomes suspended in the water column from dredging activities or other factors may settle on coral polyps and smother them. Suspended sediment may also abrade or contaminate coral polyps and planktonic larvae and render them non-viable. Water quality is an important consideration for coral reefs.

Hawaiian coral reefs remain vulnerable to alien species, destructive fishing practices, marine debris, coastal runoff and sedimentation, ship groundings, marine recreation, urbanization and coastal development (Turgeon, et al. 2002). Elevated levels of nutrients (*e.g.*, phosphates or nitrates), petroleum products, or polychlorinated byphenyls (PCBs) may have lethal or sub-lethal affects upon coral communities. Sewage and leachate from unlined landfills are primary sources of chemical contamination that may degrade coral reef communities.





## FISH AND WILDLIFE RESOURCE CONCERNS AND PLANNING OBJECTIVES

With regard to the proposed project, the Service's primary concern is that endangered species and other fish and wildlife resources and their habitats may be adversely impacted from the discharge of fill materials in the marine environment. Specific Service planning objectives are to maintain and enhance the existing significant habitat values at the proposed project site by (1) obtaining basic biological data for the site, (2) evaluating and analyzing the impacts of proposed-project alternatives on fish and wildlife resources and their habitats, (3) identifying the proposed-project alternative least damaging to fish and wildlife resources, and (4) recommending mitigation measures that are protective of fish and wildlife resources that result in the avoidance of unnecessary impacts, minimization of unavoidable impacts, and compensation for unavoidable resource losses consistent with the FWCA and the Service's Mitigation Policy.

Under the authority of the Endangered Species Act (ESA), the Department of the Interior and the Department of Commerce share responsibility for the conservation, protection and recovery of federally listed endangered and threatened species. Authority to conduct consultations has been delegated by the Secretary of the Interior to the Director of the Service and by the Secretary of Commerce to the Assistant Administrator of the NOAA Fisheries Service. Section 7(a)(2) of the ESA requires Federal agencies, in consultation with and with the assistance of the Service or NOAA Fisheries Service, to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitats. The Biological Opinion is the document that states the opinion of the Service or NOAA Fisheries Service as to whether the Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

The Service's Mitigation Policy (Federal Register 1981) outlines internal guidance for evaluating impacts affecting fish and wildlife resources. The Mitigation Policy complements the Service's participation under the NEPA and the FWCA. The Service's Mitigation Policy was formulated with the intent of protecting and conserving the most important fish and wildlife resources while facilitating balanced development of this nation's natural resources. The policy focuses primarily on habitat values and identifies four resource categories and mitigation guidelines. The resource categories are the following:

a. Resource Category 1: Habitat to be impacted is of high value for the evaluation specie and is unique and irreplaceable on a national basis or in the ecoregion section.

b. Resource Category 2: Habitat to be impacted is of high value for the evaluation species and is relatively scarce or becoming scarce on a national basis or in the ecoregion section.

c. Resource Category 3: Habitat to be impacted is of high to medium value for the evaluation species and is relatively abundant on a national basis.

d. Resource Category 4: Habitat to be impacted is of medium to low value for the evaluation species.

The coral reef ecosystem fronting the project site at Lahaina comprises the habitat of major concern. Although corals are very small and sensitive organisms, healthy coral colonies are fundamentally important in providing the basic foundation for habitat that supports diverse communities of other highly specialized marine organisms. Corals contribute the bulk of the calcareous raw materials that form and maintain the basic structural framework of the reef. Coral colonies add significantly to the submarine topographic relief in which a large number of fish and invertebrate species find shelter and food. Coral polyps themselves are an important food source for some fishes and other marine life. The institutional significance of U.S. coral reefs has been established through their designation as Special Aquatic Sites under the Clean Water Act [40 CFR Part 230 §230.44/FR v.45 n.249] and as a Federal Trust Resource via Executive Order 13089 on Coral Reef Protection. Special Aquatic Sites possess special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values and contribute to the general overall environmental health or vitality of an entire ecosystem of a region.

Coral reefs are relatively scarce on a national basis and are currently in a world-wide state of decline (U.S. Coral Reef Task Force 2000; Waddell 2005). In the Main Hawaiian Islands, some coral reefs are subjected to relatively frequent adverse impacts from land-based sources of pollution, over-fishing, recreational overuse, and alien and invasive species, and the extent of healthy and productive coral reefs may be declining on a local basis (Turgeon et al. 2002; Friedlander et al. 2005). The Service considers the coral reef habitats within the proposed project site to be Resource Category 2 habitats. The Service's resource goal for Category 2 habitat is no net loss of in-kind habitat values. Under this designation, the Service will recommend ways to mitigate losses through measures to avoid or minimize significant adverse impacts. If losses are unavoidable, measures to immediately rectify, reduce, or eliminate losses over time by the replacement of in-kind habitat values will be recommended for incorporation as integral project features.

Corals, algae, invertebrates, seagrass, and reef fishes have been selected as the evaluation species for the reef habitats that may be affected by the proposed project. Selection of a diverse assemblage of organisms allows for a more complete snapshot of the baseline conditions prior to construction. This information is important in determining if on-site compensatory mitigation actually provides services similar to those lost from the construction.

## EVALUATION METHODOLOGY

### Marine Biological Assessment

A team that included scientists from the Service, Hawaii DAR and the BPBMconducted a marine biological assessment of the shallow reef environment at Lahaina Small Boat Harbor to evaluate potential impacts to fish and wildlife resources based on the proposed project design criteria. Observations of the distribution and relative abundance of reef fishes, corals, other macro-invertebrates, and algae were compiled. Global Positioning System (GPS) data were collected to identify the location of all survey transects.





Service ecologist Antonio Bentivoglio, BPBM scientist Holly Bolick, and DAR ecologists David Gulko and Ryan Okano conducted the marine survey work for this project during December 11-14, 2005. Mr. Bentivoglio collected marine fish and benthic substrate rugosity data, Ms. Bolick collected benthic macro-invertebrate data, Mr. Gulko collected coral data; and Mr. Okano collected data on algae and benthic substrate cover. All marine surveys were conducted between 8:00 am and 5:00 pm. Photographs for this report were supplied by all surveyors.

Data from a total of seven survey stations were collected to characterize the marine community at the proposed project site. Quantitative transects were used at all survey stations. Two 98 ft (25 m) transect lines were deployed per survey station. Deployment generally occurred end-to-end along the bottom, no more than 20 ft (5m) apart. Biologists swam the length of the transect tape collecting biological data. Rugosity was measured using a small-link chain laid over the substrate under the transect tape. To collect additional fish diversity data, random swims were conducted between the transect lines and after the timed transect swims were completed. All dive operations were conducted from shore. For more detailed descriptions of specific methods employed to collect data on fishes, algae, corals, and other invertebrates, see Appendix A.

### HEA: Quantitative Determination of Compensatory Mitigation

In a review of the application of compensatory mitigation for coral reef impacts resulting from federal projects in the Pacific (USFWS 2003), the Service concluded that federal agencies needed to improve their performance in implementing a successful mitigation process. As a result, the HEA methodology was used in the current project to improve the efficiency and effectiveness of mitigating project-related losses, specifically focusing on compensatory mitigation. HEA is a quantitative method used to determine the necessary amount of compensatory mitigation needed to offset project-related impacts. In 1991, HEA was developed (King and Adler 1991) as a methodology for scaling compensatory mitigation under section 404 of the Clean Water Act, and currently, it is used extensively in natural resource damage assessments conducted under the Oil Pollution Act of 1990 (33 U.S.C. 2701 *et seq.*).

Basically, HEA quantitatively scales compensatory mitigation so that the total quantity of ecological services the compensatory mitigation is anticipated to provide is sufficient to offset the total quantity of ecological services anticipated to be lost as a result of a proposed project. Ecological services have a temporal dimension as well as a spatial dimension (*e.g.*, a given area of coral habitat provides various beneficial services over a period of time). Therefore, projected impact-area information and biological data from the surveys are input into the HEA mathematical model and the output is in time-area units, in this case square foot-years.

The results of the field work conducted in this investigation characterize the "baseline" conditions at the proposed project site before the project-related impacts occur. These data and other quantitative data were used to produce three HEA models (one for each of the major habitat types: sand, pilings, and reef flat), and this information is presented in Appendix B. The HEA model applications were conducted by Bruce Peacock and Heather Goeddeke of the National Park Service. The biological inputs to the HEA models were extensively discussed between the biological assessment team and these experts prior to execution of the model applications.

## DESCRIPTION OF FISH AND WILDLIFE RESOURCES

GPS coordinates were collected for each survey transect station and these are presented in Table 1. Figure 1 shows the approximate location of the Lahaina survey stations at the LSBH in relation to the proposed dredge area. It is important to note that GPS accuracy at Lahaina was within 15 feet (4.6 m) of the exact location. Due to the small scale of the map in Figure 1, the survey lines are approximations. The complete biological results of the FWCA investigation are contained in this report (Tables 2-6). The percent (%) contributions of various types of substrate cover recorded on the LSBH transects are presented in Table 2. The marine macro-invertebrate diversities and densities recorded on the LSBH transects are presented in Tables 3 and 4. The coral diversity and density data are presented in Table 5. The fish diversity and biomass data are presented in Table 6.

### Existing Conditions at the Lahaina Small Boat Harbor

Terrestrial

Currently, there is no proposed work that will occur on land. Therefore, impacts to terrestrial animals, plants or habitat are not expected at the project site.

Marine

The inner harbor shoreline is a concrete seawall that continues north of the harbor and protects most of the town. The waters off West Maui are relatively calm and buffered from most ocean swells (except south and southwest swells) due to the protection provided by the surrounding islands of Molokai, Lanai and Kahoolawe. The near-shore bottom consists primarily of hard consolidated, coralline reef pavement interspersed with sand pockets, coral colonies, and terrestrial sediment. Prevailing coastal currents in the Lahaina area are largely influenced by tides, with currents generally parallel to shore. The Lahaina harbor channel appears to provide a pathway for the outflow of nearshore water (AECOS 2005; EKNA Services 2005).

The reefs on the north and south sides of the harbor are about 1,000 ft (304 m) wide and shallow. Waves that break over these shallow reefs drive water across the reef towards areas of least resistance resulting in a general flow out to sea through the deeper entrance channel. The currents move sand, which is then carried to offshore areas through the channel. However, stagnant areas near the channel can serve as sediment traps, thus, necessitating the need for maintenance dredging (AECOS 2005; Mitsunaga Services 2005).

Benthic substrate data are presented in Table 2. A total of 38 species of marine plants (Table 2), 50 species of benthic macro-invertebrates (Table 3), 11 species of corals (Table 5), and 52 species of reef fishes were observed and recorded (Table 6). Federally threatened green (*Chelonia mydas*) and endangered hawksbill (*Eretmochelys imbricata*) sea turtles are known to exist in Hawaii and three green sea turtles were observed swimming during the LSBH site surveys. Green sea turtles are known to forage on the reef flats surrounding the LSBH.





### Survey Station Results

At the time the marine surveys at LSBH began, the steel-hulled German freighter named Carthaginian II, was moored at the LSBH within the proposed project area. This vessel was secured with lines and anchors that bisected survey station 1 and survey notes reflect this. Three days after the survey began, the Carthaginian II was towed to deeper water and sunk to create an artificial reef and dive site. Surveys conducted in the area that was crossed by the vessels mooring lines were done after the vessel was moved out of the harbor.

**Survey Station 1: North of the existing pier, in the turning basin adjacent to the former anchoring site of the Carthaginian II.** This survey station consisted of sand that had filled in the channel since the last maintenance dredging occurred (estimated to be in the 1970s). Water depth varied from 2 to 3 m at the furthest seaward point. Benthic substrate cover was 98% sand 1.5% turf algae and 0.5% macro-algae; and rugosity was 10, indicating that the substrate was flat. **Algae:** Seven species of algae were observed, all of which were in very small amounts. **Corals:** No significant coral numbers or growth forms were seen on the transects. **Invertebrates:** One species of hermit crab was seen on the transects. A total of 5 species, including banded shrimp, rock crabs, sponges and hydroids, were seen living near and growing on the boat and the mooring lines. **Fish:** Few fishes were seen at this site. Fish that were present included: band-tail goatfish (*Upeneus arge*), blue-spotted cornetfish (*Fistularia commersoni*) and peacock flounder (*Bothus mancus*). Total fish biomass was 0.01 tons per hectare, and the total number of observed fish species was 6.

**Survey Station 2: North of the existing pier, on the reef flat adjacent to the former anchoring site of the Carthaginian II.** This station consisted of hard calcium carbonate substrate colonized by coral, algae, invertebrates and fish typical of the shallow reef flat around LSBH. Water depth varied from 2 to 3 m at the farthest seaward point. Benthic substrate cover was 40% macro-algae, 21% turf algae, 18% sand, 8% alien algae, 7% crustose coralline algae, 3% coral, and 3% sponge; and rugosity was 8.9, indicating a modest level of substrate complexity. **Algae:** 17 species of algae were observed, the dominant algae were *Amphiroa* sp., *Tolypiocladia glomerulata* and *Halimeda discoidea*. **Corals:** Six species of coral were observed, with the four largest colonies ranging over 160 cm in diameter. Mean frequency of coral colonies was 3.425 colonies per $m^2$. The most common coral species were *Montipora capitata* and *M. patula*. **Invertebrates:** The invertebrates were mostly echinoderms and mollusks. Five species of trapezid crab were seen in the *Pocillopora* coral heads. **Fish:** A moderate number of fishes were seen at this station. Fish that were present included: band-tail goatfish, Christmas wrasse (*Thalassoma trilobatum*), surgeonfishes (*Acathurus nigroris*, *A. nigrofuscus*, *A. olivaceus*, and *A. triostegus*), and lagoon triggerfish (*Rhinecanthus aculeatus*). Total fish biomass was 0.07 tons per hectare, and total number of observed fish species was 18.

**Survey Station 3: North and west of the breakwater and continuing from where Survey Station 1 ended.** This station consisted of sand that had filled in the channel since the last maintenance dredging had occurred. Water depth varied from 3 to 4 m at the farthest seaward point. Benthic substrate cover was 100% sand and rugosity was 10 indicating that the substrate was flat. **Algae:** Only *Amasia glomerata* was seen on the transects. **Corals:** No significant corals were seen on the transects. **Invertebrates:** Although there were not any visible

invertebrates, there were many burrows, indicating the presence of a fairly substantial benthic infauna. **Fish:** No fish were seen at this station, therefore, total fish biomass was 0.0.

**Survey Station 4: West of the breakwater and continuing from where Survey Station 3 ended.** This station consisted of sand that had filled in the channel since the last dredging had occurred. Water depth varied from 4 to 5 m at the farthest seaward point. Benthic substrate cover was 96% sand, 3% turf algae, and 1% macro-algae; and rugosity was 10, indicating that the substrate was flat. **Algae:** A total of seven alga species were observed, including *Amasia glomerata* and *Spyridia filamentosa*. **Corals:** No significant numbers of corals were seen on the transects. **Invertebrates:** There were far fewer burrows observed here than at survey station 3. There were a total of four species, including a few hermit crabs and brittle stars on the reef edge. **Fish:** Very few fish species were seen at this site. Fish species that were present included Hawaiian humbugs (*Dascyllus albisella*), saddle wrasse (*Thalassoma duperrey*) and reef triggerfish (*Rhinecanthus rectangulus*). Total fish biomass was 0.02 tons per hectare, and total number of observed fish species was 6.

**Survey Station 5: Adjacent and parallel to Survey Station 4 but on the reef flat.** This station consisted of hard carbonate substrate colonized by coral, algae, invertebrates and fish. Water depth varied from 3 to 4 m at the farthest seaward point. Benthic substrate cover was 34% turf algae, 30% macro-algae, 21% coral, 11% crustose coralline algae, 3% sand, and 1% sponge; and rugosity was 8.7, indicating a modest level of benthic complexity. **Algae:** A total of 23 species of algae were observed, including *A. glomerata*, *H. discodea*, *Gelid* sp., *T. glomerulata*. **Corals:** A total of 9 species of coral were observed. The mean number of coral colonies per transect was 233 (the largest number observed during the surveys), and the resulting mean frequency of coral colonies was 23.275 colonies per $m^2$. The largest colony sizes ranged between 80 and 160 cm in diameter. The most common coral species was *M. capitata* followed by *Pocillopora eydouxi*. **Invertebrates:** This was an invertebrate rich area with polychaetes, gastropods, zoanthids, hermit crabs, hydroids, sea urchins, and sea cucumbers. Trapezid crabs were observed in the dominant *Pocillopora* coral heads. There was a total of 23 species of macro-invertebrates at this station. **Fish:** There was a wide variety of fishes at this station. Fish present included Hawaiian orbicular velvetfishes (*Caracanthus typicus*), arc-eye hawkfishes (*Paracirrhites arcatus*), blue-eye damselfishes (*Plectroglyphidodon johnstonianus*), wrasses (*Gomphosus varius* and *T. duperrey*), surgeonfishes (*A. nigroris* and *A. olivaceus*), and reef triggerfish (*R. rectangulus*). Total fish biomass was 0.40 tons per hectare, and the total number of observed fish species was 27.

**Survey Station 6: On the south side of the channel on the reef flat adjacent to the harbor rock revetment.** This station consisted of hard carbonate substrate colonized by coral, algae, invertebrates and fish. Water depth varied from 2 to 3 m. Benthic substrate cover was 39% coral, 33% turf algae, 11% sand, 11% crustose coralline algae, and 6% macro-algae; and rugosity was 7.25, indicating a high level of substrate complexity. **Algae:** 18 species of algae were observed, including *A. glomerata*, *Amphiroa* sp. and *T. glomerulata*. **Corals:** This station was second only to survey station 5 with regard to the richness and abundance of coral, with a total of 7 species of coral and the zoanthid *Palythoa* sp observed. The 6 largest coral colonies (all *Montipora* sp.) ranged over 160 cm in diameter. Mean frequency of coral colonies was 14.675 colonies per $m^2$. The most common coral species were *M. capitata* and *M. patula*.





**Invertebrates:** This area was also relatively invertebrate-rich. A total of 21 species were seen at this station, including polychaetes, zoanthids, gastropods, bivalves and hermit crabs, sea urchins, and sea stars. **Fish:** There was a wide variety of fishes at this site. Fish present included goatfishes (*Mulloidichthys vanicolensis* and *Parupeneus bifasciatus*), wrasses (*G. varius* and *T. duperrey*), surgeonfishes (*A. nigrofuscus*, *A. nigroris* and *A. olivaceus*), and the Hawaiian spotted puffer (*Canthigaster jactator*). Total fish biomass was 0.62 tons per hectare, and the total number of observed fish species was 26.

**Survey Station 7: On the reef flat adjacent to where the Carthaginian was anchored and near Survey Stations 1 and 2.** This station consisted of hard carbonate substrate colonized by coral, algae, invertebrates and fish. Benthic substrate cover was 52% macro-algae, 17% sand, 12% alien algae, 11% turf algae, 4% coralline crustose algae, 3% coral, and 1% sponge; and rugosity was 8.85, indicating modest benthic complexity. **Algae:** A total of 18 species of algae were observed including *Amphiroa* sp., *Gelid* sp., *H. discodea*, *Jania* sp., *Laurencia* sp., and *T. glomerulata*. **Corals:** A total of 5 species of coral observed, with one colony ranging above 160 cm in diameter. Mean frequency of coral colonies was 1.75 colonies per $m^2$. The most common coral species was *M. capitata* followed by *M. patula*. **Invertebrates:** There were scattered invertebrates consisting mostly of boring sea urchins and small hermit crabs, with other gastropods, spaghetti worms, and banded shrimp present. There was a total of 8 species. **Fish:** There was a moderate number of fish species at this site. Fish present included: Hawaiian sargeants (*Abudefduf abdominalis*), wrasses (*Thalassoma trilobatum* and *T. duperrey*), surgeonfishes (*A. nigrofuscus* and *A. triostegus*), and the lagoon triggerfish (*R. aculeatus*). Total fish biomass was 0.02 tons per hectare, and the total number of observed fish species was 15.

**Future Without the Project**

It is likely that boat traffic will stay static or continue to slowly increase at LSBH with or without the proposed project. Lahaina Small Boat Harbor is currently the busiest small boat harbor in Hawaii. Without the proposed project, the potential for collisions, oil spills and vessel groundings would be expected to increase as boat traffic increases. A small amount (2,720 $ft^2$, 253 $m^2$) of reef flat would not be removed and dredging would not occur in the near future.

## DESCRIPTION OF ALTERNATIVES EVALUATED

Alternative 1a. Sheet Pile and Fill at LSBH

This proposed project alternative involves construction of a new ferry pier adjacent to the existing pier at LSBH. A concrete walkway would connect the existing pier to the new pier or to the shoreline. The new pier would be constructed of sheet pile and fill. The area surrounding the new pier and portions of the entrance channel would be dredged. A two-story building would be constructed on the pier to accommodate office and concessions space, public restrooms, and a wrap-around deck. The HEA model was applied to this alternative.

Alternative 1b. Pilings at LSBH

This alternative includes placement of the new pier on concrete pilings. The area surrounding the new pier and portions of the entrance channel would be dredged. The pier would either be secured on top of the pilings or the deck would be constructed out of a molded composite that would float between and be secured by the pilings. The HEA model was applied to this alternative.

Alternative 2: New Pier at Mala Wharf

This alternative includes construction of a new pier at Mala Wharf, which is located one mile north of LSBH. The wharf was constructed in 1922. It is a deep-water docking facility that originally extended approximately 950 ft (290 m) from shore. However, the design failed to protect the wharf from strong currents and high swells, which made docking at the facility hazardous. Shortly after it was built, the wharf was declared unsafe. Existing facilities at Mala Wharf include a boat launching ramp with a protected breakwater, a boat wash-down area, unmarked paved parking area for approximately 34 vehicles, and a comfort station. Currently, the wharf is in serious disrepair and major portions of the wharf are missing or badly damaged. The wharf is currently condemned and gated to prevent public entry. If this alternative is selected, the following would occur: removal of the existing wharf, construction of a concrete walkway and pier, construction of a ferry terminal building and waiting area, construction of offsite parking areas and repavement of an existing parking area, construction of a sewer pump to the new pier, construction of a new individual wastewater system, and extended utility services to the new pier. Since Mala Wharf area is not protected from wave action, a breakwater would have to be constructed so the pier could be used during severe weather conditions. Alternatively, during severe weather conditions, ferry services would be cancelled or relocated to the existing LSBH. The HEA model was not applied to this alternative because no specific construction designs were provided.

Alternative 3: Pier Repair at Ke Kaa Point

Ke Kaa Point is located approximately 4 miles north of Lahaina. An existing pier at the site was constructed around the turn of the century, and it served as the main shipping point for Pioneer Mill's sugar. The pier is located next to Black Rock, a prominent historic Hawaiian site. Ke Ka'a Point is the present location of the Sheraton Maui Resort. If this alternative is selected the following would occur: development of secure public access, extensive repairs of the existing pier, construction of a ferry terminal building and waiting area, installation of pedestrian bridges across existing drainage ditches, and construction of a new parking structure and comfort station. The pier is not protected from wave action and a breakwater would have to be constructed so the pier could be used during severe weather conditions. The HEA model was not applied to this alternative because no specific construction designs were provided.

Alternative 4: No Action

No activities would be undertaken to address harbor congestion and loading and offloading delays. No resources would be lost and no compensatory mitigation would be required. Without





the proposed project, the potential for vessel collisions, oil spills and groundings would be expected to increase as boat traffic increases.

## PROJECT IMPACTS

### Terrestrial

Alternative 1a: The construction footprint will be in the water. The current shoreline in the LSBH and surrounding area is cement or large boulders. Therefore, there are not expected to be any terrestrial impacts from the proposed project.

Alternative 1b: The construction footprint will be in the water. The current shoreline in the LSBH and surrounding area is cement or large boulders. Therefore, there are not expected to be any terrestrial impacts from the proposed project.

Alternative 2: Most of the construction footprint will be in the water. Currently one side of the shoreline at Mala Wharf is a sand beach and the other is a hardened breakwater. Most of the terrestrial construction will improve existing parking facilities around Mala Wharf.

Alternative 3: Most of the construction footprint will be in the water. Terrestrial impacts would consist of the construction of a parking facility with a comfort station and pedestrian walkways over existing drainage ditches. Minimal impacts may occur to terrestrial species.

### Marine

All alternatives currently under consideration are anticipated to result in direct and secondary adverse impacts to marine fish and wildlife resources due to project construction-related activities. These impacts include the direct loss of coral reef resources (including corals, coralline algae, macro-algae, invertebrates) and sand habitat from dredging operations and pier construction and the indirect effects of sedimentation. Coralline algae offer settlement opportunities for coral larvae and stabilize or cement physical reef structures. Coral colonies provide food, shelter and recruitment opportunities for a wide variety of vertebrate and invertebrate species. Certain species of macro-algae found at LSBH serve as food items for sea turtles. Therefore, adverse impacts to coral, coralline algae, and macro-algae may lead to the degradation of the reef and its potential to support certain existing functions such as the provision for foraging habitat for sea turtles, maintenance for coral reef replenishment; provision of habitat for general marine species recruitment, foraging, nesting, and sheltering from predators, as well as foraging habitat for migratory birds. Since the new construction at LSBH will be adjacent to the existing harbor, it is not anticipated that the new construction will affect longshore currents.

Also, construction-related activities will mobilize sediment that may migrate, abrade, settle on, and smother corals, coralline algae, and macro-algae. Corals are particularly vulnerable to suspended sediment, which may inhibit successful reproduction and settlement of larvae, lacerate larval tissue, and result in other lethal affects. The suspension of sediment during project

construction activities may result in the temporary degradation of water quality, which may reduce the ability of the coral reef ecosystem to support certain functions such as foraging by sea turtles, coral replenishment, and general marine species recruitment, foraging, nesting, and sheltering from predators. However, appropriate mitigation could be implemented for construction of a new pier at LSBH.

Alternative 1a: Sheet Pile and Fill at LSBH

This alternative would involve construction of a new ferry pier that is 45 feet wide and 120 feet long in the LSBH. A concrete walkway 12 feet wide and 60 feet long would connect the existing pier to the new pier or to the shoreline. The new pier would be constructed of sheet pile with fill and would cover 5,400 ft²). The area surrounding the new pier and portions of the entrance channel would be dredged. Maintenance dredging would cover 17,040 t²f and new dredging would cover 3,920 ft² (20,960 t²f total). Total project impacts would be 26,360 ft².

The following assumptions were made for Alternative 1a and input into the HEA model applications (Appendix C):

Impacts to Reef Flat: 2,720 ft² of reef flat are expected to be permanently removed and changed to sand. Secondary impacts caused by sedimentation from dredging activities are estimated to impact a 10-ft-wide area along the north side (reef flat side) of the channel (total area of band is 950 ft²). This 10-ft-wide area is an estimate based on conversations with construction experts and expected dredging techniques (Darren Mingle, pers. comm. February 14, 2006). Coral reef resources within this area are expected to be reduced to 80% of the baseline services based on expected dredging techniques and expert opinion (Dave Gulko, pers. comm.). Impacts will be greatest next to the dredging activities and decrease outward. Recovery within the band to 100% of the baseline services is expected to take 15 years (D. Gulko, pers. comm.). Net Loss to Reef Flat: 89,281 ft² years.

Impact to Sand: The sheet pile and fill would cover and cause the permanent loss of 5,020 ft² of sand habitat. The dredging would remove sand covering 17,040 ft². Maintenance dredging of this area is expected to occur every 10 years. The dredged reef flat would change to sand, thereby adding 2,720 ft² of new sand habitat. The sand community is expected to return to 100% of lost resource services within 6 months after dredging has stopped (Julie Brock pers. comm.). Net Loss to Sand: 166,155 ft² years.

Impacts to Cement Piling Community: 14 pilings (24-in diameter) and their associated reef communities would be removed and replaced by sheet pile. It is not expected that organisms would grow on the new metal sheet pile. Net Loss to Cement Piling Community: 17,080 ft² years.

Alternative 1b: Pilings at LSBH

This alternative involves placement of a new pier on concrete pilings. Each piling would impact 3.14 ft², and 100 pilings would be required, thereby impacting 314 ft² of sand. Maintenance





dredging of sand would cover 21,100 ft² and new dredging of reef flat would cover 2,720 ft² (23,820 ft² total). Total project impacts would be 24,134 ft².

The following assumptions were made for Alternative 1b and were input into the HEA model applications (Appendix C).

Impacts to Reef Flat: 2,720 ft² of reef flat are expected to be permanently removed and changed to sand. Secondary impacts caused by sedimentation from dredging activities are estimated to impact a 10-ft-wide band along the north side (coral reef side) of the channel (total area of band is 950 ft²). Coral reef resources in this 10-ft-wide band are expected to be reduced to 80% of the baseline services. Recovery within the band to 100% of the baseline services is expected to take 15 years. Net Loss to Reef Flat: 89,281 ft² years.

Impacts to Sand: Dredging would remove sand covering 21,100 ft². A total of 100 new pilings would replace 14 old pilings. The diameter of each piling is 24 in. Therefore, 270 t²f of sand habitat would be lost due to the installation of 84 new piles. Total affected dredged sand habitat will be 20,830 ft². Dredging of this area is expected to occur every 10 years. The dredged reef flat will change to sand, thereby adding 2,720 ft² of new sand habitat. The sand community is expected to return to 100% of lost baseline resource services within 6 months after dredging has stopped. Net Loss to Sand: 116,845 ft² years.

Impacts to Concrete Piling Community: 14 concrete pilings would be removed. Each piling has a diameter of 24 in. A biological community was found growing within a six-foot vertical section of the pilings, delineated on the top of the pilings by the low tide and wave action and on the bottom by sediment impacts. Therefore, 528 ft² of piling community would be removed. A total of 100 new concrete pilings (each 24 in diameter) will create 3770 ft² of new habitat. This habitat should achieve 100% of lost baseline services in 30 years (Dave Gulko pers. comm.). Net Gain to Cement Piling Community: 60,309 ft² years.

Alternative 2: New Pier at Mala Wharf

No proposed designs were provided for construction at Mala Wharf, however, some general observations on impacts were provided in the Site Location and Design Alternatives document (Munekiyo and Hiraga, Inc., 2005). This document identifies the need to remove the existing derelict pier and dredge a turning basin and entrance channel. No estimates of the area to be impacted are available. The coral reef resources at Mala Wharf are extensive. The DLNR estimated that directly underneath the existing pier, coral cover is less than 10% however, immediately adjacent and extending along the coast line, coral cover increases to 80-90% (Munekiyo and Hiraga Inc., 2005). It is expected that direct and indirect impacts to marine resources would be significant although additional information would need to be collected in order to fully evaluate possible impacts. The HEA model was not applied to this alternative because no proposed project impact estimates were available.

Alternative 3: Pier Repair at Ke Ka'a Point

No proposed designs were provided for construction at Ke Ka'a Point, however, some general observations on impacts were provided in the Site Location and Design Alternatives document (Munekiyo and Hiraga, Inc., 2005). This document identifies the need to remove the existing pier, dredge a turning basin and entrance channel and build a breakwater 550 ft long. Existing marine conditions include a rocky shoreline next to the existing pier that quickly drops off to a sandy bottom. Live coral cover is less than 10% near the existing pier and hard pavement type substrate along the north edge of the pier has approximately 10-15% coral cover (Munekiyo and Hiraga Inc., 2005). Not enough information is provided to fully evaluate the impacts of this alternative on the marine environment. The HEA model was not applied to this alternative because no proposed project impact estimates were available.

In summary, we anticipate that a small amount of coral reef resources and associated ecological functions would be lost or diminished as a result of project-related construction and dredging activities. This may be partly offset by the addition of hard substrate (sheet pile or pilings) and by implementation of the compensatory mitigation actions proposed below. Adverse impacts to the terrestrial environment are not expected to be significant.

## FISH AND WILDLIFE SERVICE RECOMMENDATIONS

The Service shares jurisdiction with the NMFS over federally listed threatened green sea turtles and endangered hawksbill sea turtles. The Service has lead jurisdiction over these species when they are on shore, and the NMFS has lead jurisdiction over these species when they are in the ocean. Based on information from the Hawaii DAR, sea turtles are not currently known to nest at the proposed project site. However, they are abundant in the waters surrounding the LSBH, and they use this area for foraging and resting. Therefore, the Service recommends that the FTA consult with NMFS regarding potential project-related effects to sea turtles.

### Compensatory Mitigation

As stated earlier, HEA modeling assesses information regarding the amount of impacts and scales the compensatory mitigation to offset these impacts. Impacts to the marine environment can sometimes be reduced by design features of the proposed construction, and therefore, reduce the amount of compensatory mitigation necessary to offset the impacts (e.g. Alternative 1b: Pilings at LSBH would have a net increase of 84 pilings, thus increasing the availability of this habitat). The HEA model was applied to three habitat areas (sand, piling, and reef flat) for alternatives 1a and 1b. The results of each application describes the losses or gains and, if appropriate, the recommended compensatory mitigation for the three different habitats modeled.

Sand

In both alternatives 1a and 1b, 2,720 ft² of reef flat would be dredged and replaced by sand habitat. For Alternative 1a, taking into account the sand habitat lost due to the sheet pile and fill (5,020 ft²) and the maintenance dredging of 17,040 ft² every 10 years, there would be a net loss of 166,155 ft² years of sand habitat. However, for Alternative 1b, taking into account the sand habitat lost due to the installation of 100 piles (270 ft²) and the maintenance dredging of 20,830





ft² every 10 years, there would be a net loss of 33,953 ft² years of sand habitat. Alternative 1b reduces the impacts to the sand by 132,202 ft² years. Recently dredged sand habitat is thought to be repopulated on a relatively short time scale. In general, within six months to one year, newly created sand should provide close to 100% of the baseline services provided prior to being dredged (Dr. Julie Brock, pers. comm.). Due to the apparent quick recovery time for sand habitats, if this alternative is selected, no additional compensatory mitigation would be required to offset the loss of sand habitat.

Pilings

In both alternatives 1a and 1b, the 14 existing cement pilings and associated community would be removed, affecting 528 ft² of this habitat type. In Alternative 1a, the new pier (45ft x 120ft) would be constructed of metal sheet pile and fill, producing 32,400 ft² of surface area. Based on discussions with experts, this area is not expected to provide any ecological benefits to offset the loss of the cement piling community. Therefore, there would be a net loss of 17,080 ft² years of this habitat. In Alternative 1b, 100 new cement pilings would provide 3,770 ft² of new habitat. Based on expert opinion, these new pilings would provide 100% of cement piling community services in 30 years. This results in a net gain of 60,309 ft² years for the cement piling community.

Reef Flat

In both alternatives 1a and 1b, 2,720 ft² of reef flat community would be permanently removed. No proposed project designs would produce in-kind habitat, therefore, compensatory mitigation is recommended. If appropriately implemented and managed, one compensatory mitigation scenario could offset the construction-related impacts. On October 31, 2004, a single-masted vessel, the "Dolphin," ran aground a few hundred yards north of LSBH. Total estimated damage from the grounding covers approximately 4,100 ft² and 100% of the ecological services in the affected area were lost. The Dolphin is still fast aground. The following parameters were used to determine whether removal of the vessel and restoration of the grounding scar would offset the construction-related losses. Once the Dolphin is removed and the scar is cleared of loose rubble, all corals and invertebrates from the 2,720 ft² area to be dredged would be transplanted to the grounding scar. Coral mortality is expected to be 30% over the first year, but coral recruitment and growth of the transplanted invertebrates are expected to return the scar to 100% of services in 35 years, which is the maximum estimated age of corals in the area to be dredged. If these assumptions are met, the mitigation site would provide a net gain of 15,742 ft² years of reef flat habitat. Therefore, the Service recommends the removal of the vessel and restoration of the grounding scar as compensatory mitigation for the project-related loss of 2,720 ft² of reef flat. For both alternatives 1a and 1b, we recommend that corals and other invertebrates be transplanted from the area to be dredged to the grounding scar and that this area be managed to provide for the long-term survival of resources at this mitigation site. Based on the results of HEA model applications, Alternative 1b would offset more of the construction-related impacts to sand, piling, and reef flat habitat than would Alternative 1a.

| Comparison of Project-Related Habitat Impacts for Alternatives 1a and 1b | | |
|---|---|---|
| **Habitat** | **Alternative 1a: Sheet Pile and Fill** | **Alternative 1b: Pilings** |
| Sand | Loss of 166,155 ft² years | Loss of 33,952 ft² years |
| Piling | Loss of 17,080 ft² years | Gain of 60,309 ft² year |
| Reef Flat | Gain of 15,742 ft² years | Gain of 15,742 ft² years |

**Ensuring Success of Implemented Compensatory Mitigation**

Based on the recent past, the effectiveness of compensatory mitigation to offset proposed project-related impacts to coral reefs from federally permitted or funded projects is below 50% (U.S. Fish and Wildlife Service, 2003). We have recommended the following structured process to increase the effectiveness of compensatory mitigation: (1) Document the anticipated area of impact; (2) Assess the resources anticipated to be impacted; (3) Correlate the anticipated impacts with the compensatory mitigation; (4) Scientifically monitor the compensatory mitigation; (5) Establish performance standards; and (6) Determine the effectiveness of implemented compensatory mitigation with long-term monitoring (Service 2003). Recent Corps guidance has provided a more structured compensatory mitigation process that is intended to produce compensatory mitigation projects that more effectively replace permanently lost coral reef resources from project-related impacts. This guidance is found in the following documents: Regulatory Guidance Letter 02-2 Subject: Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 (RGL 02-2); the Corps Memorandum to the Field entitled, Model Compensatory Mitigation Plan Checklist for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 4004 of the Clean Water Act and Section 10 of the Rivers and Harbors Act (Corps 2004) and Public Notice 200400448, Special Public Notice: Honolulu District Compensatory Mitigation and Monitoring Guidelines (Corps 2005). The Corps requires a mitigation plan be submitted as part of the supporting documentation for the permit application process (PN 200400048) and, therefore, a mitigation plan should be completed prior to construction.

This draft FWCA report addresses the first three steps of the structured process outlined above (Service 2003). We recommend that steps 4-6 of the structured process be detailed in a written Compensatory Mitigation Plan (also required by the Corps) that is completed before construction begins and is coordinated with the involved agencies (Service, DLNR, NOAA, FTA and EPA). The completion of these steps will increase the likelihood that the implemented compensatory mitigation will effectively offset the anticipated project-related impacts to the marine community. We recommend that the following be included as part of the Compensatory Mitigation Plan.

**Scientific Monitoring of Compensatory Mitigation**

The Service recommends that a post-construction assessment of the marine environment in the vicinity of the LSBH project be conducted. The marine assessment should evaluate the coral reef community in the vicinity of the dredging operation to ensure that the primary and secondary project-related impacts occurred as anticipated during the planning phase of this project. Post construction surveys are important because they provide information on whether





actual project-related impacts are greater or less than the anticipated project-related impacts. If there are appreciable differences, the compensatory mitigation can be recalculated so that it is appropriately scaled to the actual project-related impacts.

We recommend that valid scientific methods be used to monitor compensatory mitigation actions. Monitoring of compensatory mitigation sites can show whether the anticipated recovery trajectory is actually occurring and this allows for adaptive management of mitigation sites to manage recovery if significant factors arise (*e.g.*, algal invasions, high mortality of transplanted corals, ongoing damage to transplanted corals by loose rubble from the grounding etc.).

**Performance Standards for Compensatory Mitigation**

The Service recommends that:

(1) Monitoring be implemented and confirmation be obtained to show that the transplanted corals are surviving above the 70% level.

(2) Monitoring be implemented and confirmation be obtained to show that new coral recruits have settled in the mitigation site at densities that mirror the environment outside the mitigation site.

(3) Long-term monitoring be implemented and confirmation be obtained to show that the mitigation site has replaced the services lost as a result of project-related impacts.

**Effectiveness of Implemented Compensatory Mitigation**

The Service recommends that:

(1) Long-term monitoring occur (for a total period of 35 years) at frequent enough intervals to ensure that if the mitigation site is not proceeding along the expected recovery trajectory, management decisions can be made to improve the mitigation site.

(2) An adaptive management plan be written and approved by all parties involved.

(3) Financial assurances are obtained to ensure that the compensatory mitigation project is implemented.

**Best Management Practices: Impact Avoidance and Minimization**

The Service recommends that the following measures be incorporated into the project to minimize the degradation of water quality and impacts to fish and wildlife resources:

(1) Turbidity and siltation from project-related work shall be minimized and contained to within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions;

(2) Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods. The most abundant corals at Lahaina were *Montipora*. This coral spawns around the new moon in June and July. Dredging activities should not occur the week before and the week after the new moon in June and July (D. Gulko, pers. comm. 3/17/06).

3) Dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss to special aquatic site (i.e., coral reef) habitats and the unavoidable loss of such habitat shall be compensated for;

(4) All project-related materials and equipment (dredges, barges, backhoes etc) to be placed in the water shall be cleaned of pollutants prior to use;

(5) No project-related materials (fill, revetment rock, pipe etc.) should be stockpiled in the water (intertidal zones, reef flats etc.);

(6) All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site;

(7) No contamination (trash or debris disposal, alien species introductions etc.) of adjacent marine/aquatic environments (reef flats, channels, open ocean etc.) shall result from project-related activities; and

(8) Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases.

## SUMMARY OF FISH AND WILDLIFE SERVICE POSITION

The reef flats protecting Lahaina, Maui, have been identified as the habitat of major concern for the proposed project. Coral reef ecosystem organisms (*e.g.*, reef fishes, corals, macro-invertebrates, algae, sea turtles, and migratory birds) that occur at these locations provide a set of ecological functions. The institutional significance of U.S. coral reefs has been established through their designation as Special Aquatic Sites [40 CFR Part 230 §230.44/FR v.45n.249] and as a Federal Trust Resource [Executive Order (E.O.) 13089]. To various degrees, the reef flats around Lahaina provide habitat that promote specialized ecological functions, which include species recruitment, foraging, nesting, and sheltering from predators and habitat for the federally listed green and hawksbill sea turtles. Reef flats support other ecological functions by providing shoreline protection from oceanic swells and storm events; significant sources of larvae/juveniles to promote species replenishment; prey items for federally protected migratory birds; and opportunities for human activities such as subsistence harvest/fishing, recreation, tourism and cultural practices.

The reef flats and adjacent sand communities may be negatively impacted due to implementation of the proposed project. The HEA model applications provide a quantitative analysis of project-related impacts and provide scaled compensatory mitigation actions to offset these impacts. Recent Corps guidance: RGL 02-2, PN 200400448 and the 2005 Memorandum to the Field provide a decisional and management framework to increase the likelihood that implemented compensatory mitigation offsets project-related impacts to coral reef resources. The Service





recommends that the project proponent develop a compensatory mitigation plan that addresses potential project impacts identified in this report. To assist in the development of this plan, we have provided a set of activities that could be implemented to minimize adverse impacts and compensate for lost habitat and ecological functions as a result of the proposed project.

From a resource conservation perspective, the selection of Alternative 1b, the new pier on cement pilings option, would result in the least amount of anticipated adverse impacts to fish and wildlife resources. The Service maintains that implementation of the proposed project including the conservation recommendations and compensatory mitigation in this report would minimize unavoidable impacts and avoid unnecessary impacts to biological resources. Any changes to the proposed project plan or to the recommendations in this report will require additional coordination with the Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii.

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Table 1. Global Position System Data for seven survey sites at Lahaina, Maui, Hawaii, December 11-14, 2005.

| Transect # | To: | Latitude | Longitude | From: | Latitude | Longitude | Date |
|---|---|---|---|---|---|---|---|
| 1 | | 20.872048 | -156.679412 | | 20.872248 | -156.67894 | 12/11/2005 |
| 2 | | 20.872334 | -156.678911 | | 20.872314 | -156.67936 | 12/11/2005 |
| 3 | | 20.872001 | -156.67944 | | 20.871668 | -156.67977 | 12/12/2005 |
| 4 | | 20.871553 | -156.679931 | | 20.871245 | -156.68031 | 12/12/2005 |
| 5 | | 20.87133 | -156.680335 | | 20.871638 | -156.68009 | 12/12/2005 |
| 6 | | 20.871659 | -156.679363 | | 20.871341 | -156.67968 | 12/12/2005 |
| 7 | | 20.872293 | -156.679306 | | 20.87221 | -156.67953 | 12/14/2005 |

Note: Data collected in UTM Zone 4, WGS 84

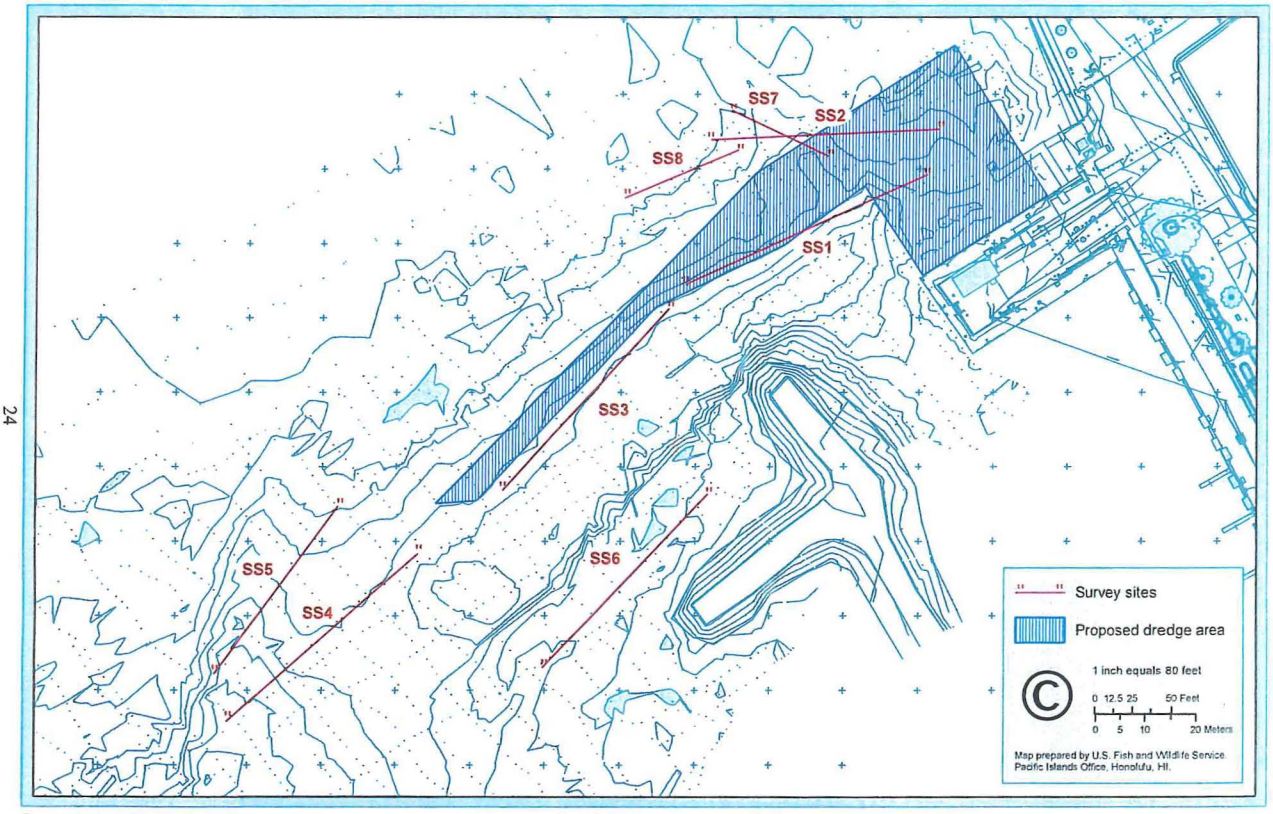



Figure 1. Lahaina Harbor with proposed dredge sites (blue) and survey sites (ss)

Table 2. Percent benthic substrate cover and algal diversity for seven survey sites at Lahaina, Maui, Hawaii. December 11-14, 2005.

| FUNCTIONAL GROUPS | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 | Site 6 | Site 7 |
|---|---|---|---|---|---|---|---|
| Coralline Crustose Algae | | 7.08 | | | 10.83 | 10.83 | 3.75 |
| Turf | 1.25 | 21.25 | | 3.33 | 34.17 | 33.33 | 11.25 |
| Sand | 98.33 | 18.33 | 100 | 96.25 | 3.33 | 11.25 | 16.67 |
| Sponge | | 2.5 | | | 0.42 | | 0.83 |
| Macro- Algae | 0.42 | 47.93 | | 0.42 | 30.42 | 5.43 | 64.18 |
| Coral | 0 | 2.92 | 0 | 0 | 20.83 | 39.17 | 3.34 |
| | | | | | | | |
| **MACRO-ALGAE SPECIES** | | | | | | | |
| *Acanthophora spicifera* | | 8.33 | | | | | 12.5 |
| *Amansia glomerata* | | | | 0.42 | 8.75 | 1.67 | |
| *Amphiroa sp.* | | 14.58 | | | 2.5 | 2.92 | 7.92 |
| *Asparagopsis taxiformis* | | | | | 0.42 | | |
| *Bryopsis sp.* | | | | | 0.42 | | |
| *Caulerpa webbiana* | | | | | 1.67 | | |
| *Champia parvula* | | | | | | | 0.42 |
| *Cladophora sp.* | | | | | | | 0.42 |
| *Cladophoropsis herpestica* | | 1.25 | | | | | 0.83 |
| *Crouania sp.* | | | | | | | 0.42 |
| *Dictyota sp.* | | | | | 0.42 | | 0.42 |
| *Dictyota sandvicensis* | | 1.67 | | | | | 7.92 |
| *Gelid.* | 0,42 | 12.5 | | | 4.58 | 0.42 | 11.67 |
| *Gracilaria coronopifolia* | | | | | | | 0.83 |
| *Griffithsia heteromorpha* | | 0.42 | | | | | 0.42 |
| *Halimeda discodea* | | 2.08 | | | 4.58 | | 8.33 |
| *Herposiphonia sp.* | | | | | 0.83 | | 1.25 |
| *Phyllodictyon anastamosans* | | | | | 0.83 | | |
| *Jania sp.* | | 1.67 | | | | | 5.42 |
| *Laurencia sp.* | | 0.42 | | | 0.42 | | 2.08 |
| *Microdictyon setchellianum* | | 0.42 | | | | | |
| *Neomeris annulata* | | | | | 0.42 | | |
| *Peyssonnelia sp.* | | 0.42 | | | | | |
| *Spirocladia hodgsoniae* | | | | | 2.5 | | |
| *Tolypiocladia glomerulata* | | 4.17 | | | 2.08 | 0.42 | 3.33 |



Table 3. Invertebrate species observed for seven survey sites at Lahaina, Maui, Hawaii. December 11-14, 2005.

| **Family** | **Survey Sites** | | | | | | |
|---|---|---|---|---|---|---|---|
| *Genus species* | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| | | | | | | | |
| **Terebellidae** | | | | | | | |
| *Lomia medusae* | | X | | | X | X | X |
| *Terebellids* | | | | X | | | |
| | | | | | | | |
| **Serpulidae** | | | | | | | |
| *Spirobranchus giganteus* | | | | | X | X | |
| *Serpulids* | | X | | | | | |
| | | | | | | | |
| **Zoanthidae** | | | | | | | |
| *Palythoa caesia* | | | | | X | X | |
| *Protopalythoa sp.* | | | | | | X | |
| | | | | | | | |
| **Hydroida** | | | | | | | |
| *Pennaria disticha* | | | | | X | | |
| | | | | | | | |
| **Hipponidae** | | | | | | | |
| *Hipponix imbricatus* | | X | | | | | |
| | | | | | | | |
| **Conidae** | | | | | | | |
| *Conus ebraeus* | | | | | X | | |
| *C. flavidus* | | | | | | | X |
| *C. imperialis* | | X | | | | | |
| *C. lividus* | | | | | X | X | |
| *C. leopardus* | | | | | | X | |
| | | | | | | | |
| **Vermtidae** | | | | | | | |
| *Serpulorbis variabilis* | | X | | | X | X | |
| | | | | | | | |
| **Neritidae** | | | | | | | |
| *Neritidae (shell only)* | | | X | | | | |
| | | | | | | | |
| **Thaididae** | | | | | | | |
| *Morula uva* | | | | | X | X | |
| | | | | | | | |
| **Cerithidae** | | | | | | | |
| *Cerithium echinatum* | | | | | X | X | X |
| *Quoyula monodonta* | | | | | X | X | |

Table 3. continued

| Family | Survey Sites | | | | | | |
|---|---|---|---|---|---|---|---|
| *Genus species* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | | |
| **Cypraeidae** | | | | | | | |
| *Cypraea caputserpentis* | | | | | | X | |
| *C. mauritiana* | | | | | | X | |
| | | | | | | | |
| **Mollusca-Bivalvia** | | | | | | | |
| *Isogonomon perna* | | X | | | | X | |
| *Pincta marginifera* | | | | | | X | |
| | | | | | | | |
| **Dendrodoridídae** | | | | | | | |
| *Dendrodoris* sp. | | | | | | X | |
| | | | | | | | |
| **Pleurobranchidae** | | | | | | | |
| *Pleurobranchia* sp. | | X | | | | | |
| | | | | | | | |
| **Stenopodidae** | | | | | | | |
| *Stenopus hispidus* | | | | | | | X |
| | | | | | | | |
| **Diogenidae** | | | | | | | |
| *Calcinus hazletti* | | | | | | X | |
| *C. latens* | X | X | | X | | X | |
| *Dardanus saguinocarpus* | | | | | X | | |
| | | | | | | | |
| **Hippolytidae** | | | | | | | |
| *Saron neglectus* | | | | | X | | |
| | | | | | | | |
| **Alpheidae** | | | | | | | |
| *Alpheus lottini* | | | | | X | | |
| *Alpheus* sp. | | | X | X | | | |
| | | | | | | | |
| **Trapeziidae** | | | | | | | |
| *Trapezia digitalis* | | | | | X | | |
| *T. ferruginea* | | | | | X | | |
| *T. flavopunctata* | | | | | X | | |
| *T. intermedia* | | | | | X | | |
| *T. tigrina* | | | | | X | | |
| | | | | | | | |
| **Xanthidae** | | | | | | | |
| small Xanthidae | | | | | X | | |



Table 3. continued

| Family | Survey Sites | | | | | | |
|---|---|---|---|---|---|---|---|
| *Genus species* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | | |
| **Enoplometopidae** | | | | | | | |
| *Parribacus antarcticus* | | | | | | X | |
| | | | | | | | |
| **Grapsidae** | | | | | | | |
| *Percnon affine* | | | | | | X | |
| | | | | | | | |
| **Ophiocomidae** | | | | | | | |
| *Ophiocoma brevipes* | | X | | X | | | |
| *O. erinaceus* | | X | | | | | X |
| *O. pica* | | X | | | X | | |
| | | | | | | | |
| **Toxopneustidae** | | | | | | | |
| *Tripneustes gratilla* | | X | | | | | |
| | | | | | | | |
| **Diadematidae** | | | | | | | |
| *Echinothrix calimaris* | | X | | | X | | |
| *E. diadema* | | X | | | | | X |
| *E. mathaei* | | X | | | | X | X |
| | | | | | | | |
| **Holothuriidae** | | | | | | | |
| *Holothuria atra* | | | | | X | | |
| *H. pardalis* | | X | | | | | |
| *H. whitmaei* | | | | | X | | |
| | | | | | | | |
| **Oreasteridae** | | | | | | | |
| *Culcita novaeguineae* | | | | | | X | |
| | | | | | | | |
| Total number of species | 1 | 16 | 2 | 4 | 23 | 21 | 7 |

Table 5. Coral species and size classes observed and density for seven survey sties at Lahaina, Maui, Hawaii. December 11-14, 2005.

| | Survey Sites | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 |
| Transect 1 (a) or Transect 2 (b) | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b |
| Transect Section (1=1st 10 meter section, 2=2nd 10 meter section) | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| **Coral size class distribution (number per size class per site)** | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Montipora capitata*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | 4 | 2 | 3 | 2 | | | | |
| 2 - <5 cm | | | | | | 4 | 4 | | | | | | | | | | 54 | 46 | 12 | 6 | 12 | 13 | 7 | 4 |
| 5 - <10 cm | | | | | | 9 | 2 | | | | | | | | | | 36 | 31 | 17 | 8 | 19 | 18 | 19 | 20 |
| 10 - <20 cm | | | | | 3 | 7 | 3 | | | | | | | | | | 24 | 13 | 10 | 8 | 11 | 18 | 38 | 19 |
| 20 - <40 cm | | | | | 1 | 6 | 2 | | | | | | | | | | 6 | 4 | 4 | 5 | 7 | 34 | 20 | 7 |
| 40 - <80 cm | | | | | | 6 | 5 | | | | | | | | | | 2 | | | 3 | 4 | 20 | 12 | 5 |
| 80 - <160 cm | | | | | | 3 | 5 | | | | | | | | | | 1 | | | | 4 | 6 | 1 | 2 |
| > 160 cm | | | | | | 2 | 2 | | | | | | | | | | | | | | 2 | 2 | 1 | |
| ***Montipora patula*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | 2 | 2 | 2 | | 1 | | | |
| 2 - <5 cm | | | | | | 3 | 1 | | | | | | | | | | 13 | 12 | 23 | 3 | 2 | 3 | 4 | |
| 5 - <10 cm | | | | | | 2 | 2 | | | | | | | | | | 18 | 14 | 19 | 3 | 9 | 10 | 6 | 7 |
| 10 - <20 cm | | | | | | 4 | 1 | | | | | | | | | | 16 | 16 | 11 | 3 | 9 | 8 | 14 | 13 |
| 20 - <40 cm | | | | | | 4 | 3 | | | | | | | | | | 8 | 8 | 5 | 6 | 8 | 7 | 18 | 3 |
| 40 - <80 cm | | | | | | 4 | 2 | | | | | | | | | | 6 | 2 | 1 | 1 | 5 | 3 | 6 | |
| 80 - <160 cm | | | | | | 2 | 1 | | | | | | | | | | | | | | 1 | 1 | 1 | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | 1 | | | |



Table 4. Key mollusc and echinoderm relative abundance data for the seven survey sites at Lahaina, Maui, Hawaii. December 11-14, 2005.

| **Phylum** | **Survey Sites** | | | | | | |
|---|---|---|---|---|---|---|---|
| *Genus/species* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | Relative Abundance (avg/m$^2$) | Relative Abundance (avg/m$^2$) | Relative Abundance (avg/m$^2$) | Relative Abundance (avg/m$^2$) | Relative Abundance (avg/m$^2$) | Relative Abundance (avg/m$^2$) | Relative Abundance (avg/m$^2$) |
| **Mollusca** | | | | | | | |
| Cone | | | | | | | 0.2 |
| Other Mollusc | | | | | | | 0.2 |
| **Echinodermata-Echinoids** | | | | | | | |
| *Echinothrix diadema* | | 0.4 | | | | | 2.6 |
| *Tripneustes gratilla* | | 0.2 | | | 0.4 | 0.2 | |
| *Echinometra oblonga* | | | | | | | |
| *Echinometra mathaei* | | 2.4 | | | | 0.2 | 3.8 |
| **Echinodermata-Holothuroids** | | | | | | | |
| *Holothuria atra* | | | | | 0.2 | | |
| *Holothuria whitmaei* | | | | | 0.4 | | |
| Other Holothuroid | | 0.2 | | | | | |
| **Echinodermata-Asteroidea** | | | | | | | |
| *Culcita novaeguineae* | | | | | | 0.2 | |
| Trapezid crabs | | 0.2 | | | 4.6 | 1.2 | |
| *Stenopus hispidus* | | | | | | | 0.4 |

Table 5. continued

| Transect 1 (a) or Transect 2 (b) | Survey Sites | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 |
| | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b |
| **Transect Section (1=1st 10 meter section, 2=2nd 10 meter section)** | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| ***Pocillopora eydouxi*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 - <5 cm | | | | | | 1 | | | | | | | | | | | | | | | | | | |
| 5 - <10 cm | | | | | | | | | | | | | | | | | 8 | | 1 | | | | | |
| 10 - <20 cm | | | | | | | | | | | | | | | | | 7 | 5 | 8 | | | | 4 | |
| 20 - <40 cm | | | | | | 2 | | | | | | | | | | | 16 | 12 | 24 | 6 | | 3 | 4 | 2 |
| 40 - <80 cm | | | | | | 2 | | | | | | | | | | | 14 | 41 | 28 | 9 | | 4 | 14 | 2 |
| 80 - <160 cm | | | | | | | | | | | | | | | | | 6 | 7 | 6 | 2 | | 1 | 9 | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pocillopora meandrina*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | 1 | | 1 | | | | 1 |
| 2 - <5 cm | | | | | | | | | | | | | | | | | 7 | 3 | 3 | 3 | | | | 1 |
| 5 - <10 cm | | | | | | | 1 | | | | | | | | | | 4 | 11 | 6 | | | | 1 | 2 |
| 10 - <20 cm | | | | | | 2 | 2 | | | | | | | | | | 7 | 13 | 5 | 8 | | 2 | | 1 |
| 20 - <40 cm | | | | | | 1 | 1 | | | | | | | | | | 2 | 4 | 2 | 5 | 1 | | 3 | 1 |
| 40 - <80 cm | | | | | | | 1 | | | | | | | | | | 1 | | 1 | | | | | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Porites compressa*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 - <5 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 - <10 cm | | | | | | | | | | | | | | | | | 1 | | | | 1 | | | 1 |
| 10 - <20 cm | | | | | | | | | | | | | | | | | | | | | 2 | | 1 | |
| 20 - <40 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 - <80 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |



Table 5. continued

| Transect 1 (a) or Transect 2 (b) | Survey Sites | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 |
| | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b | a | a | b | b |
| **Transect Section (1=1st 10 meter section, 2=2nd 10 meter section)** | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| ***Montipora flabellata*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 - <5 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 - <10 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 - <20 cm | | | | | | | | | | | | | | | | | | | 1 | | | | | |
| 20 - <40 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 - <80 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Leptastrea purpurea*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 - <5 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 - <10 cm | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| 10 - <20 cm | | | | | | | | | | | | | | | | | | 2 | | | | | | |
| 20 - <40 cm | | | | | | | | | | | | | | | | | | 2 | | | | | | |
| 40 - <80 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Pocillopora damicornis*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 - <5 cm | | | | | | 10 | | | | | | | | | | | | | | | | | | |
| 5 - <10 cm | | | | | | 8 | 1 | | | | | | | | | | | | | | | | | |
| 10 - <20 cm | | | | | | 3 | | | | | | | | | | | | | | | | | | |
| 20 - <40 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 - <80 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |

Table 5. continued

| | Survey Sites | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Transect 1 (a) or Transect 2 (b)** | 1 a | 1 a | 1 b | 1 b | 2 a | 2 a | 2 b | 2 b | 3 a | 3 a | 3 b | 3 b | 4 a | 4 a | 4 b | 4 b | 5 a | 5 a | 5 b | 5 b | 6 a | 6 a | 6 b | 6 b |
| **Transect Section (1=1st 10 meter section, 2=2nd 10 meter section)** | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| **FRAGMENTS (all species)** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 - <5 cm | | | | | | 3 | | | | | | | | | | | | | | | | | | |
| 5 - <10 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 - <20 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 - <40 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 - <80 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| **Totals for all anthozoans in each size class per site** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0-5 cm | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 5 | 5 | 3 | 3 | 0 | 0 | 1 |
| 5-10 cm | 0 | 0 | 0 | 0 | 0 | 18 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 84 | 77 | 41 | 12 | 19 | 18 | 11 | 5 |
| 10-20 cm | 0 | 0 | 0 | 0 | 0 | 21 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 79 | 69 | 58 | 13 | 30 | 31 | 33 | 31 |
| 20-40 cm | 0 | 0 | 0 | 0 | 3 | 19 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 76 | 72 | 62 | 30 | 24 | 34 | 70 | 39 |
| 40-80 cm | 0 | 0 | 0 | 0 | 1 | 14 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 75 | 46 | 28 | 18 | 48 | 66 | 14 |
| 80-160 cm | 0 | 0 | 0 | 0 | 0 | 12 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 13 | 8 | 7 | 10 | 25 | 30 | 5 |
| > 160 cm | 0 | 0 | 0 | 0 | 0 | 5 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 5 | 7 | 2 | 2 |
| TOTAL | 0 | 0 | 0 | 0 | 4 | 89 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 306 | 311 | 221 | 93 | 109 | 163 | 212 | 97 |
| **POPULATION PARAMETERS** | | | | | | | | | | | | | | | | | | | | | | | | |
| **Mean frequency: no/m2** | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 8.9 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.6 | 31.1 | 22.1 | 9.3 | 10.9 | 16.3 | 21.2 | 9.7 |
| **Total anthozoan genera:** | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | 4.0 | 3.0 | 3.0 |
| **Mean diversity: anthozoan genera/m2** | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 | 0.3 | 0.3 |
| **Total scleractinian species:** | 0 | 0 | 0 | 0 | 1 | 6 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 7 | 6 | 6 | 6 | 7 | 7 | 6 |
| **Total scleractinian genera:** | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 3 |
| **Area surveyed, $m^2$** | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |



Table 5. continued

| | Survey Sites | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Transect 1 (a) or Transect 2 (b)** | 1 a | 1 a | 1 b | 1 b | 2 a | 2 a | 2 b | 2 b | 3 a | 3 a | 3 b | 3 b | 4 a | 4 a | 4 b | 4 b | 5 a | 5 a | 5 b | 5 b | 6 a | 6 a | 6 b | 6 b |
| **Transect Section (1=1st 10 meter section, 2=2nd 10 meter section)** | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| ***Porites evermanni*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 - <5 cm | | | | | | | | | | | | | | | | | | 4 | | | | 2 | | |
| 5 - <10 cm | | | | | | | | | | | | | | | | | | | | 1 | | | 1 | |
| 10 - <20 cm | | | | | | | | | | | | | | | | | | 1 | | | | | 1 | |
| 20 - <40 cm | | | | | | | | | | | | | | | | | | | | | | | 1 | |
| 40 - <80 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Porites lobata*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | 2 | | | |
| 2 - <5 cm | | | | | | | | | | | | | | | | | 2 | 12 | 2 | | 5 | | | |
| 5 - <10 cm | | | | | | 2 | 2 | | | | | | | | | | 13 | 7 | 8 | 1 | 1 | 1 | 2 | 1 |
| 10 - <20 cm | | | | | | 3 | 1 | | | | | | | | | | 13 | 15 | 11 | 5 | 1 | 3 | 12 | 4 |
| 20 - <40 cm | | | | | | 1 | | | | | | | | | | | 9 | 16 | 7 | 3 | 2 | 3 | 10 | 1 |
| 40 - <80 cm | | | | | | | | | | | | | | | | | 6 | 4 | | 1 | 1 | 1 | 3 | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | 1 | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| ***Palythoa sp.*** | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 - <2 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 - <5 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 - <10 cm | | | | | | | | | | | | | | | | | | | | | | 2 | | |
| 10 - <20 cm | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| 20 - <40 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 - <80 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 - <160 cm | | | | | | | | | | | | | | | | | | | | | | | | |
| > 160 cm | | | | | | | | | | | | | | | | | | | | | | | | |

Table 6. Reef fish diversity and biomass for seven survey sites at Lahaina, Maui, Hawaii. December 11-14,2005.

| FAMILY | Survey Sites | | | | | | |
|---|---|---|---|---|---|---|---|
| *Genus species* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **OPHICHTHIDAE** | | | | | | | |
| *Callechelys lutea* | | | | X | | | |
| | | | | | | | |
| **AULOSTOMIDAE** | | | | | | | |
| *Aulostomus chinensis* | | | | | | | |
| | | | | | | | |
| **FISTULARIIDAE** | | | | | | | |
| *Fistularia commersonii* | X | | | | | X | |
| | | | | | | | |
| **SCORPAENIDAE** | | | | | | | |
| *Scorpaenopsis cacopsis* | | | | | | X | |
| *Sebastapistes coniorta* | | X | | | X | X | |
| | | | | | | | |
| **CARACANTHIDAE** | | | | | | | |
| *Caracanthus typicus* | | | | | X | | |
| | | | | | | | |
| **SERRANIDAE** | | | | | | | |
| *Cephalopholis argus* | | X | | | | | |
| | | | | | | | |
| **CIRRHITIDAE** | | | | | | | |
| *Paracirrhites arcatus* | | | | | X | | |
| *P. forsteri* | | | | | | X | |
| | | | | | | | |
| **CARANGIDAE** | | | | | | | |
| *Scomberoides lysan* | | | | | | X | |
| | | | | | | | |
| **MULLIDAE** | | | | | | | |
| *Mulloidichthys vanicolensis* | | | | | | X | |
| *Parupeneus bifasciatus* | | | | | X | X | |
| *P. cyclostomus* | | | | X | | | |
| *P. multifasciatus* | | | | | X | | |
| *P. porphyreus* | | | | | | X | |
| *Upeneus arge* | X | X | | | | | |



Table 6. continued

| FAMILY | Survey Sites | | | | | | |
|---|---|---|---|---|---|---|---|
| *Genus species* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **CHAETODONTIDAE** | | | | | | | |
| *Chaetodon auriga* | | X | | | | X | X |
| *C. lunula* | | X | | | | X | X |
| *C. lunulatus* | | | | | | | |
| *C. miliaris* | | | | | | | |
| *C. quadrimaculatus* | | X | | | | | |
| *C. unimaculatus* | | | | | | X | |
| | | | | | | | |
| **POMACENTRIDAE** | | | | | | | |
| *Abudefduf abdominalis* | | X | | | X | | |
| *A. vaigiensis* | | | | | | | X |
| *Chromis vanderbilti* | | | | | X | X | |
| *Dascyllus albisella* | | | | X | | | |
| *Plectroglyphidodon johnstonianus* | | | | | X | X | |
| *P. imparipennis* | | | | | X | | |
| *Stegastes fasciolatus* | | | | | X | X | |
| | | | | | | | |
| **LABRIDAE** | | | | | | | |
| *Gomphosus varius* | | | | | X | X | |
| *Labroides phthirophagus* | | | | | | X | |
| *Stethojulis balteata* | | X | | | X | X | X |
| *Thalassoma duperrey* | | X | | X | X | X | X |
| *T. trilobatum* | | X | | | X | | X |
| | | | | | | | |
| **SCARIDAE** | | | | | | | |
| *Chlorurus sordidus* | | | | | | | |
| *Scarus psittacus* | | | | | X | X | |
| | | | | | | | |
| **BLENIINDAE** | | | | | | | |
| *Cirripectes vanderbilti* | | | | | | X | |
| *Exallias brevis* | | | | | X | | |
| | | | | | | | |
| **ZANCLIDAE** | | | | | | | |
| *Zanclus cornutus* | | | | | X | | |

Table 6. continued

| FAMILY | Survey Sites | | | | | | |
|---|---|---|---|---|---|---|---|
| *Genus species* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **ACANTHURIDAE** | | | | | | | |
| *Acanthurus olivaceus* | | X | | | X | X | X |
| *A. blochii* | | | | | X | | X |
| *A. dussumieri* | | | | | X | | |
| *A. leucopareius* | | | | | X | | |
| *A. nigrofuscus* | | X | | | | X | X |
| *A. nigroris* | | X | | | X | X | |
| *A. triostegus* | | X | | | | | X |
| *Ctenochaetus strigosus* | | | | | | | |
| *Naso brevirostris* | | | | | X | | |
| *N. lituratus* | X | | | | X | X | |
| *N. unicornis* | X | | | | | | |
| | | | | | | | |
| **BOTHIDAE** | | | | | | | |
| *Bothus mancus* | | | | X | | | |
| | | | | | | | |
| **BALLISTIDAE** | | | | | | | |
| *Melichthys niger* | | | | | | | |
| *Rhinecanthus aculeatus* | | X | | | | | X |
| *R. rectangulus* | | | | X | X | | |
| | | | | | | | |
| **MONACANTHIDAE** | | | | | | | |
| *Cantherhines dumerilii* | | X | | | | | X |
| *C. sandwichiensis* | | | | | X | | |
| | | | | | | | |
| **TETRAODONTIDAE** | | | | | | | |
| *Arothron meleagris* | | | | | | | |
| *Canthigaster. amboinensis* | | X | | | | X | X |
| *C. jactator* | X | X | | | X | X | X |
| | | | | | | | |
| Total number of families | 4 | 10 | 0 | 6 | 13 | 12 | 7 |
| Total number of species | 5 | 18 | 0 | 6 | 27 | 26 | 14 |
| Total fish biomass in tons/hectare | 0.01 | 0.07 | 0 | 0.02 | 0.4 | 0.62 | 0.02 |



# APPENDIX A

## Lahaina, Maui, Hawaii
## Rapid Ecological Assessment Survey Protocols

The survey protocols that were used in this investigation included the following general protocol, which applied to all survey divers. This protocol was extensively modified after the original, which was developed for use in remote areas of the Northwestern Hawaiian Islands (Maragos & Gulko, 2002). This general protocol was revised by Antonio Bentivoglio on December 15, 2004, and is based on information from Dave Gulko, Alan Friedlander, and Ryan Okano.

Fish Survey Protocols:

The fish team consisted of one diver swimming two 25-meter (m) belt transects per dive and collecting data on all species observed. Random swims were conducted in areas between transect lines and after timed transect swims were completed.

*25-m Belt Transects*:
During the deployment leg of the transect line, the diver recorded size-class-specific (Total Length, TL) counts of all fishes greater than 20 centimeters (cm) within 2 m on each side of the line, while small and cryptic fish (*i.e.*, less than 20 cm) were counted within 1 m on each side of the line during the "swim-back" leg. The total length of each fish within the transect area was estimated and put into a size class. Size classes were 1, 2, 3, 4, 5, 6-10, 11-15, and 16-20 cm. Total length of fish larger than 20 cm was estimated in 5 cm increments (25, 30, 35, 40, etc...). The diver obtained a density estimate of all fishes > 20 cm Total Length (TL) within a 25-m long x 4-m wide (100-$m^2$) area on an initial ("swim-out") leg, followed by a density estimate of fishes $\leq$ 20 cm TL within a 25-m long x 2-m wide (50-$m^2$) area on the subsequent ("swim back") leg, on each of the 2 transects, at each dive-station, conditions permitting. Two transects worth of data would provide totals of 400 $m^2$ and 200 $m^2$ searched for large, relatively vagile and for small, site-attached reef fishes, respectively. The diver swam each transect at a constant speed (~ 15 minutes per transect) and identified each fish to species.

*Random Swim*:
After the deployment of the transect line and data had been collected during the timed fish size-class survey, the diver randomly swam the area of the transect line collecting data on all fish species present. Depth and air limited the duration of these random swims, but they generally lasted about 20 minutes at each survey site.

*Estimation of Fish Biomass*:
Biomass estimates were determined by using the length data estimates collected on the 25-m belt transect described above. Divers collected a fish's Total Length. This was transformed to Standard Length (SL) using data provided by Alan Friedlander that is based on unpublished data from the University of Hawaii Cooperative Fishery Research Unit. Once the SL was determined, the allometric length-weight conversion $W=aSL^b$ was used, where parameters $a$ and $b$ are constants, SL is Standard Length in millimeters, and W is the weight in grams. The $a$ and $b$

constants for the above allometric equation for 150 species was also provided by Alan Friedlander. In cases where allometric length-weight conversions did not exist for a given species, the parameters from similar bodied congeners were used. The fish data collected at each transect was input into a spreadsheet by species and size class. The allometric equations converted the individual fish observations into fish weight estimates, then all individuals per transect were summed to determine the total fish weight per transect. Fish weight per transect was then converted to a standard biomass estimate of metric tons per hectare.

Algae Survey Protocol:

*Quantitative (benthic percent cover)*:
A total of seven sites were surveyed in the vicinity of the Lahaina Harbor. Four 10-m surveys (two on each of the 25-m transect lines) were laid linearly on the reef or sand per survey station. Three quadrats were systematically placed on each 10-m survey. Quadrats were evenly spaced with five meters between each. The quadrat was 0.5 $m^2$ with 49 evenly spaced points, 20 of the 49 points were randomly selected to be identified. A total of 60 points were selected and identified per transect, and 240 points were compiled per station.

The organisms at each point were identified to the species level when possible. If a point could not be identified to the species or genus level, they were placed into functional groups. Turf algae consisted of all unidentifiable upright algal species of less than 1 cm. Other functional groups included crustose coralline algae, blue green algae, sponges, and sand.

*Qualitative (algal species list)*:
This data set consisted of all macro-algae and distinguishable turf algae encountered on transects. In this case, the four 10-m linear surveys at each site were treated as a single two-meter wide belt transect. A species list was assembled for all seven sites at Lahaina. This data set should not be considered to be a comprehensive species list, no collections were taken or slides made to identify smaller difficult to identify species. Instead, this list should be considered to be a quick survey of the more prevalent algal species at each site. The actual number of species at these sites may be up to four times greater than what is presented in this report.

Coral Survey Protocol (modified after Maragos *et al.*, 2003, Ryan Okano, 2003):

*Coral Transects*:
The coral specialists surveyed all coral species found occurring within 0.5 m to either side of the transect line. The survey involved estimating the long diameter and species of each coral and recording the coral's assignment to one of the eight long-diameter size classes listed below:

| | | | |
|---|---|---|---|
| 0 – 1 cm | 6 – 10 cm | 21 – 40 cm | 81 – 160 cm |
| 2 – 5 cm | 11 – 20 cm | 41 – 80 cm | >160 cm |

These size classes and protocols are adapted originally from Mundy (1996), who used them in American Samoa and by Maragos (2003) who used them in the Northwestern Hawaiian Islands. Corals showing signs of disease, predation, abnormal growth, bleaching or direct human impact were tallied, described, photographed, and if necessary, collected. Loose coral fragments were



also size classed as above using an "f" instead of a tally mark. Colonies showing partial mortality or observable fission were tallied into size classes based on total original colony size, but with a flag as to either partial mortality or fission (usually an "s" instead of a tally mark).

Invertebrate Survey Protocol:

The invertebrate specialist surveyed 3 meters on either side of the two 25-m transects for non-coral marine invertebrates. Additionally, data from ten 0.25$m^2$ quadrats for each survey site (five for each 25-m transect) were collected to determine the average percent cover of certain sessile target species or for sub-sampling large populations of mobile species (*e.g.*, boring sea urchins). Additionally, direct counts for trapezid guard crabs (per coral head) were taken by swimming back along the transect belt looking 1 m on either side of the line and recording the species of coral with the amount and species of crab inside.

Based on data from previous rapid ecological assessments, a group of target species was chosen for quadrat counts. The species in this list were chosen because they have been shown to be common components of the reef habitats of the Main Hawaiian Islands, and they are species that are generally visible (*i.e.*, non-cryptic) and easily enumerated during the course of a single 30-40 minute SCUBA survey.

These target species were:

ECHINODERMS
- Echinoids – sea urchins
- Holothuroids – sea cucumbers
- Asteroids – sea stars

MOLLUSCS
- Bivalves – spondylid oysters, pearl oysters
- Nudibranchs – sea slugs
- Gastropods – snails

CRUSTACEANS
- hermit crabs and lobsters

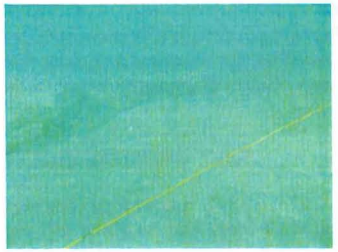
## References

Maragos, J., Gulko, D. (eds.). 2002. Coral Reef Ecosystems of the Northwestern Hawaiian Islands: Interim Results Emphasizing the 2000 Surveys. U.S. Fish and Wildlife Service and the Hawaii Department of Land and Natural Resources, Honolulu, Hawaii. 46 pp.

## APPENDIX B

### Photo Sequence for Lahaina Small Boat Harbor Survey Stations
### December 11-14, 2005

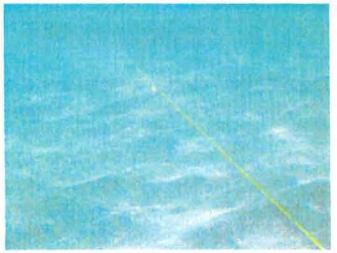
Survey Station 1. Sand



Survey Station 1. Sand

Survey Station 2. Reef flat

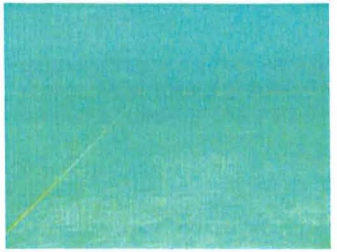
Survey Station 2. Reef flat



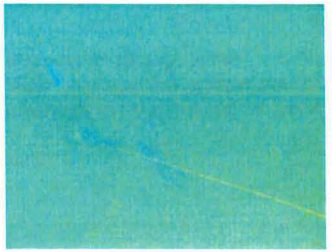
Survey Station 3. Sand

Survey Station 3. Sand





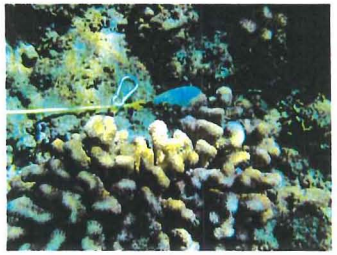
Survey Station 4. Sand



Survey Station 4. Sand

Survey Station. 5. Reef flat

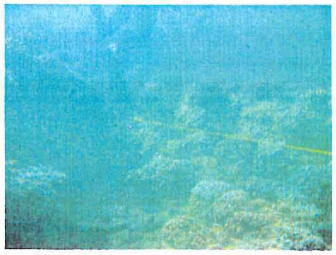
Survey Station 5. Reef flat



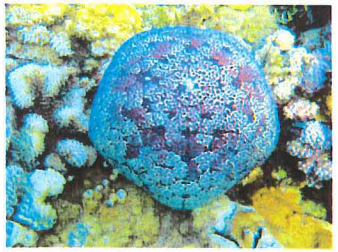
Survey Station 5. Reef flat

Survey Station 5. Reef flat

Survey Station 6. Reef flat

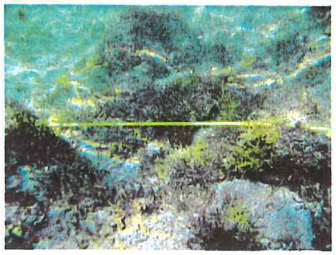


Survey Station 6. Reef flat



Survey Station 6. *Culcita novaeguineae*

Survey Station 6. *Parrabacus antarcticus*



Survey Station 7. Reef flat

Survey Station 7. Reef flat



**APPENDIX C**

# Habitat Equivalency Analysis of Compensatory Mitigation For the Lahaina Small Boat Harbor Project, Maui, Hawaii

Prepared for the Pacific Islands Office,
U.S. Fish and Wildlife Service,
Honolulu, Hawaii

by

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DRAFT March 1, 2006

Introduction

This report documents the habitat equivalency analysis (HEA) of the Lahaina Small Boat Harbor project in Maui, Hawaii. HEA was used to scale, or to determine the appropriate quantity of, the compensatory mitigation measures that are recommended for the project. Compensatory mitigation is intended to replace the ecological services lost as a result of unavoidable impacts to resources affected by the project. Ecological services refer to the functions performed by a resource for the benefit of other resources or the public, such as the provision of food and refuge for fish populations. Given project impacts, the affected resources fail to provide the full complement of services that would have been provided absent the impacts until baseline is eventually achieved, if at all. During the interim between the onset of project impacts and the return to baseline, the ecological services associated with these affected resources will not be provided at the levels that would have existed had the impacts not occurred. Therefore, compensatory mitigation is recommended to provide comparable ecological services as a replacement for the services lost during that interim period.

It is important to scale compensatory mitigation to be commensurate with the type, level, and duration of lost services.[1] The amount of compensatory mitigation needed to replace lost services depends, in part, on the ability of the affected resources to return to their baseline conditions. Factors relevant in that regard include the quantity of affected resources and how fast and how completely they return to their baseline conditions. The amount of compensatory mitigation also depends on the ability of the selected compensatory mitigation measures to replace lost services. Relevant factors for replacement include how fast the compensatory mitigation measures become fully functional and the relative degree to which they provide additional ecological services. This report documents how these factors were considered in calculating the amount of compensatory mitigation for the project.

This report provides a brief description of the HEA methodology followed by an explanation of the analytic inputs and results. Two construction techniques were analyzed: piling pier construction and metal sheetpile pier construction. The inputs and results for these two techniques are presented separately. Details of the HEA are presented in an appendix.

Description of Habitat Equivalency Analysis

King and Adler (1991) first described habitat equivalency analysis as a methodology for scaling compensatory mitigation under Section 404 of the Clean Water Act. A more recent description of the methodology can be found in Allen, Chapman, and Lane (2005).

[1] A memorandum of agreement between the two Federal agencies that administer the Clean Water Act Section 404 program (US Department of the Army and US Environmental Protection Agency 1990) states that "The determination of what level of mitigation constitutes 'appropriate' mitigation is based solely on the values and functions of the aquatic resource that will be impacted." Further, where "practicable," the Army Corps of Engineers "will strive to achieve a goal of no overall net loss of values and functions."





Briefly, HEA scales compensatory mitigation so that the total quantity of ecological services it provides is sufficient to offset the total quantity of lost ecological services resulting from the project. When quantifying ecological services, it is important to note that they have a temporal dimension as well as a geographic dimension (e.g., a given area of coral habitat provides beneficial services over a period of time). Therefore, ecological services are quantified in HEA in units of measure such as "square foot-years." A square foot-year refers to all the resource services provided by one square foot of habitat for one year. For example, 1,000 square foot-years of services could be provided by a 50-square foot resource over a period of 20 years. This characterization captures not only the important aspect of the physical size of a resource, but also the fact that the period of time it continues to function is important as well.

This measure of ecological services is obviously specific to habitat since different habitats provide different services. Therefore, it is important to select compensatory mitigation measures that provide replacement services that are similar to the lost services (i.e., in-kind replacement). If that is not possible, some meaningful adjustment must be made to equate the replacement services to lost services.

Another important consideration is the value of time. In general, people prefer to enjoy things (money, consumption goods, environmental services, etc.) sooner rather than later. This "impatience" is important when comparing ecological services that are either lost or replaced at different times. Since the incidence of lost and replacement services generally extends over a span of time, these services must be adjusted so they can be aggregated and compared in a meaningful way. This adjustment process, known as discounting, permits one to examine values occurring at different times on a comparable basis. The adjustment involves decreasing future values, and increasing past values, each year by a proportional amount known as the discount rate. Discounting in this context is analogous to a bank's calculation of compound interest for a deposit or loan. The common time period to which all lost and replacement ecological services are discounted for sake of comparison is known as the present time period. For this analysis, the present time period is the year in which the HEA was conducted.

Through this process of quantifying and discounting ecological services, HEA takes into account losses and gains that occur over different timeframes to determine a scale of compensatory mitigation that is commensurate with the type, level, and duration of lost services. Because HEA accounts for all these important aspects, different compensatory mitigation projects will generally have different scales. For example, a compensatory mitigation project that becomes fully functional in 5 years will have a smaller indicated scale than one that becomes fully functional in 10 years. Therefore, it is important that the compensatory mitigation projects selected for analysis be chosen carefully. HEA is not used to select compensatory mitigation projects, only to determine their scale.

HEA has also been used in other contexts involving the loss of ecological services. For example, it is widely used in natural resource damage assessments conducted under the Oil Pollution Act of 1990 (33 U.S.C. 2701 *et seq.*) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601 *et*

*seq.*).[2] It has also been used to quantify consequences in ecological risk assessment (Linder et al. 2005).

Analytic Inputs - Piling Pier Construction

The following analytic inputs were used in the habitat equivalency analysis for the piling pier construction technique. These inputs are organized by the specific habitats affected by the project: sand, reef flat, and pilings. Detailed HEA calculations are presented in an appendix.

- Sand Habitat
  - Discounting inputs: Time in this HEA was denominated by quarter years due to the quick recovery times involved.
    - Quarterly discount rate: 0.75% (one-quarter of an annual 3% rate)
    - Present quarter: 1st quarter 2006
  - Lost services inputs
    - Losses due to net increase in pier pilings in 2008 (100-14=86 24-inch diameter pilings)
      - Affected habitat: 270.18 sq. feet
      - Lost services time path: 100% in 1st quarter 2008 and into perpetuity
    - Losses due to periodic dredging of remaining original sand habitat beginning in 2008 (10-year cycle)
      - Affected habitat: 21,100-270.18=20,829.82 sq. feet
      - Lost services time path
        - 100% in 1st through 4th quarters of each 10-year cycle
        - 0% in 7th quarter of each 10-year cycle
        - Lost services percentages for interim quarters determined by linear interpolation
    - Gains due to conversion of reef flat habitat to new sand habitat in 2009
      - Affected habitat: 2,720 sq. feet
      - Gained services time path
        - 0% in 4th quarter 2008
        - 100% in 3rd quarter 2009
        - Gained services percentages for interim quarters determined by linear interpolation
    - Losses due to periodic dredging of new sand habitat beginning in 2018 (10-year cycle)
      - Affected habitat: 2,720 sq. feet
      - Lost services time path

[2] For example, see Unsworth and Petersen (1995) and National Park Service (2003).





        - 100% in 1st through 4th quarters of each 10-year cycle
        - 0% in 7th quarter of each 10-year cycle
        - Lost services percentages for interim quarters determined by linear interpolation

- Reef Flat Habitat
  - Discounting inputs: Time in this HEA was denominated by years.
    - Annual discount rate: 3%
    - Present year: 2006
  - Lost services inputs
    - Losses due to primary impacts (dredging)
      - Affected habitat: 2,720 sq. feet
      - Lost services time path: 100% in 2008 and into perpetuity
    - Losses due to secondary impacts (sedimentation)
      - Affected habitat: 950 sq. feet
      - Lost services time path
        - 20% in 2008
        - 0% in 2023
        - Lost services percentages for interim years determined by linear interpolation
    - Gains due to transplantation (Dolphin grounding site)
      - Affected habitat: 4,100 sq. feet
      - Gained services time path
        - 46% in 2008 (70% survival of transplanted coral from 2,720-sq foot dredged reef flat)
        - 100% in 2043
        - Gained services percentages for interim years determined by linear interpolation

- Pilings Habitat
  - Discounting inputs: Time in this HEA was denominated by years.
    - Annual discount rate: 3%
    - Present year: 2006
  - Lost services inputs
    - Losses due to removal of existing pilings (14 24-inch diameter pilings)
      - Affected habitat: 527.79 sq. feet
      - Lost services time path: 100% in 2008 and into perpetuity
    - Gains due to installation of new pilings (100 24-inch diameter pilings)
      - Affected habitat: 3,769.91 sq. feet
      - Gained services time path
        - 0% in 2009
        - 100% in 2039

- Gained services percentages for interim years determined by linear interpolation

Results - Piling Pier Construction

The following results were determined by the habitat equivalency analysis for the piling pier construction technique. These results are organized by the specific habitats affected by the project: sand, reef flat, and pilings. Detailed HEA calculations are presented in an appendix.

- Pilings Habitat
  - Total present value of lost services
    - Losses due to net increase in pier pilings in 2008: 34,188.22 sq. foot quarters
    - Losses due to periodic dredging of remaining original sand habitat beginning in 2008: 396,977.04 sq. foot quarters
    - Gains due to conversion of reef flat habitat to new sand habitat in 2009: 331,569.87 sq. foot quarters
    - Losses due to periodic dredging of new sand habitat beginning in 2018: 36,214.80 sq. foot quarters
    - *Net lost services: 135,810.20 sq. foot quarters*

- Reef Flat Habitat
  - Total present value of lost services
    - Losses due to primary impacts (dredging): 88,025.89 sq. foot years
    - Losses due to secondary impacts (sedimentation): 1,255.22 sq. foot years
    - Gains due to transplantation (Dolphin grounding site): 105,023.31 sq. foot years
    - *Net lost services: -15,742.20 sq. foot years (a net gain)*

- Pilings Habitat
  - Total present value of lost services
    - Losses due to removal of existing pilings (14 24-inch diameter pilings): 17,080.50 sq. foot years
    - Gains due to installation of new pilings (100 24-inch diameter pilings): 77,389.14 sq. foot years
    - *Net lost services: -60,308.63 sq. foot years (a net gain)*

References

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## Habitat Equivalency Analysis
### Lahaina Small Boat Harbor - Piling Pier Construction
### Sand Habitat

Quarterly discount rate: 0.75%

Present actual quarter (a): 1

### Quantification of Lost Services

**Losses due to net increase in pier pilings in 2008 (100-14=86 24-inch diameter pilings)**

Affected habitat (sq ft): 270.18

| | | <----------(Sq Ft Quarters)----------> | |
|---|---|---|---|
| Actual Quarter (a) | (Percent) | Current Value | Present Value (b) |
| 9 | 100.0% | 270.18 | 254.50 |
| Beyond | | | 33,933.72 |
| Total | | | 34,188.22 |

**Losses due to periodic dredging of remaining original sand habitat beginning in 2008 (21,100-270.18=20,829.82 sq ft)**

Affected habitat (sq ft): 20,829.82

| | | <----------(Sq Ft Quarters)----------> | |
|---|---|---|---|
| Recurring Quarter (c) | (Percent) | Current Value | Present Value (d) |
| 1 | 100.0% | 20,829.82 | 20,674.76 |
| 2 | 100.0% | 20,829.82 | 20,520.85 |
| 3 | 100.0% | 20,829.82 | 20,368.09 |
| 4 | 100.0% | 20,829.82 | 20,216.47 |
| 5 | 66.7% | 13,886.55 | 13,377.32 |
| 6 | 33.3% | 6,943.27 | 6,638.87 |
| 7 | 0.0% | 0.00 | 0.00 |
| Total | | | 101,796.36 |

Amortized present value over 10-year dredging cycle (sq ft quarters): 2,955.16

Present value into perpetuity (sq ft quarters): 396,977.04

**Gains due to conversion of reef flat habitat to new sand habitat in 2009**

Affected habitat (sq ft): 2,720.00

| | | <(Sq Ft Quarters)> | |
|---|---|---|---|
| Actual Quarter (a) | (Percent) | Current Value | Present Value (b) |
| 12 | 0.0% | 0.00 | 0.00 |
| 13 | 33.3% | 906.67 | 828.91 |
| 14 | 66.7% | 1,813.33 | 1,645.48 |
| 15 | 100.0% | 2,720.00 | 2,449.84 |
| Beyond | | | 326,645.65 |
| Total | | | 331,569.87 |

**Losses due to periodic dredging of new sand habitat beginning in 2018**

Affected habitat (sq ft): 2,720.00

| | | <(Sq Ft Quarters)> | |
|---|---|---|---|
| Recurring Quarter (c) | (Percent) | Current Value | Present Value (d) |
| 1 | 100.0% | 2,720.00 | 2,699.75 |
| 2 | 100.0% | 2,720.00 | 2,679.65 |
| 3 | 100.0% | 2,720.00 | 2,659.71 |
| 4 | 100.0% | 2,720.00 | 2,639.91 |
| 5 | 66.7% | 1,813.33 | 1,746.84 |
| 6 | 33.3% | 906.67 | 866.92 |
| 7 | 0.0% | 0.00 | 0.00 |
| Total | | | 13,292.77 |

Amortized present value over 10-year dredging cycle (sq ft quarters): 385.89

Present value into perpetuity (sq ft quarters): 36,214.80

**Net lost services (sq ft quarters):** 135,810.20

## Notes

(a) Actual quarters are numbered in a series beginning with 1 corresponding to the first quarter of 2006.

(b) Current values are discounted to the present actual quarter (1).

(c) Recurring quarters are numbered in a series beginning with 1 corresponding to the first quarter of each 10-year dredging cycle.

(d) Current values are discounted to recurring quarter 0.

"Beyond" indicates the remaining time horizon into perpetuity.





# Habitat Equivalency Analysis

**Lahaina Small Boat Harbor - Piling Pier Construction**

**Reef Flat Habitat**

Annual discount rate: 3.0%

Present year: 2006

## Quantification of Lost Services

**Losses due to primary impacts (dredging)**

Affected habitat (sq ft): 2,720.00

| | | <(Sq Ft Years)> | |
|---|---|---|---|
| Year | (Percent) | Current Value | Present Value |
| 2008 | 100.0% | 2,720.00 | 2,563.86 |
| Beyond | | | 85,462.03 |
| Total | | | 88,025.89 |

**Losses due to secondary impacts (sedimentation)**

Affected habitat (sq ft): 950.00

| | | <(Sq Ft Years)> | |
|---|---|---|---|
| Year | (Percent) | Current Value | Present Value |
| 2008 | 20.0% | 190.00 | 179.09 |
| 2009 | 18.7% | 177.33 | 162.29 |
| 2010 | 17.3% | 164.67 | 146.30 |
| 2011 | 16.0% | 152.00 | 131.12 |
| 2012 | 14.7% | 139.33 | 116.69 |
| 2013 | 13.3% | 126.67 | 102.99 |
| 2014 | 12.0% | 114.00 | 89.99 |
| 2015 | 10.7% | 101.33 | 77.66 |
| 2016 | 9.3% | 88.67 | 65.98 |
| 2017 | 8.0% | 76.00 | 54.90 |
| 2018 | 6.7% | 63.33 | 44.42 |
| 2019 | 5.3% | 50.67 | 34.50 |
| 2020 | 4.0% | 38.00 | 25.12 |
| 2021 | 2.7% | 25.33 | 16.26 |
| 2022 | 1.3% | 12.67 | 7.89 |
| 2023 | 0.0% | 0.00 | 0.00 |
| Total | | | 1,255.22 |

**Gains due to transplantation (Dolphin grounding site)**

Affected habitat (sq ft): 4,100.00

| Year | (Percent) | (Sq Ft Years) Current Value | Present Value |
|---|---|---|---|
| 2008 | 46.0% | 1,886.00 | 1,777.74 |
| 2009 | 47.5% | 1,949.26 | 1,783.85 |
| 2010 | 49.1% | 2,012.51 | 1,788.09 |
| 2011 | 50.6% | 2,075.77 | 1,790.58 |
| 2012 | 52.2% | 2,139.03 | 1,791.40 |
| 2013 | 53.7% | 2,202.29 | 1,790.66 |
| 2014 | 55.3% | 2,265.54 | 1,788.44 |
| 2015 | 56.8% | 2,328.80 | 1,784.83 |
| 2016 | 58.3% | 2,392.06 | 1,779.92 |
| 2017 | 59.9% | 2,455.31 | 1,773.77 |
| 2018 | 61.4% | 2,518.57 | 1,766.48 |
| 2019 | 63.0% | 2,581.83 | 1,758.10 |
| 2020 | 64.5% | 2,645.09 | 1,748.71 |
| 2021 | 66.1% | 2,708.34 | 1,738.38 |
| 2022 | 67.6% | 2,771.60 | 1,727.17 |
| 2023 | 69.1% | 2,834.86 | 1,715.14 |
| 2024 | 70.7% | 2,898.11 | 1,702.34 |
| 2025 | 72.2% | 2,961.37 | 1,688.83 |
| 2026 | 73.8% | 3,024.63 | 1,674.66 |
| 2027 | 75.3% | 3,087.89 | 1,659.89 |
| 2028 | 76.9% | 3,151.14 | 1,644.56 |
| 2029 | 78.4% | 3,214.40 | 1,628.71 |
| 2030 | 79.9% | 3,277.66 | 1,612.39 |
| 2031 | 81.5% | 3,340.91 | 1,595.64 |
| 2032 | 83.0% | 3,404.17 | 1,578.50 |
| 2033 | 84.6% | 3,467.43 | 1,561.00 |
| 2034 | 86.1% | 3,530.69 | 1,543.18 |
| 2035 | 87.7% | 3,593.94 | 1,525.08 |
| 2036 | 89.2% | 3,657.20 | 1,506.72 |
| 2037 | 90.7% | 3,720.46 | 1,488.14 |
| 2038 | 92.3% | 3,783.71 | 1,469.36 |
| 2039 | 93.8% | 3,846.97 | 1,450.41 |
| 2040 | 95.4% | 3,910.23 | 1,431.32 |
| 2041 | 96.9% | 3,973.49 | 1,412.11 |
| 2042 | 98.5% | 4,036.74 | 1,392.81 |
| 2043 | 100.0% | 4,100.00 | 1,373.43 |
| Beyond | | | 45,781.00 |
| Total | | | 105,023.31 |

**Net lost services (sq ft years):** -15,742.20

## Notes

"Beyond" indicates the remaining time horizon into perpetuity.





# Habitat Equivalency Analysis

## Lahaina Small Boat Harbor - Piling Pier Construction

## Pilings Habitat

Annual discount rate: 3.0%

Present year: 2006

## Quantification of Lost Services

**Losses due to removal of existing pilings (14 24-inch diameter pilings)**

Affected habitat (sq ft): 527.79

| Year | (Percent) | (Sq Ft Years) Current Value | Present Value |
|---|---|---|---|
| 2008 | 100.0% | 527.79 | 497.49 |
| Beyond | | | 16,583.01 |
| Total | | | 17,080.50 |

**Gains due to installation of new pilings (100 24-inch diameter pilings)**

New piling habitat (sq ft): 3,769.91

| Year | (Percent) | (Sq Ft Years) Current Value | Present Value |
|---|---|---|---|
| 2009 | 0.0% | 0.00 | 0.00 |
| 2010 | 3.3% | 125.66 | 111.65 |
| 2011 | 6.7% | 251.33 | 216.80 |
| 2012 | 10.0% | 376.99 | 315.72 |
| 2013 | 13.3% | 502.65 | 408.70 |
| 2014 | 16.7% | 628.32 | 496.00 |
| 2015 | 20.0% | 753.98 | 577.86 |
| 2016 | 23.3% | 879.65 | 654.54 |
| 2017 | 26.7% | 1,005.31 | 726.26 |
| 2018 | 30.0% | 1,130.97 | 793.24 |
| 2019 | 33.3% | 1,256.64 | 855.71 |
| 2020 | 36.7% | 1,382.30 | 913.86 |
| 2021 | 40.0% | 1,507.96 | 967.91 |
| 2022 | 43.3% | 1,633.63 | 1,018.02 |
| 2023 | 46.7% | 1,759.29 | 1,064.40 |
| 2024 | 50.0% | 1,884.96 | 1,107.21 |
| 2025 | 53.3% | 2,010.62 | 1,146.63 |
| 2026 | 56.7% | 2,136.28 | 1,182.81 |
| 2027 | 60.0% | 2,261.95 | 1,215.91 |
| 2028 | 63.3% | 2,387.61 | 1,246.08 |
| 2029 | 66.7% | 2,513.27 | 1,273.46 |
| 2030 | 70.0% | 2,638.94 | 1,298.18 |
| 2031 | 73.3% | 2,764.60 | 1,320.39 |

| | | | |
|---|---|---|---|
| 2032 | 76.7% | 2,890.27 | 1,340.20 |
| 2033 | 80.0% | 3,015.93 | 1,357.74 |
| 2034 | 83.3% | 3,141.59 | 1,373.12 |
| 2035 | 86.7% | 3,267.26 | 1,386.45 |
| 2036 | 90.0% | 3,392.92 | 1,397.84 |
| 2037 | 93.3% | 3,518.58 | 1,407.39 |
| 2038 | 96.7% | 3,644.25 | 1,415.20 |
| 2039 | 100.0% | 3,769.91 | 1,421.36 |
| Beyond | | | 47,378.52 |
| Total | | | 77,389.14 |
| | | | |
| **Net loss services (sq ft):** | | | -60,308.63 |

## Notes

"Beyond" indicates the remaining time horizon into perpetuity.

# APPENDIX F.

# Traffic Impact Report, June 2006

**Traffic Impact Report**

# Lahaina Small Boat Harbor


Submitted to:
**Mitsunaga & Associates, Inc.**

Submitted by:
**Wilson Okamoto Corporation**

June 2006

***TRAFFIC ASSESSMENT REPORT***

***FOR THE***

***LAHAINA SMALL BOAT HARBOR***

*Prepared for*:

Mitsunaga & Associates, Inc.
747 Amana Street, Suite 216
Honolulu, Hawaii 96814

*Prepared by*:

Wilson Okamoto Corporation
1907 South Beretania Street
Honolulu, Hawaii 96826
WOC Ref: #7545-01

June 2006

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## LIST OF EXHIBITS



## LIST OF APPENDICES

## I. INTRODUCTION

### A. Purpose of Study

The purpose of this study is to assess anticipated traffic conditions resulting from the implementation of improvements at the existing Lahaina Small Boat Harbor located in Lahaina on the island of Maui. These improvements include the construction of a new ferry pier with a pedestrian walkway connection to the existing pier, sidewalk, parking, and roadway modifications, and the replacement of an existing comfort station, Harbor Master's Office, and ancillary structures.

### B. Scope of Study

This report presents the findings and conclusions of the traffic study, the scope of which includes:

1. Description of the proposed project.
2. Evaluation of existing traffic operations in the vicinity.
3. Analysis of projected traffic operations in the vicinity with the proposed project.
4. Recommendation of improvements, if appropriate, that would alleviate anticipated traffic operating conditions with the proposed project.

## II. PROJECT DESCRIPTION

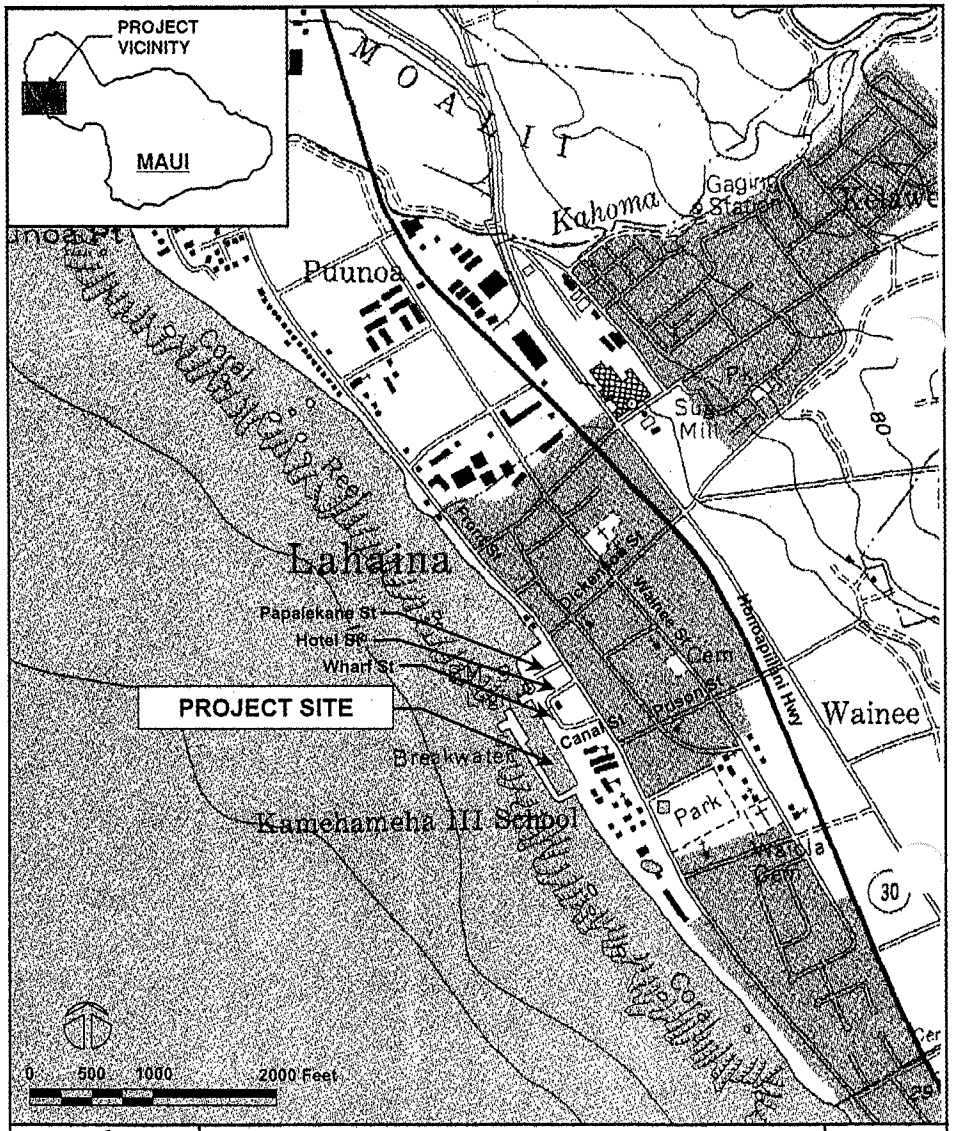
### A. Location

The existing Lahaina Small Boat Harbor is located west of Front Street between Dickenson Street and Prison Street in Lahaina on the island of Maui (see Figure 1). Access to the existing harbor from Front Street is currently provided via Hotel Street, Wharf Street, Canal Street, and Papalekane Street.

### B. Project Characteristics

The Lahaina Small Boat Harbor currently includes approximately 98 berths for recreational and commercial craft and a pier which houses the Harbor Master's Office, ferry kiosk, and diesel fuel dispensing and sewage pumping facilities. The existing pier is used to load/unload passengers from recreational and commercial vessels including cruise ship tenders and interisland ferries. When there are large cruise ships in port, the area immediately adjacent to this existing pier, including





portions of the adjacent roadway, is blocked by removable bollards and cones to create a security buffer area that is controlled by harbor personnel. As such, portions of the adjacent Wharf Street are inaccessible to privately owned vehicles. Only authorized vehicles driven by harbor personnel, library users, or guests of the adjacent Pioneer Inn are allowed to access this area.

The proposed project entails the construction of a new ferry pier north of the existing pier with a new pedestrian walkway connection to the existing pier, sidewalk, parking, and roadway modifications, and the replacement of an existing comfort station, Harbor Master's Office, and ancillary structures to conform to the Americans with Disabilities (ADA) and/or Lahaina Historic District requirements. The new ferry pier is intended to serve as the primary docking facility for the interisland ferries currently accessing the harbor and is expected to improve operating conditions in the harbor by alleviating existing vessel traffic congestion at the existing pier. Similarly, the proposed sidewalk, parking, and roadway modifications are intended to improve traffic operating conditions near the harbor by reducing the existing vehicular and pedestrian congestion in the immediate vicinity of the existing pier. As such, the proposed improvements are not anticipated to generate any additional trips to or from the harbor. However, the proposed roadway modifications would allow vehicular traffic to access the entire length of Wharf Street and Papalekane Street at all times. As such, vehicles exiting the harbor area may modify their route resulting in the redistribution of traffic in the project vicinity. The proposed improvements are expected to be completed by the Year 2010. Access to harbor will continue to be provided via Hotel Street, Wharf Street, Canal Street, and Papalekane Street. Figure 2 shows the proposed site plan.

## III. EXISTING CONDITIONS

### A. General

The existing Lahaina Small Boat Harbor is located west of Front Street, a predominantly two-lane, two-way roadway that provides access between Honoapiilani Highway and the commercial areas, residences, and other areas of accommodations along its alignment. In the vicinity of the project site, Honoapiilani Highway is a



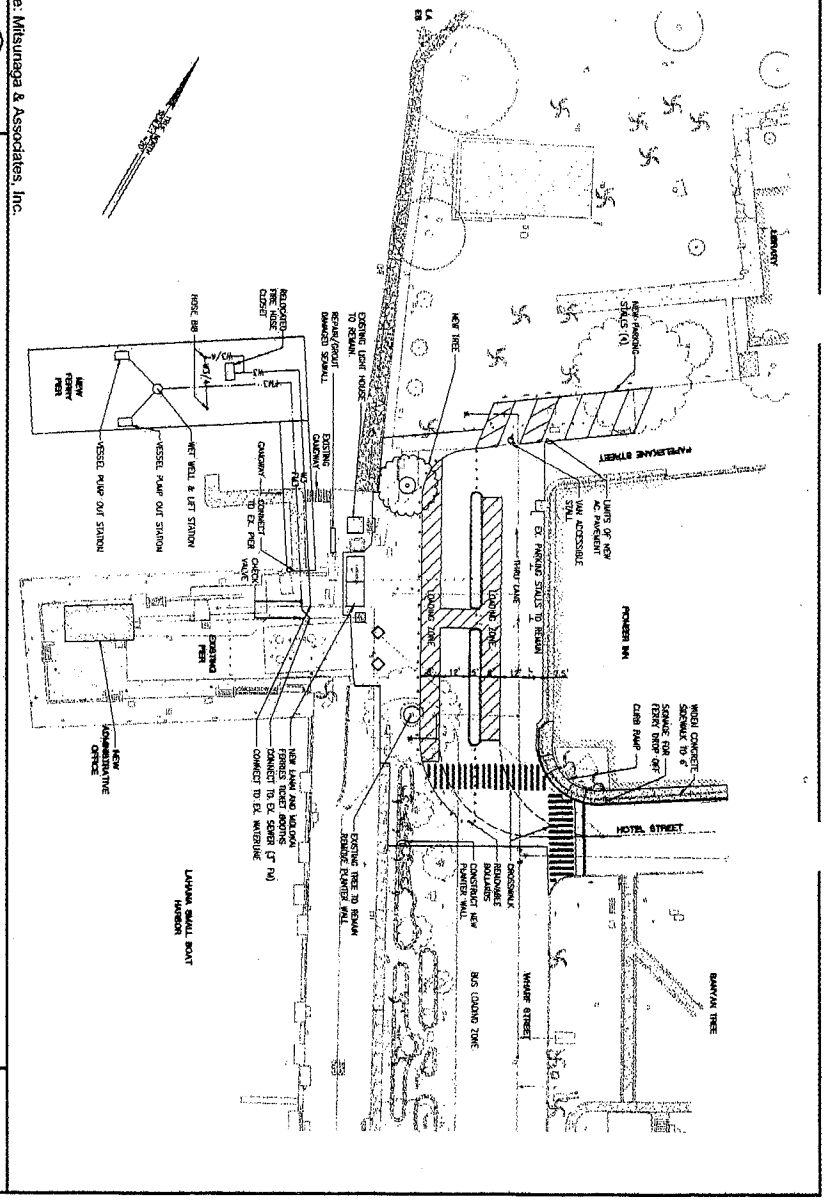
WILSON OKAMOTO CORPORATION
ENGINEERS - PLANNERS

PROJECT SITE PLAN

LAHAINA SMALL BOAT HARBOR

FIGURE 2

Source: Mitsunaga & Associates, Inc.



predominantly two-lane, two-way State of Hawaii roadway that serves as the main access road along the coastline of West Maui. Traffic volumes along the highway have increased steadily in recent years due to residential and commercial development in areas north of Lahaina.

**B. Area Roadway System**

Vehicular traffic access to the Lahaina Small Boat Harbor is currently provided via Front Street. Near the north end of the project site, Front Street intersects Hotel Street, a one-lane, one-way (westbound) roadway that serves as the primary entrance for the harbor. At this unsignalized T-intersection, both approaches of Front Street have one lane that serve through and turning traffic movements.

North of the intersection with Hotel Street, Front Street intersects Papalekane Street, a one-lane, one-way (eastbound) roadway that serves as a secondary exit for the harbor. At this unsignalized T-intersection, both approaches of Front Street have one lane that serve through traffic only while the Papalekane Street approach has one lane that serves left-turn and right-turn traffic movements.

South of the intersection with Hotel Street, Front Street intersects Canal Street. At this unsignalized T-intersection, both approaches of Front Street have one lane that serve through traffic only. Canal Street is a predominantly one-lane, one-way (eastbound) roadway that serves as the primary exit for the harbor. At the intersection with Front Street, the Canal Street approach has two exclusive turning lanes.

Further south, Front Street intersects Prison Street. At this unsignalized T-intersection, both approaches of Front Street have one lane that serve through and turning traffic movements. Prison Street is a two-lane, two-way County of Maui roadway generally oriented in the east-west direction that primarily serves as a connector roadway between Front Street and Honoapiilani Highway. At the intersection with Front Street, the Prison Street approach has one lane that serves left-turn and right-turn traffic movements.

East of the intersection with Front Street, Prison Street intersects Wainee Street. At this unsignalized intersection, both approaches of Prison Street have one





lane that serve left-turn, through, and right-turn traffic movements. Wainee Street is a two-lane, two-way County of Maui roadway generally oriented in the north-south direction that provides access to the residential and commercial properties along its alignment. At the intersection with Prison Street, both approaches of Wainee Street have one lane that serve all traffic movements.

Further east, Prison Street intersects Honoapiilani Highway. At this unsignalized intersection, the eastbound approach of Prison Street has one lane that serves through and right-turn traffic movements while the westbound approach has one lane that serves all traffic movements. The northbound approach of Honoapiilani Highway has an exclusive left-turn lane and a shared through and right-turn lane at this intersection while the southbound approach has one lane that serves through and right-turn traffic movements.

North of the intersection with Papalekane Street, Front Street intersects Dickenson Street. At this unsignalized T-intersection, both approaches of Front Street have one lane that serves through and turning traffic movements. Dickenson Street is a two-lane, two-way County of Maui roadway generally oriented in the east-west direction that primarily serves as a connector roadway between Front Street and Honoapiilani Highway. At the intersection with Front Street, the Dickenson Street approach has one lane that serves left-turn and right-turn traffic movements.

East of the intersection with Front Street, Dickenson Street intersects Wainee Street. At this unsignalized intersection, the eastbound and westbound approaches of Dickenson Street have one lane that serves all traffic movements. The northbound and southbound approaches of Wainee Street also have one lane at this intersection that serves all traffic movements.

Further east, Dickenson Street intersects Honoapiilani Highway. At this signalized intersection, both approaches of Dickenson Street have one lane that serves all traffic movements. The northbound approach of Honoapiilani Highway has an exclusive left-turn lane and a shared through and right-turn lane at this intersection while the southbound approach has an exclusive left-turn lane, one through lane, and a shared through and right-turn lane.

## C. Traffic Volumes and Conditions

### 1. General

#### a. Field Investigation

Field investigations were conducted on March 8-9 and 29-31, 2006 and April 18-19 and 25-26, 2006, and consisted of field observations of traffic conditions in the vicinity and manual turning movement count surveys in the project vicinity. These investigations encompassed periods when there were cruise ships in port with more than 2,000 passengers (hereinafter referred to as a "Boat Day") and when there were only smaller ships in port (hereinafter referred to as a "Non Boat Day"). On a "Boat Day," the manual turning movement count surveys were conducted between the morning peak hours of 8:30 AM and 10:30 AM, and between the afternoon peak hours of 3:30 PM and 5:30 PM at the following intersections:

- Front Street and Hotel Street
- Front Street and Prison Street
- Prison Street and Wainee Street
- Prison Street and Honoapiilani Highway
- Front Street and Dickenson Street
- Dickenson Street and Wainee Street
- Dickenson Street and Honoapiilani Highway

On a "Non Boat Day," the manual turning movement count surveys were conducted between the morning peak hours of 7:00 AM and 9:00 AM, and the between the afternoon peak hours of 3:30 PM and 5:30 PM. In addition, any available 24-hour traffic counts along Honoapiilani Highway were reviewed and additional 24-hour traffic counts surveys were collected along Hotel Street, Canal Street, Prison Street, and Dickenson Street.





#### b. Capacity Analysis Methodology

The highway capacity analysis performed in this study is based upon procedures presented in the "Highway Capacity Manual", Transportation Research Board, 2000, and the "Highway Capacity Software", developed by the Federal Highway Administration. The analysis is based on the concept of Level of Service (LOS).

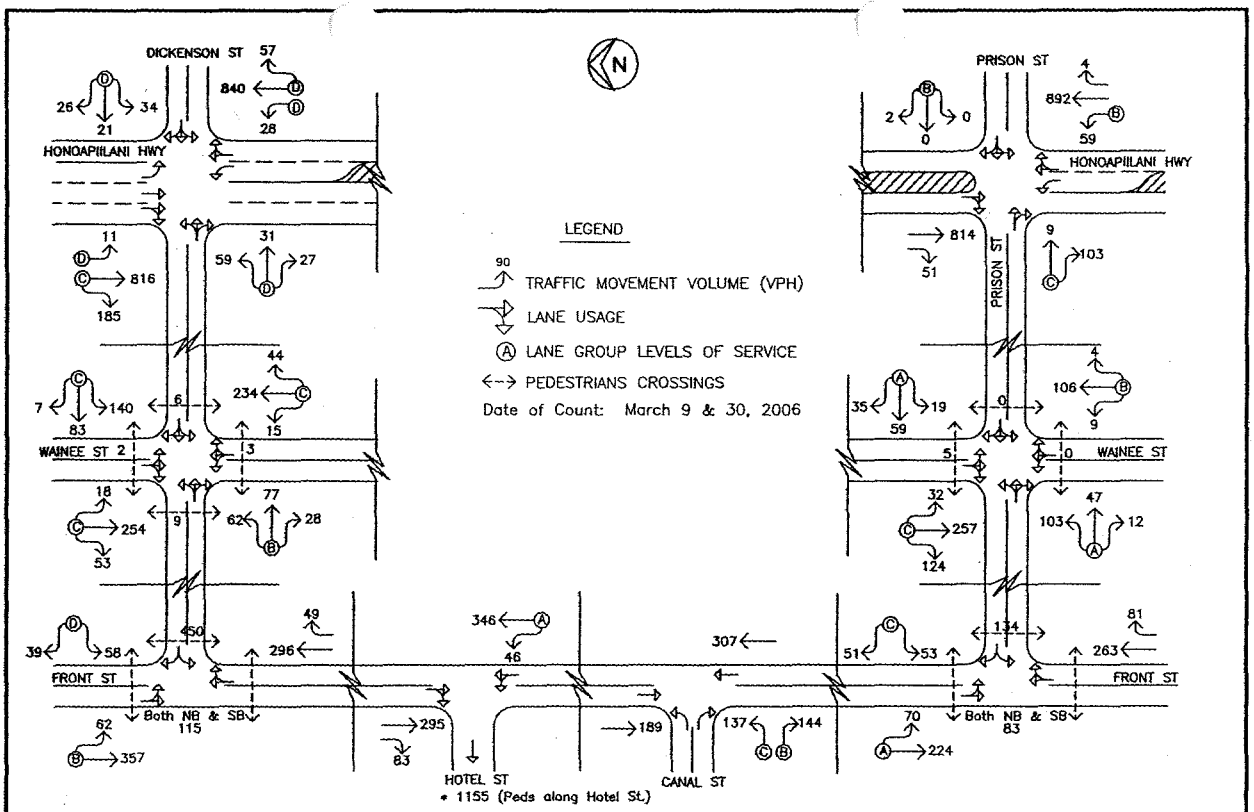
LOS is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F". LOS "A" represents ideal or free-flow traffic operating conditions and LOS "F" represents unacceptable or potentially congested traffic operating conditions. LOS "B", "C", "D", and "E" represent the intermediate traffic operational characteristics between the two extremes of LOS "A" and LOS "F". The LOS definitions are included in Appendix B.

"Volume-to-Capacity" (v/c) ratio is another measure indicating the relative traffic demand to the roadway carrying capacity. A v/c ratio of one (1.00) indicates that the roadway is operating at or near capacity. A v/c ratio of greater than 1.00 generally indicates that the traffic demand exceeds the road's carrying capacity.

### 2. Existing Peak Hour Traffic

#### a. General

Figures 3 to 6 show the existing AM and PM peak hour traffic volumes and traffic operating conditions in the project vicinity on a "Boat Day" and "Non Boat Day." In the vicinity of the proposed project, the AM peak hour of traffic generally occurs between 9:30 AM and 10:30 AM on a "Boat Day" and between 7:00 AM and 8:00 AM on a "Non Boat Day." In the afternoon, the PM peak hour of traffic generally occurs between the hours of 3:30 PM and 4:30 PM for both a "Boat Day" and "Non Boat Day." The analysis is based on these peak hour time periods to identify the traffic impacts resulting

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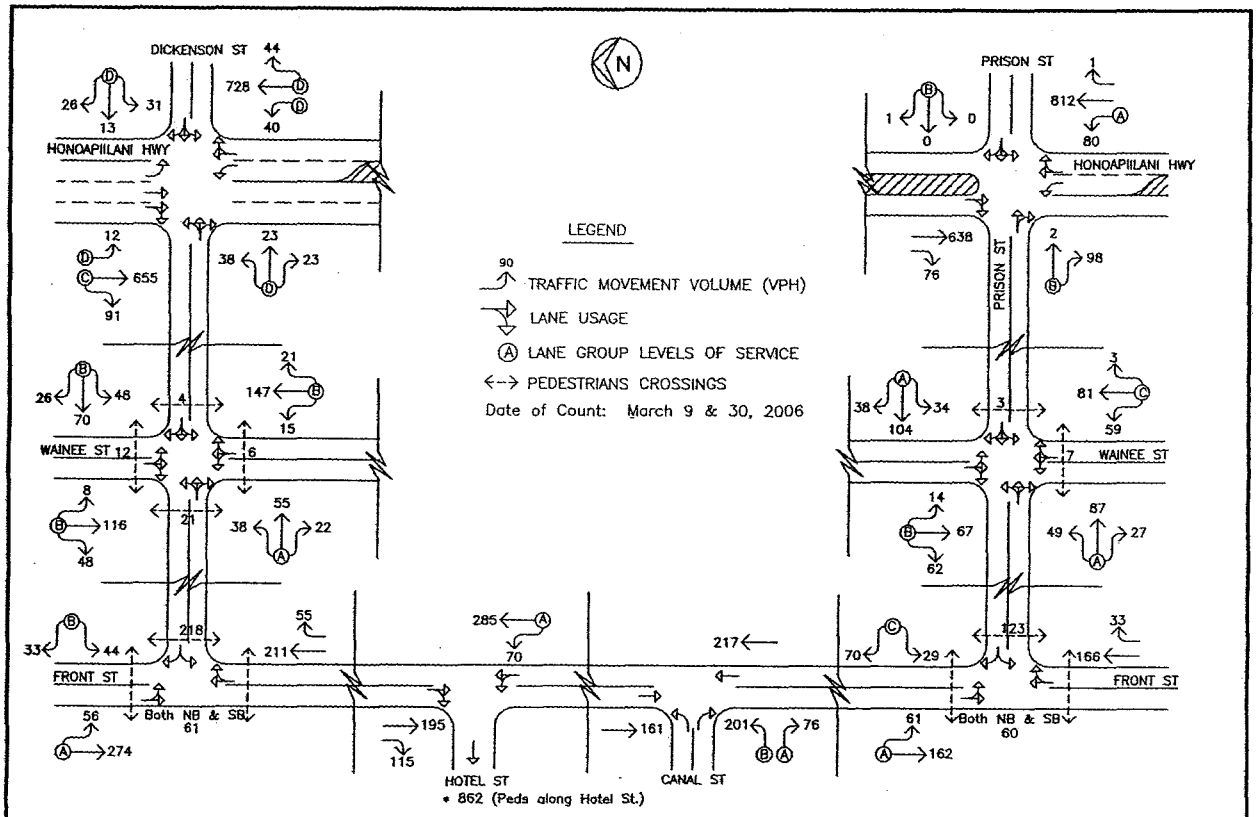
## EXISTING PM PEAK HOURS OF TRAFFIC - BOAT DAY

FIGURE 4

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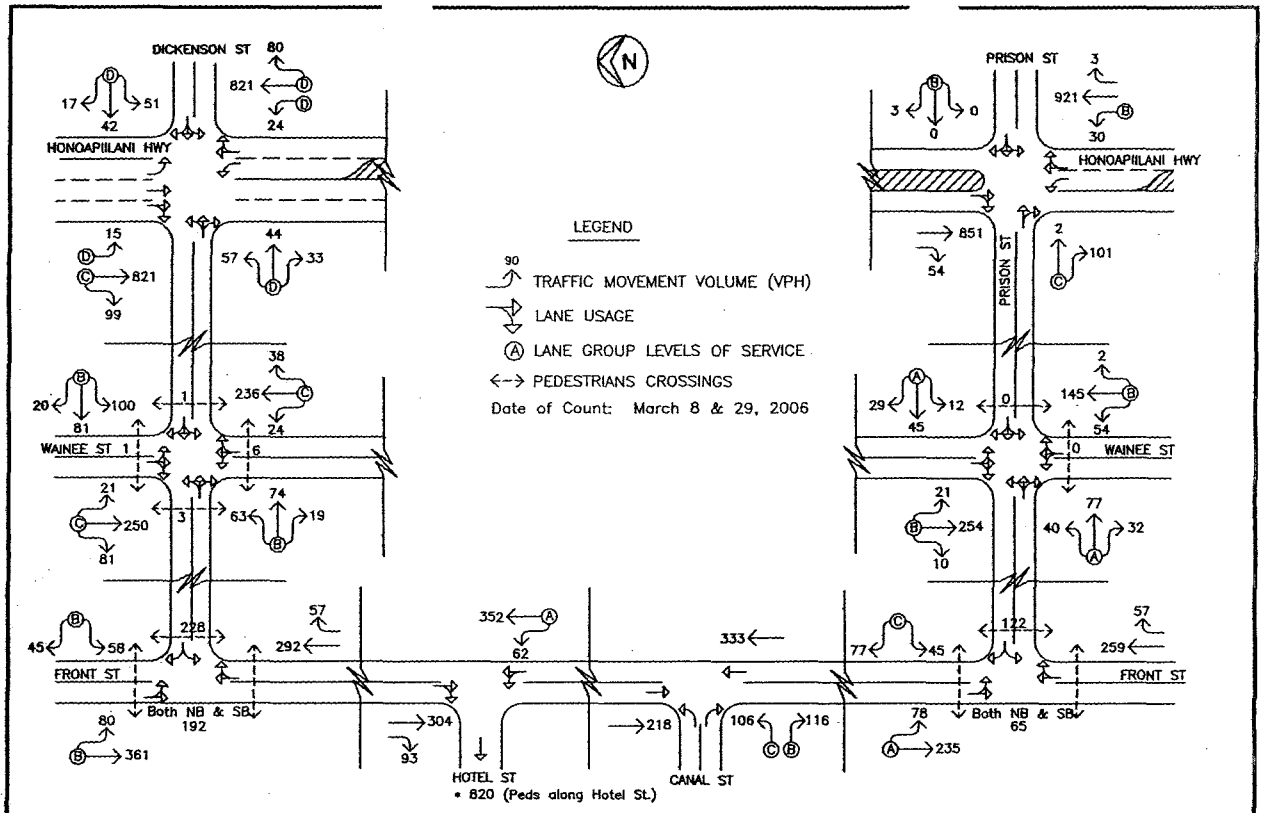
## EXISTING AM PEAK HOURS OF TRAFFIC - BOAT DAY

FIGURE 3

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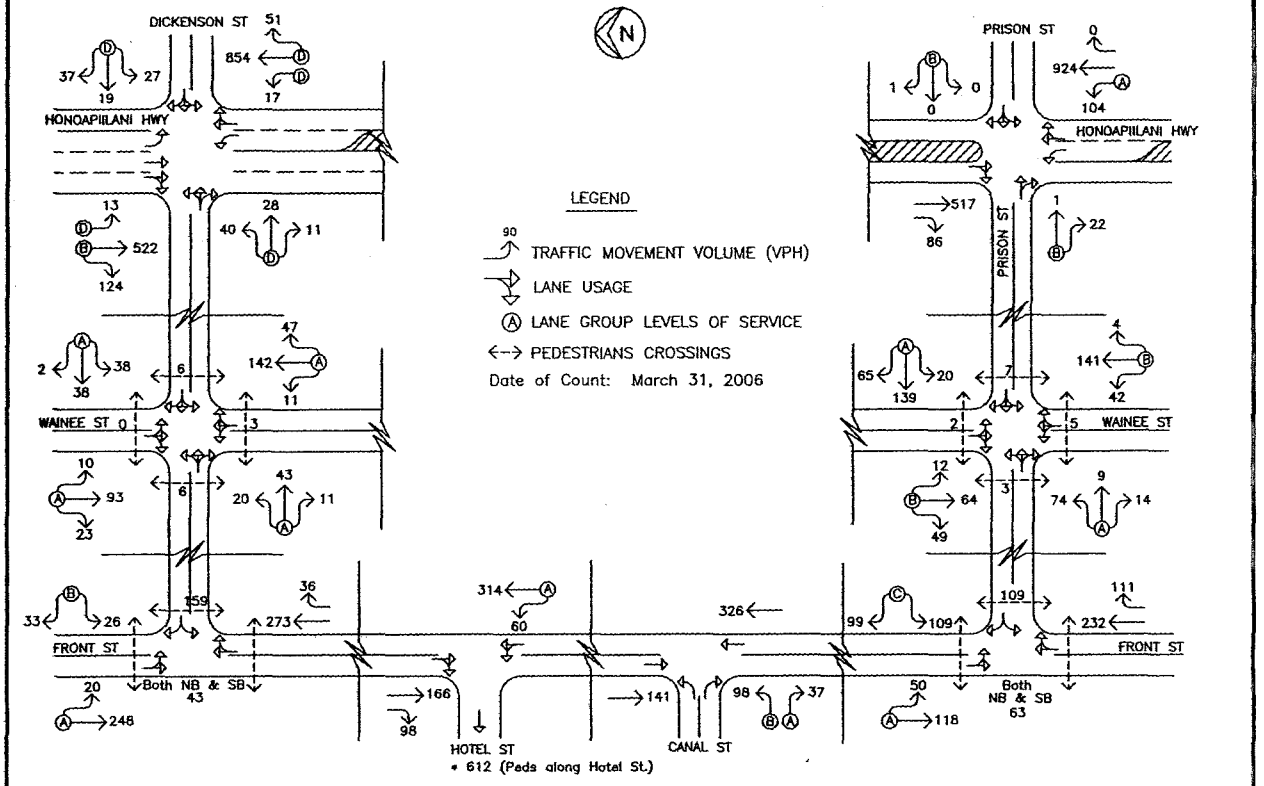
## EXISTING PM PEAK HOURS OF TRAFFIC - NON BOAT DAY

FIGURE 6

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## EXISTING AM PEAK HOURS OF TRAFFIC - NON BOAT DAY

FIGURE 5

from the proposed project. The LOS calculation worksheets are included in Appendix C.

**b. Front Street and Hotel Street**

At the intersection with Hotel Street, Front Street carries 355 vehicles northbound and 310 vehicles southbound during the AM peak period on a "Boat Day," and 374 vehicles northbound and 264 vehicles southbound on a "Non Boat Day." During the PM peak period, traffic volumes are higher with 392 vehicles traveling northbound and 378 vehicles traveling southbound on a "Boat Day" and 414 vehicles traveling northbound and 397 southbound on a "Non Boat Day." A significant portion of this traffic is comprised of taxis, limos, buses, and shuttles. On a "Boat Day," the volume of buses and shuttles was three to five times higher than on a "Non Boat Day." The critical movement at the intersection is the northbound left-turn and through traffic movement which operates at LOS "A" during all peak periods.

Pedestrian traffic at the intersection and along Hotel Street is fairly high. Approximately 862 pedestrians and 612 pedestrian were observed traveling along that roadway during the AM peak period of a "Boat Day" and "Non Boat Day," respectively, and 1,155 pedestrians and 820 pedestrians observed along that roadway during the PM peak period of a "Boat Day" and "Non Boat Day," respectively. These pedestrians conflict with turning vehicular traffic at the intersection and often impede the movement of vehicles along Hotel Street.

**c. Front Street and Canal Street**

At the intersection with Canal Street, Front Street carries 217 vehicles northbound and 161 vehicles southbound during the AM peak period on a "Boat Day," and 326 vehicles northbound and 141 vehicles southbound on a "Non Boat Day." During the PM peak period, traffic volumes are slightly higher with 307 vehicles traveling northbound and





189 vehicles traveling southbound on a "Boat Day" and 333 vehicles traveling northbound and 218 southbound on a "Non Boat Day."

The Canal Street approach of the intersection carries 277 vehicles and 135 vehicles eastbound during the AM peak period on a "Boat Day" and "Non Boat Day," respectively. During the PM peak period, traffic volumes are slightly higher with 281 vehicles and 222 vehicles traveling eastbound. The left-turn traffic movement on this approach operates at LOS "B" and LOS "C" during the AM and PM peak periods, respectively, of a "Boat Day" and "Non Boat Day" while the right-turn traffic movement operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively, of a "Boat Day" and "Non Boat Day."

**d. Front Street and Prison Street**

At the intersection with Prison Street, Front Street carries 199 vehicles northbound and 223 vehicles southbound during the AM peak period on a "Boat Day," and 343 vehicles northbound and 168 vehicles southbound on a "Non Boat Day." During the PM peak period, the overall traffic volume is higher with 344 vehicles traveling northbound and 294 vehicles traveling southbound on a "Boat Day" and 316 vehicles traveling northbound and 313 southbound on a "Non Boat Day." The critical movement on the Front Street approaches is the southbound left-turn and through traffic movement which operates at LOS "A" during all peak periods. Pedestrian volumes crossing Front Street are significantly lower than along Hotel Street with 60 pedestrians and 63 pedestrians observed crossing the street during the AM peak period of a "Boat Day" and "Non Boat Day," respectively. During the PM peak period, pedestrian volumes are approximately the same with 83 pedestrians and 65 pedestrians observed crossing the street on a "Boat Day" and "Non Boat Day," respectively.

The Prison Street approach of the intersection carries 99 vehicles and 208 vehicles westbound during the AM peak period on a "Boat Day" and "Non Boat Day," respectively. During the PM peak period, this approach carries 104 vehicles and 122 vehicles westbound. Vehicular queues periodically formed on this approach with average queue lengths of 3-5 vehicles observed during all peak periods. The Prison Street approach operates at LOS "C" during all peak periods. Pedestrian volumes crossing Prison Street are slightly higher than those crossing Front Street with 123 pedestrians and 109 pedestrians observed crossing the street during the AM peak period of a "Boat Day" and "Non Boat Day," respectively. During the PM peak period, 134 pedestrians and 122 pedestrians were observed crossing the street on a "Boat Day" and "Non Boat Day," respectively.

**e. Prison Street and Wainee Street**

At the intersection with Wainee Street, Prison Street carries 163 vehicles eastbound and 176 vehicles westbound during the AM peak period on a "Boat Day," and 97 vehicles eastbound and 224 vehicles westbound on a "Non Boat Day." During the PM peak period, the overall traffic volume is slightly less with 162 vehicles traveling eastbound and 113 vehicles traveling westbound on a "Boat Day" and 149 vehicles traveling eastbound and 86 traveling westbound on a "Non Boat Day." Both approaches of Prison Street operate at LOS "A" during all peak periods.

The Wainee Street approaches of the intersection carry 143 vehicles northbound and 143 vehicles southbound during the AM peak period on a "Boat Day," and 187 vehicles northbound and 125 vehicles southbound on a "Non Boat Day." During the PM peak period, the overall traffic volume is higher with 119 vehicles traveling northbound and 413 vehicles traveling southbound on a "Boat Day" and 201 vehicles traveling northbound and 285 traveling southbound on a "Non





Boat Day." Vehicular queues periodically formed on both approaches with average queue lengths of 3-5 vehicles observed during all peak periods. The northbound approach of Wainee Street operates at LOS "C" and LOS "B" during the AM and PM peak periods, respectively, of a "Boat Day" while the southbound approach operates at LOS "B" and LOS "C" during the AM and PM peak periods, respectively. On a "Non Boat Day," both approaches of Wainee Street operate at LOS "B" during both peak periods.

**f. Prison Street and Honoapiilani Highway**

At the intersection with Honoapiilani Highway, Prison Street carries 100 vehicles eastbound and 1 vehicle westbound during the AM peak period on a "Boat Day," and 23 vehicles eastbound and 1 vehicle westbound on a "Non Boat Day." During the PM peak period, traffic volumes are higher with 112 vehicles traveling eastbound and 2 vehicle traveling westbound on a "Boat Day" and 103 vehicles traveling eastbound and 3 vehicles traveling westbound on a "Non Boat Day." Vehicular queues periodically formed on the eastbound approach of Prison Street with average queue lengths of 3-5 vehicles observed during all peak periods. The eastbound approach of Prison Street operates at LOS "B" and LOS "C" during the AM and PM peak periods, respectively, of a "Boat Day" and "Non Boat Day" while the westbound approach operates at LOS "B" during all peak periods.

The Honoapiilani Highway approaches of the intersection carry 893 vehicles northbound and 714 vehicles southbound during the AM peak period on a "Boat Day," and 1,028 vehicles northbound and 603 vehicles southbound on a "Non Boat Day." During the PM peak period, the overall traffic volume is higher with 955 vehicles traveling northbound and 865 vehicles traveling southbound on a "Boat Day" and 954 vehicles traveling northbound and 905 traveling southbound on a "Non Boat Day." Although the highway approaches of the

intersection are uncontrolled, during the PM peak period vehicular queues from downstream intersections were observed extending to and periodically through the intersection with Prison Street. The critical traffic movement on the Honoapiilani Highway approaches is the northbound left-turn and through traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively, of a "Boat Day" and "Non Boat Day."

**g. Front Street and Dickenson Street**

At the intersection with Dickenson Street, Front Street carries 266 vehicles northbound and 330 vehicles southbound during the AM peak period on a "Boat Day," and 309 vehicles northbound and 268 vehicles southbound on a "Non Boat Day." During the PM peak period, traffic volumes are higher with 345 vehicles traveling northbound and 419 vehicles traveling southbound on a "Boat Day" and 349 vehicles traveling northbound and 441 southbound on a "Non Boat Day." The critical movement on the Front Street approaches is the southbound left-turn and through traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively, of a "Boat Day" and "Non Boat Day." Pedestrian volumes crossing Front Street are also significantly lower than along Hotel Street with 61 pedestrians and 43 pedestrians observed crossing the street during the AM peak period of a "Boat Day" and "Non Boat Day," respectively. During the PM peak period, pedestrian volumes are higher with 115 pedestrians and 192 pedestrians observed crossing the street on a "Boat Day" and "Non Boat Day," respectively.

The Dickenson Street approach of the intersection carries 77 vehicles and 59 vehicles westbound during the AM peak period on a "Boat Day" and "Non Boat Day," respectively. During the PM peak period, traffic volumes are higher with 97 vehicles and 103 vehicles traveling westbound. Vehicular queue periodically formed on this





approach with average queue lengths of 3-5 vehicles observed during all peak periods. The Dickenson Street approach operates at LOS "B" and LOS "D" during the AM and PM peak periods, respectively, of a "Boat Day" and at LOS "B" during both peak periods of a "Non Boat Day." Pedestrian volumes crossing Dickenson Street are higher than those crossing Front Street with 218 pedestrians and 159 pedestrians observed crossing the street during the AM peak period of a "Boat Day" and "Non Boat Day," respectively. During the PM peak period, 450 pedestrians and 228 pedestrians were observed crossing the street on a "Boat Day" and "Non Boat Day," respectively.

**h. Dickenson Street and Wainee Street**

At the intersection with Wainee Street, Dickenson Street carries 115 vehicles eastbound and 144 vehicles westbound during the AM peak period on a "Boat Day," and 74 vehicles eastbound and 78 vehicles westbound on a "Non Boat Day." During the PM peak period, traffic volumes are higher with 167 vehicles traveling eastbound and 230 vehicles traveling westbound on a "Boat Day" and 156 vehicles traveling eastbound and 201 traveling westbound on a "Non Boat Day." Vehicular queues periodically formed along Dickenson Street with average queue lengths of 3-5 vehicles observed during all peak periods. Occasionally, queues from the downstream intersection with Honoapiilani Highway extended through this intersection. The eastbound approach of Dickenson Street operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively, of a "Boat Day" and "Non Boat Day." The westbound approach operates at LOS "B" and LOS "C" during the AM and PM peak periods, respectively, of a "Boat Day" and at "LOS "A" and LOS "B" during the AM and PM peak periods, respectively, of a "Non Boat Day."

The Wainee Street approaches of the intersection carry 183 vehicles northbound and 172 vehicles southbound during the AM peak period on a "Boat Day," and 200 vehicles northbound and 126 vehicles southbound on a "Non Boat Day." During the PM peak period, traffic volumes are higher with 293 vehicles traveling northbound and 325 vehicles traveling southbound on a "Boat Day" and 298 vehicles traveling northbound and 352 traveling southbound on a "Non Boat Day." Vehicular queues periodically formed along Wainee Street with average queue lengths of 3-5 vehicles observed during all peak periods. Both approaches operate at LOS "B" and LOS "C" during the AM and PM peak periods, respectively, of a "Boat Day" and at LOS "A" and LOS "C" during the AM and PM peak periods, respectively, of a "Non Boat Day."

**i. Dickenson Street and Honoapiilani Highway**

At the intersection with Honoapiilani Highway, Dickenson Street carries 84 vehicles eastbound and 70 vehicles westbound during the AM peak period on a "Boat Day," and 79 vehicles eastbound and 83 vehicles westbound on a "Non Boat Day." During the PM peak period, traffic volumes are higher with 117 vehicles traveling eastbound and 81 vehicles traveling westbound on a "Boat Day" and 134 vehicles traveling eastbound and 110 traveling westbound on a "Non Boat Day." Vehicular queues periodically formed along Dickenson Street with the most significant queuing occurring on the eastbound approach during the PM peak period with average queue lengths of 5-7 vehicles observed during this period. Occasionally, these queues extended through the upstream intersection with Wainee Street. Both approaches of Dickenson Street operate at LOS "D" during all peak periods.

The Honoapiilani Highway approaches of the intersection carry 812 vehicles northbound and 758 vehicles southbound during the AM





peak period on a "Boat Day," and 922 vehicles northbound and 659 vehicles southbound on a "Non Boat Day." During the PM peak period, traffic volumes are higher with 925 vehicles traveling northbound and 1,012 vehicles traveling southbound on a "Boat Day" and 925 vehicles traveling northbound and 935 traveling southbound on a "Non Boat Day." Vehicular queues periodically formed on the highway approaches of the intersection with the most significant queuing occurring on the southbound approach during the PM peak period. Average queue lengths of 15-20 vehicles were observed during this peak period. Occasionally, vehicular queues from downstream intersections were observed extending to and periodically through the intersection with Dickenson Street. Most of these queues would clear the intersection after each traffic signal cycle change, however some vehicles had to wait for more than one traffic signal cycle length. The traffic movements on the northbound approach and the southbound left-turn traffic movement operate at LOS "D" during all peak periods while the southbound through and right-turn traffic movement operates at LOS "C" during both peak periods of a "Boat Day" and at LOS B" and LOS "C" during the AM and PM peak periods, respectively, of a "Non Boat Day."

## IV. PROJECTED TRAFFIC CONDITIONS

### A. General

As previously stated, the new pier is intended to serve as the primary docking facility for the interisland ferries currently accessing the harbor. As such, the proposed improvements are not anticipated to generate any additional vehicular trips to or from the harbor. However, the proposed roadway modifications may result in the redistribution of traffic in the project vicinity.

**B. Traffic Reassignment**

Currently, most vehicles accessing the harbor area enter via Hotel Street, turn left onto Wharf Street, and exit via Canal Street, especially on a "Boat Day" when the north end of Wharf Street is blocked off to create a security buffer for the pier. However, the proposed roadway modifications would allow vehicular traffic to access the entire length of Wharf Street at all times thereby providing an alternate route to Front Street via Papalekane Street. However, due to the narrowness of the travel lane along Papalekane Street and the higher conflicting traffic volumes along Front Street near Papalekane Street, only 20% of the existing trips utilizing Canal Street to exit the harbor area were assumed to utilize Papalekane Street instead. The directional distribution of exiting vehicles at the intersection of Front Street and Papalekane Street was assumed to remain similar to the existing distribution at the Canal Street intersection.

**C. Through Traffic Forecasting Methodology**

An analysis of both historical traffic data and traffic projections contained within Maui Long-Range Land Transportation Plan (MLRLTP) was made to determine the appropriate ambient growth of traffic demands in the project vicinity. The historical data, using linear regression analyses, indicate an average annual traffic growth rate in the vicinity of approximately 1.0%, while the MLRLTP indicates a negative average annual traffic growth rate. Therefore, for conservative analysis purposes, the travel forecast used in this study is based upon the historical traffic count data obtained from the State Department of Transportation (DOT) resulting in an average annual traffic growth rate of 1.0%. Using Year 2006 as the base year, a growth rate factor of 1.04 was applied to the existing through traffic demands on the highway to achieve the projected ambient traffic demands for Year 2010.

**D. Other Considerations**

The following are other developments expected to be completed by the Year 2010 when the proposed improvements at the Lahaina Small Boat Harbor are anticipated to be completed:





- Maui Breakers project in Mahinahina, which includes 90 multi-family affordable residential units, is expected to be completed by the Year 2010.
- Villas at Kahana Ridge development includes 117 multi-family residential units and is expected to be completed by the Year 2010.
- Lokahi Pacific project in Lahaina with an expected completion by the Year 2010. The Lokahi Pacific project includes 12 single-family residential units.
- North Beach Lot 1 project of the Kaanapali Ocean Resort subdivision, which includes a total of 280 timeshare units. At the time of the study, North Beach Lot 1 included 103 units, with the balance of 177 units currently under construction and soon to be completed.
- North Beach Lot 2 of Kaanapali Ocean Resort subdivision, located adjacent to North Beach Lot 1, is currently in the planning stages at this writing, and includes approximately 258 multi-family units with potential lockouts for each unit.
- North Beach Lot 4 of the Kaanapali North Beach subdivision (also known as Honua Kai) located makai of Honoapiilani Highway in the vicinity of Lower Honoapiilani Road which includes a total of 700 multi-family units to be constructed in five phases, this first of which is expected to be completed by the Year 2009 and the rest of the phases is expected to be completed by the Year 2008.
- Kaanapali Golf Estates Parcels 22 and 23 residential subdivision located mauka of Honoapiilani highway within the South Beach Mauka are will include 132 single-family recreational homes. Construction is expected to start soon with completion anticipated by Year 2007.
- Pioneer Farms Phases I and II residential subdivision located in Kaanapali, mauka of Honoapiilani Highway. The proposed project will include 108 residential lots with expected completion by Year 2008.
- Maui Preparatory Academy located mauka of Honoapiilani Highway with access to and from the highway via the Napilihau Street intersection. The project is expected to include a total of 540 students from pre-kindergarten to grade 12with the expected completion by Year 2013. The project will be completed by three

phases. The first two phases will include an enrollment of 198 students total with build-out in Year 2008. Therefore, only 198 students will be included in the trip-generation for this analysis.

- Residences at Kapalua Bay project located in Kapalua on the makai side of Honoapiilani Highway. The proposed project entails the redevelopment of the existing Kapalua Bay Hotel to include approximately 155, 2- and 3-bedroom units with expected completion by Year 2008.
- Villages at Lealii, a residential development that includes a total of 4,846 dwelling units, 2,006 single-family units and 2,840 multi-family units. The proposed project is expected to include 104 single-family units with build-out in Year 2006. Build-out for the rest of the residential development is expected to occur beyond the expected completion of the proposed residential development.
- Royal Lahaina Resort project located in Kaanapali on the makai side of Honoapiilani Highway. The proposed project entails the revitalization of the existing resort to include approximately 330 hotel units in a 12-story tower and 125 condominium/hotel units in 11 new building with expected completion by Year 2009.
- Lahaina Cannery Mall located adjacent to Honoapiilani Highway near the intersections with Keawe Street and Kapunakea Street. The proposed expansion project is anticipated to completed by Year 2008 and is expected to increase the existing floor area by approximately 33,160 square feet.

The traffic generated by the above projects, as applicable, were estimated based on the generation rates and procedures identified in the Institute of Transportation Engineers publication on trip generation for specific land use types, and other traffic studies associated with each proposed development. The determined traffic generation was applied to the ambient traffic growth, thus incorporating these additional applicable projects in the baseline traffic conditions. The purpose of including traffic demands from these other developments is to obtain a more realistic traffic forecast model and to ensure that any adverse traffic operational impacts can be properly addressed. Thus, the traffic analysis would include the cumulative traffic





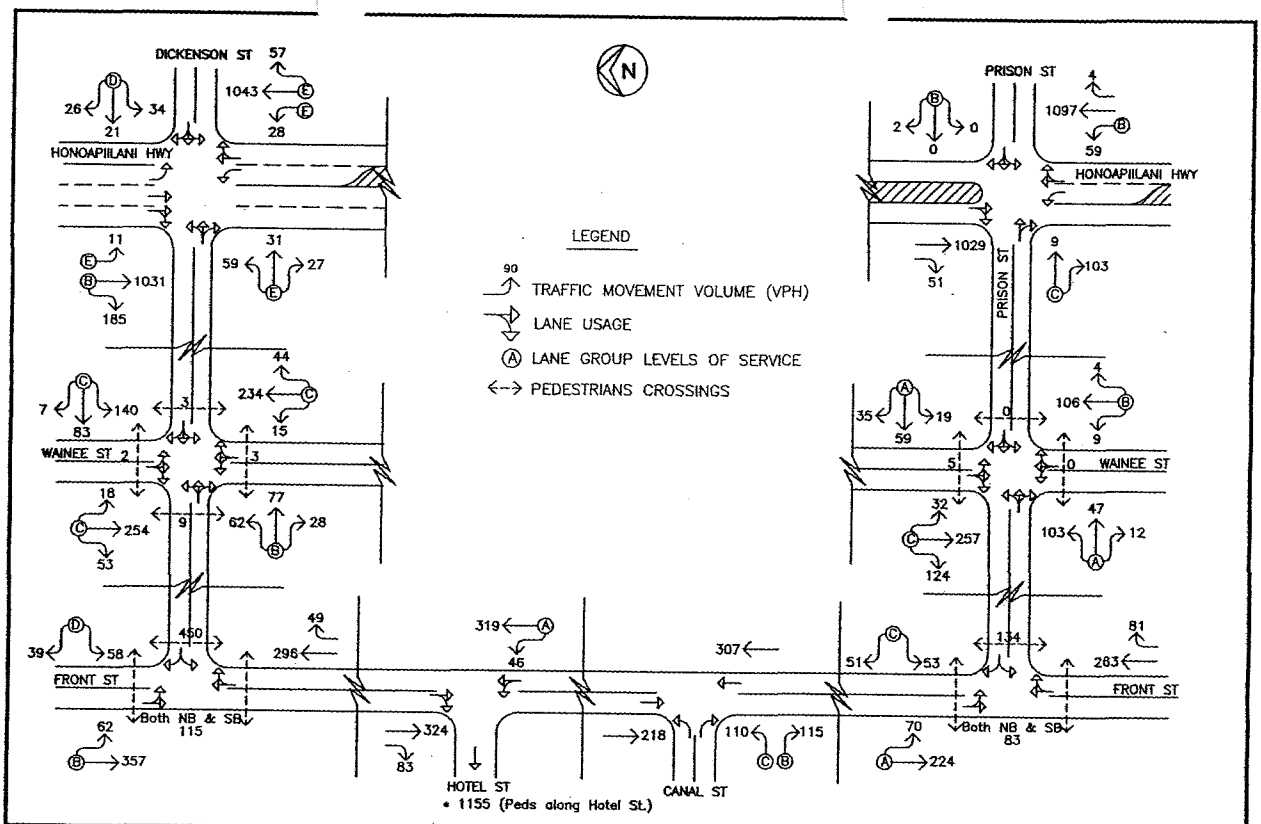
demands on the roadways in the vicinity of the project at its build-out. Should there be additional developments not accounted for in the analysis, the average annual ambient traffic growth rate utilized in the traffic forecast is expected to encompass the increase traffic demands resulting from these unknown developments. Should there be no additional developments other than those stated above, including the average annual ambient growth rate would represent a conservative traffic analysis in terms of future traffic projections.

**E. Total Traffic Volumes With Project**

The Year 2010 cumulative AM and PM peak hour traffic conditions with the implementation of improvements at the Lahaina Small Boat Harbor on a "Boat Day" and "Non Boat Day" are shown in Figures 7 to 10, and summarized in Tables 1 and 2. The existing levels of service are included for comparison purposes. LOS calculations are included in Appendix D.

**Table 1: Existing and Projected Levels of Service on a "Boat Day"**

| Intersection | Critical Movement | | AM | | PM | |
|---|---|---|---|---|---|---|
| | | | Exist | Year 2010 w/ Proj | Exist | Year 2010 w/ Proj |
| Front St/Hotel St | Northbound | LT-TH | A | A | A | A |
| Front St/Canal St | Eastbound | LT | B | B | C | C |
| | | RT | A | A | B | B |
| Front St/Prison St | Westbound | LT-RT | C | C | C | C |
| | Southbound | LT-TH | A | A | A | A |
| Prison St/Wainee St | Eastbound | LT-TH-RT | A | A | A | A |
| | Westbound | LT-TH-RT | A | A | A | A |
| | Northbound | LT-TH-RT | C | C | B | B |
| | Southbound | LT-TH-RT | B | B | C | C |
| Prison St/ Honoapiilani Hwy | Eastbound | TH-RT | B | B | C | C |
| | Westbound | LT-TH-RT | B | B | B | B |
| | Northbound | LT | A | A | B | B |

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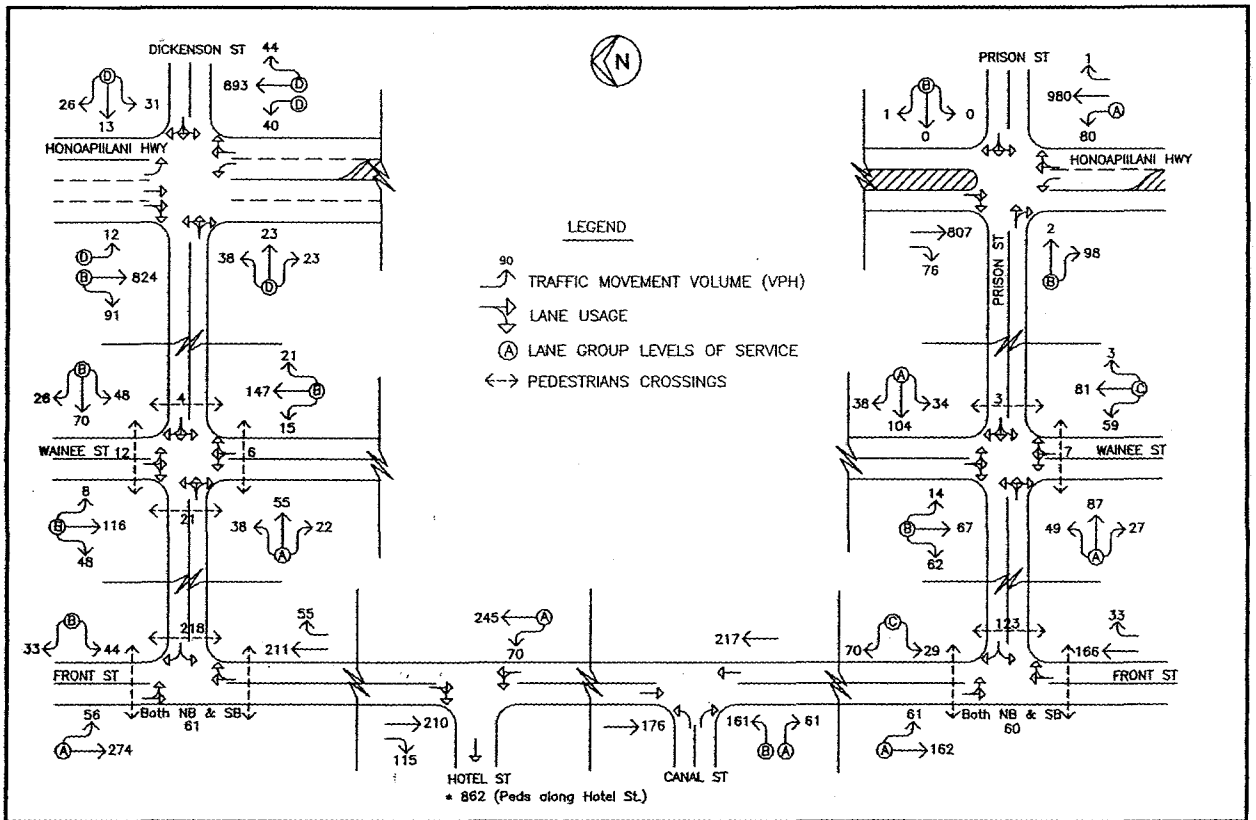
## YEAR 2010 PM PEAK HOURS OF TRAFFIC WITH PROJECT - BOAT DAY

FIGURE 8

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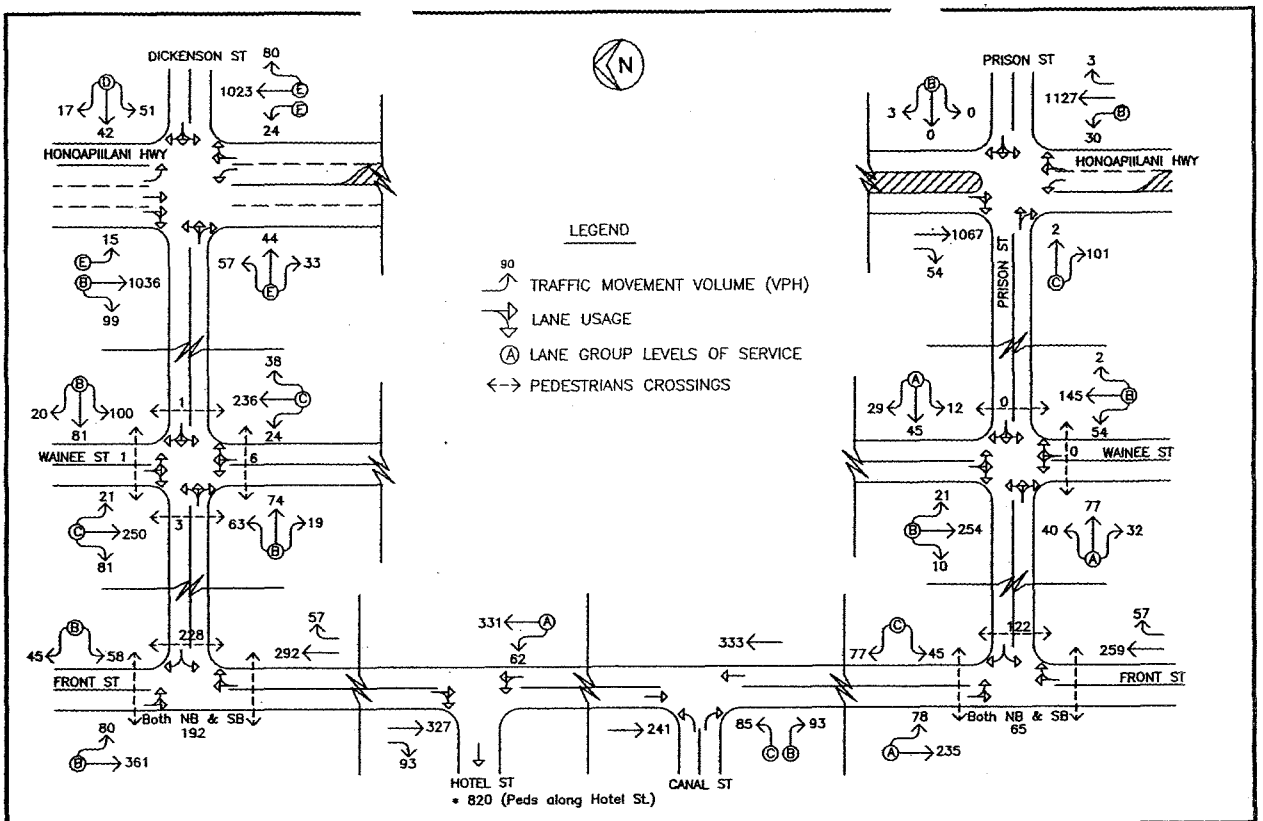
## YEAR 2010 AM PEAK HOURS OF TRAFFIC WITH PROJECT - BOAT DAY

FIGURE 7

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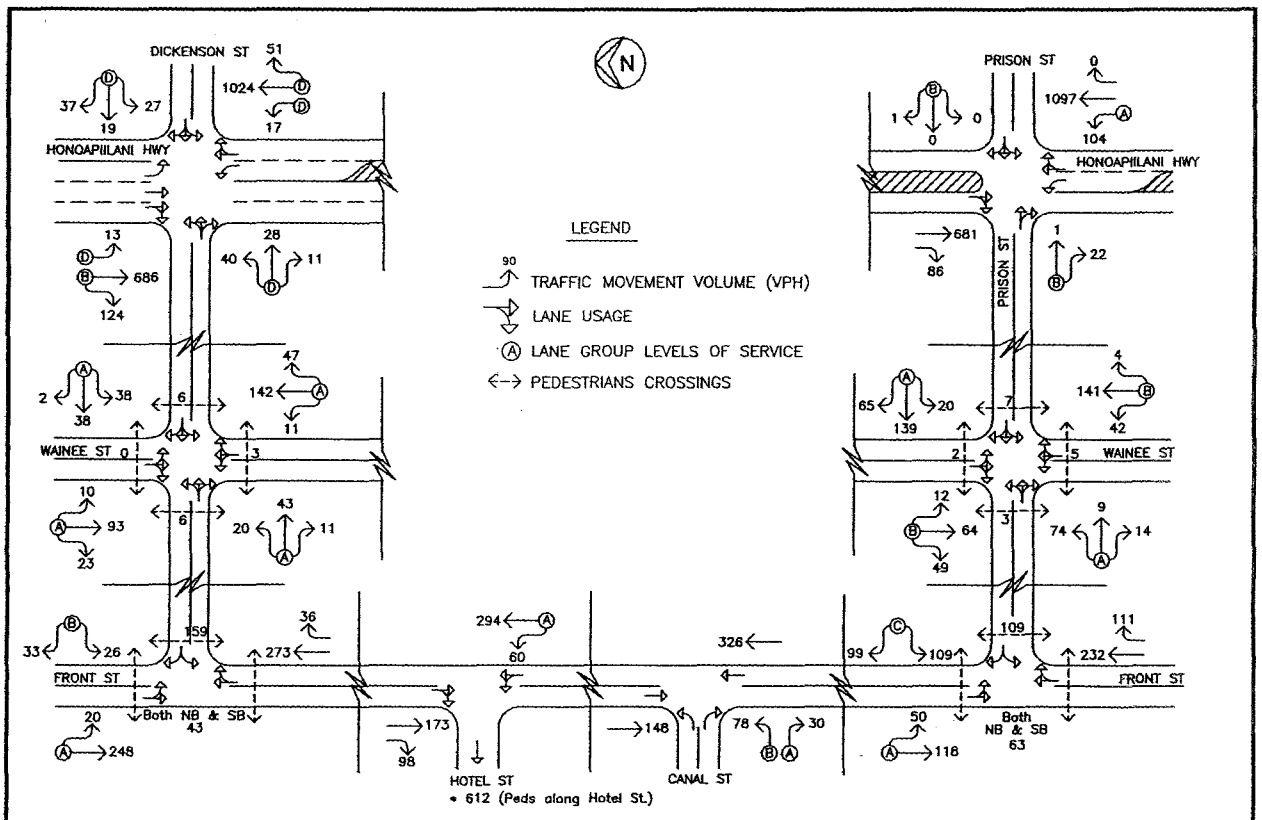
## YEAR 2010 PM PEAK HOURS OF TRAFFIC WITH PROJECT - NON BOAT DAY

FIGURE 10

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**LAHAINA SMALL BOAT HARBOR**

## YEAR 2010 AM PEAK HOURS OF TRAFFIC WITH PROJECT - NON BOAT DAY

FIGURE 9

**Table 1: Existing and Projected Levels of Service on a "Boat Day" (Cont'd)**

| Intersection | Critical Movement | | AM | | PM | |
|---|---|---|---|---|---|---|
| | | | Exist | Year 2010 w/ Proj | Exist | Year 2010 w/ Proj |
| Front St/Dickenson St | Westbound | LT-RT | B | B | D | D |
| | Southbound | LT-TH | A | A | B | B |
| Dickenson St/ Wainee St | Eastbound | LT-TH-RT | A | A | B | B |
| | Westbound | LT-TH-RT | B | B | C | C |
| | Northbound | LT-TH-RT | B | B | C | C |
| | Southbound | LT-TH-RT | B | B | C | C |
| Dickenson St/ Honoapiilani Hwy | Eastbound | LT-TH-RT | D | D | D | E |
| | Westbound | LT-TH-RT | D | D | D | D |
| | Northbound | LT | D | D | D | E |
| | | TH-RT | D | D | D | E |
| | Southbound | LT | D | D | D | E |
| | | TH-RT | C | B | C | B |

**Table 2: Existing and Projected Levels of Service on a "Non Boat Day"**

| Intersection | Critical Movement | | AM | | PM | |
|---|---|---|---|---|---|---|
| | | | Exist | Year 2010 w/ Proj | Exist | Year 2010 w/ Proj |
| Front St/Hotel St | Northbound | LT-TH | A | A | A | A |
| Front St/Canal St | Eastbound | LT | B | B | C | C |
| | | RT | A | A | B | B |
| Front St/Prison St | Westbound | LT-RT | C | C | C | C |
| | Southbound | LT-TH | A | A | A | A |
| Prison St/Wainee St | Eastbound | LT-TH-RT | A | A | A | A |
| | Westbound | LT-TH-RT | A | A | A | A |
| | Northbound | LT-TH-RT | B | B | B | B |
| | Southbound | LT-TH-RT | B | B | B | B |





**Table 2: Existing and Projected Levels of Service on a "Non Boat Day" (Cont'd)**

| Intersection | Critical Movement | | AM | | PM | |
|---|---|---|---|---|---|---|
| | | | Exist | Year 2010 w/ Proj | Exist | Year 2010 w/ Proj |
| Prison St/ Honoapiilani Hwy | Eastbound | TH-RT | B | B | C | C |
| | Westbound | LT-TH-RT | B | B | B | B |
| | Northbound | LT | A | A | B | B |
| Front St/Dickenson St | Westbound | LT-RT | B | B | B | B |
| | Southbound | LT-TH | A | A | B | B |
| Dickenson St/ Wainee St | Eastbound | LT-TH-RT | A | A | B | B |
| | Westbound | LT-TH-RT | A | A | B | B |
| | Northbound | LT-TH-RT | A | A | C | C |
| | Southbound | LT-TH-RT | A | A | C | C |
| Dickenson St/ Honoapiilani Hwy | Eastbound | LT-TH-RT | D | D | D | E |
| | Westbound | LT-TH-RT | D | D | D | D |
| | Northbound | LT | D | D | D | E |
| | | TH-RT | D | D | D | E |
| | Southbound | LT | D | D | D | E |
| | | TH-RT | B | B | C | B |

Traffic operations in the vicinity of the Lahaina Small Boat Harbor with the implementation of the proposed improvements are expected, in general, to remain similar to existing conditions despite the slight redistribution in traffic in the project vicinity. The traffic movements on the eastbound and northbound approaches of the intersection with Honoapiilani Highway and Dickenson Street, as well as, the left-turn traffic movement on the southbound approach are anticipated to deteriorate from LOS "D" to LOS "E" during the PM peak period due to the anticipated ambient growth in traffic along the highway. In addition, the southbound through and right-turn traffic movement at that intersection is anticipated to improve from LOS "C" to LOS "B" during both peak periods of a "Boat Day" and the PM peak period of a "Non Boat Day" resulting from the shift in green times at that intersection to accommodate the

increase in traffic along the highway. The other critical movements at that intersection, as well as, the remaining study intersections are anticipated to operate at levels of service similar to existing conditions during all peak periods.

**F. Pedestrian Traffic**

Pedestrian traffic in the vicinity of the Lahaina Small Boat Harbor is currently heavy, especially on a "Boat Day." Field investigations indicate that there are approximately 862 pedestrians and 1,155 pedestrians traveling along Hotel Street during the AM and PM peak periods, respectively, of a "Boat Day." On a "Non Boat Day," the volume of pedestrians is slightly less with approximately 612 pedestrians and 820 pedestrians traveling along Hotel Street during the AM and PM peak periods, respectively. To accommodate these pedestrians, concrete sidewalks are provided along the north side of Hotel Street and the west side of Wharf Street along the pier. In addition, meandering sidewalks are provided through the park between Hotel Street and Canal Street.

The proposed improvements at the harbor are intended to provide additional loading/unloading space for the vessels currently utilizing the existing pier, the volume of pedestrians in the vicinity of the harbor is not expected to increase significantly. However, in conjunction with the project, sidewalk, parking, and roadway modifications are currently being planned to alleviate the existing pedestrian and vehicular congestion within the harbor area. The existing sidewalk along Hotel Street narrows to approximately 3'-4" in width as it nears Wharf Street. This narrow width is not sufficient to accommodate the existing high volume of pedestrian traffic in the vicinity. As such, many pedestrians are forced to utilize the adjacent roadway pavement instead resulting in an unsafe pedestrian environment. The proposed project entails the widening of this portion of the sidewalk along Hotel Street by approximately 4' to provide additional pedestrian capacity. In conjunction with this sidewalk widening, pedestrian traffic management strategies could also be implemented by harbor personnel to channelize pedestrian traffic along the improved pedestrian facilities (i.e., concrete sidewalks) in the vicinity thereby reducing the conflicts with vehicular traffic. Personnel or directional signs could be utilized to





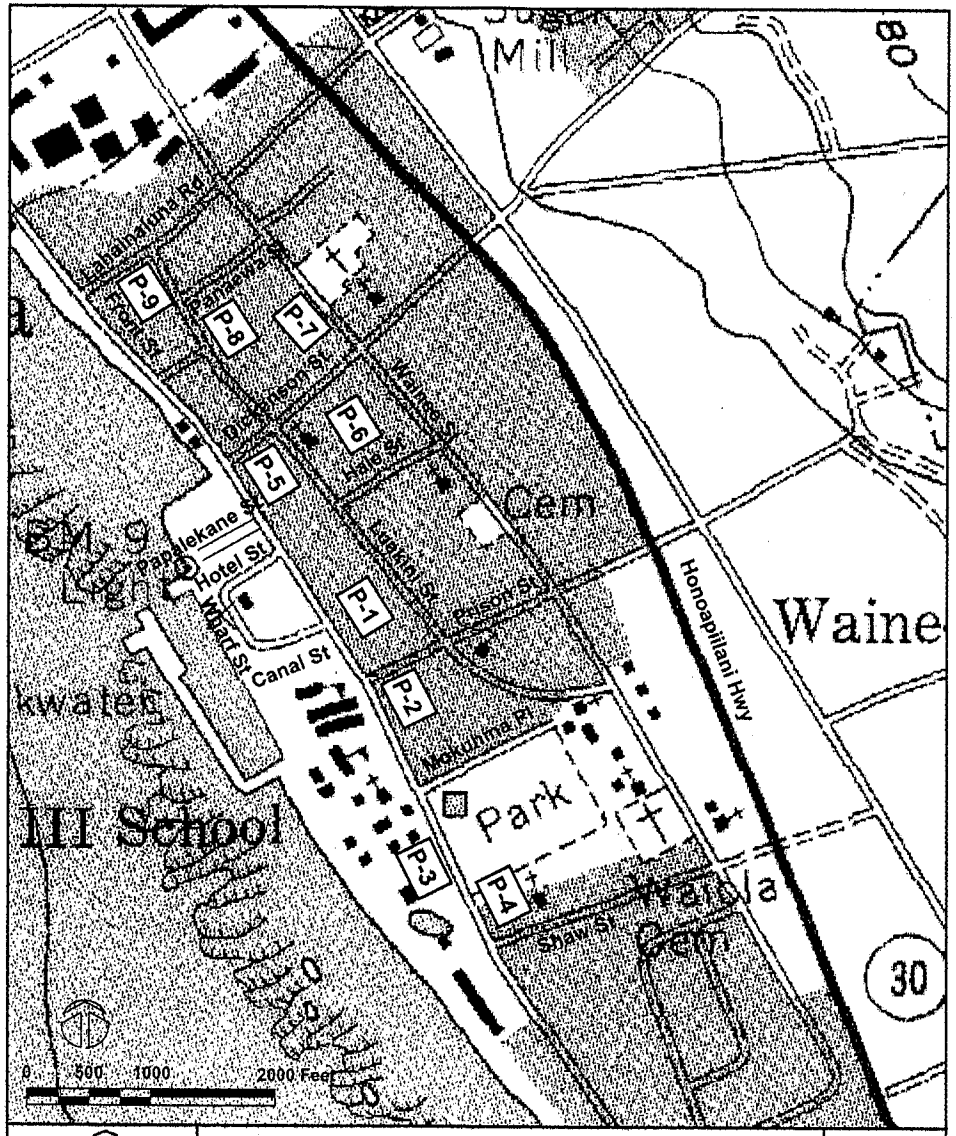
channelize pedestrians along the newly widened sidewalk along the north side of Hotel Street and the existing sidewalk along the west side of Wharf Street.

**G. Parking**

Immediately adjacent to the existing pier there is a drop-off/loading zone that has a total of four parking stalls, one of which is a reserved stall. Just north of this zone, there are two accessible parking stalls located in front of the historic Light House. As previously stated, on a "Boat Day," the north end of Wharf Street which includes this area is blocked off by removable bollards. On a "Non-Boat Day," these stalls are utilized heavily. According to harbor staff, vehicles are regularly double- or triple-parking in these stalls. In addition to these stalls immediately adjacent to the existing pier, there are 32 additional parking stalls located on the south side of the harbor west of Kamehameha III Elementary School that are available to vehicles with parking permits.

Public parking within the harbor area is available along Hotel Street, Wharf Street, Canal Street, and Papalekane Street. Hotel Street has 11 parking stalls and two loading zones along its length while Canal Street has 10 parking stalls along its length. Along Wharf Street, there are 27 parking stalls, one of which is accessible, and a loading zone adjacent to the Pioneer Inn Lobby which is available to hotel guests at all times. Papalekane Street has four parking stalls, one of which is accessible, for use by visitors to the adjacent Library.

Outside the harbor area, public parking is available along Front Street and other intersecting streets, as well as, in private and public parking lots. A survey of the existing inventory in these nearby parking lots was conducted by the State of Hawaii Department of Land and Natural Resources (DNLR) in May 2005. This survey included nine parking areas in the vicinity of the harbor (see Figure 11) and noted the operator, number of stalls, and cost per hour for each location. The results of the study, which are summarized in Table 3, indicate that there are a total of 690 marked parking stalls, 40 unmarked parking stalls, 10 bus parking stalls, and 6 limousine parking stalls.




| WILSON OKAMOTO CORPORATION ENGINEERS · PLANNERS | LAHAINA SMALL BOAT HARBOR | FIGURE |
|---|---|---|
| | DLNR Parking Survey Locations | 11 |

**Table 3: DLNR Parking Survey**

| Parking ID | Location | Operator | # of Stalls | Paved | Cost Per Hour | |
|---|---|---|---|---|---|---|
| P-1 | Mauka of the intersection of Canal and Front Streets (behind Burger King) | Parking Diamond Service | 110 | Yes | 0-2<br>2-4<br>4-10<br>24<br>48<br>72<br>96 | $5<br>$10<br>$15<br>$20<br>$40<br>$60<br>$80 |
| P-2 | Mauka of the intersection of Prison and Front Streets | County of Maui | 120 marked<br>40 unmarked<br>6 bus stalls | Yes<br>No<br>Yes | Free/3-hour limit | |
| P-3 | Kamehameha Iki Park Adjacent to 505 Front Street Shopping Center | County of Maui | 30 | Yes | Free | |
| P-4 | Mauka of the intersection of Shaw and Front Streets Mauka of 505 Front | Parking Diamond Service | 74 | Yes | 0-2<br>2-5<br>All day up to 5 PM<br>Evenings 5 PM to 6 AM | $5<br>$10<br>$10<br>$5 |
| P-5 | 120 Dickerson Street Makai of Luakini Street | Lahaina Restoration Foundation | 62 | Yes | 0-2<br>2-8<br>24<br>48<br>72<br>96 | $5<br>$10<br>$15<br>$30<br>$45<br>$60 |
| P-6 | Mauka of the intersection of Hale and Luakini Street Behind the Wharf Cinema Center | Wharf Cinema Center | 100<br>4 bus<br>6 limo | Yes | 0-1/2<br>1/2-1<br>Overnight<br>Ferry (day)<br>Ferry (evenings) | $1<br>$2<br>$5<br>$2<br>$3.00 |
| P-7 | Makai of the intersections of Wainee and Dickerson Streets | Republic Parking | 91 | Yes | 0-2<br>2-8<br>24<br>48 | $4<br>$8<br>$12<br>$24 |
| P-8 | Mauka of Panaewa and Luakini Streets | Maui County | 73 | Yes | Free Closed 2 to 4 AM | |
| P-9 | Off of Luakini Street behind Front Street shops | PPS Parking | 30 | Yes | 0-1<br>1-3<br>All day up to 5 PM<br>5 PM to 7 AM | $2<br>$3<br>$6<br>$5 |

## V. RECOMMENDATIONS

Based on the analysis of the traffic data, the following are the recommendations of this study associated with the proposed project to be incorporated during the design phase:

1. Widen the sidewalk along the north side of Hotel Street to provide additional capacity for pedestrian traffic.

2. Consider implementing pedestrian traffic management strategies to channelize pedestrian traffic along the improved pedestrian facilities.

3. Ensure that all new and modified sidewalks are constructed in accordance with the American with Disabilities Act (ADA) and that all pedestrian routes/facilities are maintained in passable condition during the construction phase of the project.

4. The County of Maui Police Department, through the Lahaina Community Police Officer, has expressed concerns regarding the management of vehicular traffic during the construction phase of the project. Consider the use of off-duty police officers to direct traffic in the vicinity of the harbor during construction to ensure the safe progress of both vehicular and pedestrian traffic. In addition, ensure that adequate parking for construction vehicles and personnel is provided to prevent increased congestion in the harbor area.

## VI. CONCLUSION

The proposed improvements to the Lahaina Small Boat Harbor includes the construction of a new ferry pier with a pedestrian walkway connection to the existing pier, sidewalk, parking, and roadway modifications, and the replacement of an existing comfort station, Harbor Master's Office, and ancillary structures. These improvements are intended to serve existing vessels currently utilizing the harbor and are therefore not anticipated to generate any additional vehicular or pedestrian traffic in the vicinity of the harbor. As such, traffic volumes in the vicinity of the Lahaina Small Boat Harbor with the implementation of the proposed improvements are expected to remain similar to existing conditions. However, the proposed sidewalk, parking, and roadway modifications, in conjunction with the implementation of the aforementioned recommendations, should help to alleviate the existing pedestrian and vehicular congestion within the harbor area.



## APPENDIX A

## EXISTING TRAFFIC COUNT DATA

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3889
Counted By: TO
Weather: Clear

File Name : frohotP(cruise)
Site Code : 00000003
Start Date : 3/9/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Hotel Street (Entrance Only) Westbound | | | | | Front Street Northbound | | | | | Papelekane Street (Exit Only) Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | |
| 03:30 PM | 0 | 0 | 23 | 0 | 23 | 0 | 0 | 0 | 238 | 238 | 10 | 0 | 0 | 0 | 10 | 2 | 0 | 0 | 0 | 2 | 273 |
| 03:45 PM | 0 | 0 | 19 | 0 | 19 | 0 | 0 | 0 | 306 | 306 | 12 | 0 | 0 | 0 | 12 | 2 | 0 | 0 | 0 | 2 | 339 |
| Total | 0 | 0 | 42 | 0 | 42 | 0 | 0 | 0 | 544 | 544 | 22 | 0 | 0 | 0 | 22 | 4 | 0 | 0 | 0 | 4 | 612 |
| 04:00 PM | 0 | 0 | 20 | 0 | 20 | 0 | 0 | 0 | 285 | 285 | 9 | 0 | 0 | 0 | 9 | 2 | 0 | 0 | 0 | 2 | 316 |
| 04:15 PM | 0 | 0 | 21 | 0 | 21 | 0 | 0 | 0 | 326 | 326 | 15 | 0 | 0 | 0 | 15 | 0 | 0 | 1 | 0 | 1 | 363 |
| 04:30 PM | 0 | 0 | 20 | 0 | 20 | 0 | 0 | 0 | 249 | 249 | 29 | 0 | 0 | 0 | 29 | 2 | 0 | 0 | 0 | 2 | 300 |
| 04:45 PM | 0 | 0 | 23 | 0 | 23 | 0 | 0 | 0 | 214 | 214 | 16 | 0 | 0 | 0 | 16 | 2 | 0 | 1 | 0 | 3 | 256 |
| Total | 0 | 0 | 84 | 0 | 84 | 0 | 0 | 0 | 1074 | 1074 | 69 | 0 | 0 | 0 | 69 | 6 | 0 | 2 | 0 | 8 | 1235 |
| 05:00 PM | 0 | 0 | 20 | 0 | 20 | 0 | 0 | 0 | 246 | 246 | 8 | 0 | 0 | 0 | 8 | 3 | 0 | 0 | 0 | 3 | 277 |
| 05:15 PM | 0 | 0 | 16 | 0 | 16 | 0 | 0 | 0 | 194 | 194 | 15 | 0 | 0 | 0 | 15 | 1 | 0 | 0 | 0 | 1 | 226 |
| Grand Total | 0 | 0 | 162 | 0 | 162 | 0 | 0 | 0 | 2058 | 2058 | 114 | 0 | 0 | 0 | 114 | 14 | 0 | 2 | 0 | 16 | 2350 |
| Apprch % | 0.0 | 0.0 | 100.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 100.0 | | 100.0 | 0.0 | 0.0 | 0.0 | | 87.5 | 0.0 | 12.5 | 0.0 | | |
| Total % | 0.0 | 0.0 | 6.9 | 0.0 | 6.9 | 0.0 | 0.0 | 0.0 | 87.6 | 87.6 | 4.9 | 0.0 | 0.0 | 0.0 | 4.9 | 0.6 | 0.0 | 0.1 | 0.0 | 0.7 | |

| | Front Street Southbound | | | | Hotel Street (Entrance Only) Westbound | | | | Front Street Northbound | | | | Papelekane Street (Exit Only) Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Intersection | 04:00 PM | | | | | | | | | | | | | | | | |
| Volume | 0 | 0 | 84 | 84 | 0 | 0 | 0 | 0 | 69 | 0 | 0 | 69 | 6 | 0 | 2 | 8 | 161 |
| Percent | 0.0 | 0.0 | 100.0 | | 0.0 | 0.0 | 0.0 | | 100.0 | 0.0 | 0.0 | | 75.0 | 0.0 | 25.0 | | |
| 04:30 Volume | 0 | 0 | 20 | 20 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 29 | 2 | 0 | 0 | 2 | 51 |
| Peak Factor | | | | | | | | | | | | | | | | | 0.789 |
| High Int. | 04:45 PM | | | | 3:15:00 PM | | | | 04:30 PM | | | | 04:45 PM | | | | |
| Volume | 0 | 0 | 23 | 23 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 29 | 2 | 0 | 1 | 3 | |
| Peak Factor | | | | 0.913 | | | | | | | | 0.595 | | | | 0.667 | |

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3889
Counted By: TO
Weather: Clear

File Name : frohotA(cruise)
Site Code : 00000003
Start Date : 3/9/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Hotel Street (Entrance Only) Westbound | | | | | Front Street Northbound | | | | | Papelekane Street (Exit Only) Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | |
| 08:30 AM | 0 | 0 | 22 | 0 | 22 | 0 | 0 | 0 | 49 | 49 | 25 | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 96 |
| 08:45 AM | 0 | 0 | 25 | 0 | 25 | 0 | 0 | 0 | 82 | 82 | 33 | 0 | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 140 |
| Total | 0 | 0 | 47 | 0 | 47 | 0 | 0 | 0 | 131 | 131 | 58 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 0 | 0 | 236 |
| 09:00 AM | 0 | 0 | 22 | 0 | 22 | 0 | 0 | 0 | 84 | 84 | 21 | 0 | 0 | 0 | 21 | 1 | 0 | 0 | 0 | 1 | 128 |
| 09:15 AM | 0 | 0 | 24 | 0 | 24 | 0 | 0 | 0 | 156 | 156 | 19 | 0 | 0 | 0 | 19 | 0 | 0 | 1 | 0 | 1 | 200 |
| 09:30 AM | 0 | 0 | 31 | 0 | 31 | 0 | 0 | 0 | 192 | 192 | 10 | 0 | 0 | 0 | 10 | 1 | 0 | 4 | 0 | 5 | 238 |
| 09:45 AM | 0 | 0 | 23 | 0 | 23 | 0 | 0 | 0 | 207 | 207 | 14 | 0 | 0 | 0 | 14 | 0 | 0 | 1 | 0 | 1 | 245 |
| Total | 0 | 0 | 100 | 0 | 100 | 0 | 0 | 0 | 639 | 639 | 64 | 0 | 0 | 0 | 64 | 2 | 0 | 6 | 0 | 8 | 811 |
| 10:00 AM | 0 | 0 | 32 | 0 | 32 | 0 | 0 | 0 | 195 | 195 | 24 | 0 | 0 | 0 | 24 | 1 | 0 | 1 | 0 | 2 | 253 |
| 10:15 AM | 0 | 0 | 29 | 0 | 29 | 0 | 0 | 0 | 268 | 268 | 22 | 0 | 0 | 0 | 22 | 2 | 0 | 0 | 0 | 2 | 321 |
| Grand Total | 0 | 0 | 208 | 0 | 208 | 0 | 0 | 0 | 1233 | 1233 | 168 | 0 | 0 | 0 | 168 | 5 | 0 | 7 | 0 | 12 | 1621 |
| Apprch % | 0.0 | 0.0 | 100.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 100.0 | | 100.0 | 0.0 | 0.0 | 0.0 | | 41.7 | 0.0 | 58.3 | 0.0 | | |
| Total % | 0.0 | 0.0 | 12.8 | 0.0 | 12.8 | 0.0 | 0.0 | 0.0 | 76.1 | 76.1 | 10.4 | 0.0 | 0.0 | 0.0 | 10.4 | 0.3 | 0.0 | 0.4 | 0.0 | 0.7 | |

| | Front Street Southbound | | | | Hotel Street (Entrance Only) Westbound | | | | Front Street Northbound | | | | Papelekane Street (Exit Only) Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour From 08:30 AM to 10:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Intersection | 09:30 AM | | | | | | | | | | | | | | | | |
| Volume | 0 | 0 | 115 | 115 | 0 | 0 | 0 | 0 | 70 | 0 | 0 | 70 | 4 | 0 | 6 | 10 | 195 |
| Percent | 0.0 | 0.0 | 100.0 | | 0.0 | 0.0 | 0.0 | | 100.0 | 0.0 | 0.0 | | 40.0 | 0.0 | 60.0 | | |
| 10:00 Volume | 0 | 0 | 32 | 32 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 24 | 1 | 0 | 1 | 2 | 58 |
| Peak Factor | | | | | | | | | | | | | | | | | 0.841 |
| High Int. | 10:00 AM | | | | 8:15:00 AM | | | | 10:00 AM | | | | 09:30 AM | | | | |
| Volume | 0 | 0 | 32 | 32 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 24 | 1 | 0 | 4 | 5 | |
| Peak Factor | | | | 0.898 | | | | | | | | 0.729 | | | | 0.500 | |

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3891
Counted By: IW
Weather: Clear

File Name : fropriA(cruise)
Site Code : 00000002
Start Date : 3/9/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Prison Street Westbound | | | | | Front Street Northbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | | |
| 08:30 AM | 15 | 30 | 0 | 8 | 53 | 7 | 0 | 19 | 11 | 37 | 0 | 20 | 4 | 0 | 24 | 0 | 114 |
| 08:45 AM | 15 | 46 | 0 | 12 | 73 | 9 | 0 | 28 | 34 | 71 | 0 | 32 | 3 | 0 | 35 | 0 | 179 |
| Total | 30 | 76 | 0 | 20 | 126 | 16 | 0 | 47 | 45 | 108 | 0 | 52 | 7 | 0 | 59 | 0 | 293 |
| 09:00 AM | 19 | 31 | 0 | 9 | 59 | 12 | 0 | 14 | 27 | 53 | 0 | 30 | 5 | 0 | 35 | 0 | 147 |
| 09:15 AM | 20 | 40 | 0 | 18 | 78 | 2 | 0 | 24 | 33 | 59 | 0 | 38 | 4 | 0 | 42 | 0 | 179 |
| 09:30 AM | 23 | 37 | 0 | 13 | 73 | 7 | 0 | 19 | 26 | 52 | 0 | 32 | 9 | 0 | 41 | 0 | 166 |
| 09:45 AM | 11 | 41 | 0 | 8 | 60 | 4 | 0 | 17 | 22 | 43 | 0 | 40 | 7 | 0 | 47 | 0 | 150 |
| Total | 73 | 149 | 0 | 48 | 270 | 25 | 0 | 74 | 108 | 207 | 0 | 140 | 25 | 0 | 165 | 0 | 642 |
| 10:00 AM | 14 | 44 | 0 | 26 | 84 | 12 | 0 | 19 | 42 | 73 | 0 | 43 | 10 | 0 | 53 | 0 | 210 |
| 10:15 AM | 13 | 40 | 0 | 13 | 66 | 6 | 0 | 15 | 33 | 54 | 0 | 51 | 7 | 0 | 58 | 0 | 178 |
| Grand Total | 130 | 309 | 0 | 107 | 546 | 59 | 0 | 155 | 228 | 442 | 0 | 286 | 49 | 0 | 335 | 0 | 1323 |
| Apprch % | 23.8 | 56.6 | 0.0 | 19.6 | | 13.3 | 0.0 | 35.1 | 51.6 | | 0.0 | 85.4 | 14.6 | 0.0 | | | |
| Total % | 9.8 | 23.4 | 0.0 | 8.1 | 41.3 | 4.5 | 0.0 | 11.7 | 17.2 | 33.4 | 0.0 | 21.6 | 3.7 | 0.0 | 25.3 | 0.0 | |

| | Front Street Southbound | | | | Prison Street Westbound | | | | Front Street Northbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | App. Total | Int. Total |
| Peak Hour From 08:30 AM to 10:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | |
| Intersection | 09:30 AM | | | | | | | | | | | | | |
| Volume | 61 | 162 | 0 | 223 | 29 | 0 | 70 | 99 | 0 | 166 | 33 | 199 | 0 | 521 |
| Percent | 27.4 | 72.6 | 0.0 | | 29.3 | 0.0 | 70.7 | | 0.0 | 83.4 | 16.6 | | | |
| 10:00 Volume | 14 | 44 | 0 | 58 | 12 | 0 | 19 | 31 | 0 | 43 | 10 | 53 | 0 | 142 |
| Peak Factor | | | | | | | | | | | | | | 0.917 |
| High Int. | 09:30 AM | | | | 10:00 AM | | | | 10:15 AM | | | | 8:15:00 AM | |
| Volume | 23 | 37 | 0 | 60 | 12 | 0 | 19 | 31 | 0 | 51 | 7 | 58 | | |
| Peak Factor | | | | 0.929 | | | | 0.798 | | | | 0.858 | | |

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3889
Counted By: TO
Weather: Clear

File Name : frohotP
Site Code : 00000008
Start Date : 3/8/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Hotel Street (Entrance Only) Westbound | | | | | Front Street Northbound | | | | | Papelekane Street (Exit Only) Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | |
| 03:30 PM | 0 | 0 | 25 | 0 | 25 | 0 | 0 | 0 | 201 | 201 | 18 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 244 |
| 03:45 PM | 0 | 0 | 25 | 0 | 25 | 0 | 0 | 0 | 208 | 208 | 19 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 252 |
| Total | 0 | 0 | 50 | 0 | 50 | 0 | 0 | 0 | 409 | 409 | 37 | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 496 |
| 04:00 PM | 0 | 0 | 27 | 0 | 27 | 0 | 0 | 0 | 218 | 218 | 9 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 254 |
| 04:15 PM | 0 | 0 | 16 | 0 | 16 | 0 | 0 | 0 | 193 | 193 | 16 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 225 |
| 04:30 PM | 0 | 0 | 21 | 0 | 21 | 0 | 0 | 0 | 180 | 180 | 17 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 218 |
| 04:45 PM | 0 | 0 | 21 | 0 | 21 | 0 | 0 | 0 | 196 | 196 | 15 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 232 |
| Total | 0 | 0 | 85 | 0 | 85 | 0 | 0 | 0 | 787 | 787 | 57 | 0 | 0 | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 929 |
| 05:00 PM | 0 | 0 | 18 | 0 | 18 | 0 | 0 | 0 | 158 | 158 | 12 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 188 |
| 05:15 PM | 0 | 0 | 21 | 0 | 21 | 0 | 0 | 0 | 126 | 126 | 17 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 164 |
| Grand Total | 0 | 0 | 174 | 0 | 174 | 0 | 0 | 0 | 1480 | 1480 | 123 | 0 | 0 | 0 | 123 | 0 | 0 | 0 | 0 | 0 | 1777 |
| Apprch % | 0.0 | 0.0 | 100.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 100.0 | | 100.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | |
| Total % | 0.0 | 0.0 | 9.8 | 0.0 | 9.8 | 0.0 | 0.0 | 0.0 | 83.3 | 83.3 | 6.9 | 0.0 | 0.0 | 0.0 | 6.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |

| | Front Street Southbound | | | | Hotel Street (Entrance Only) Westbound | | | | Front Street Northbound | | | | Papelekane Street (Exit Only) Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Intersection | 03:30 PM | | | | | | | | | | | | | | | | |
| Volume | 0 | 0 | 93 | 93 | 0 | 0 | 0 | 0 | 62 | 0 | 0 | 62 | 0 | 0 | 0 | 0 | 155 |
| Percent | 0.0 | 0.0 | 100.0 | | 0.0 | 0.0 | 0.0 | | 100.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | | |
| 03:45 Volume | 0 | 0 | 25 | 25 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 44 |
| Peak Factor | | | | | | | | | | | | | | | | | 0.881 |
| High Int. | 04:00 PM | | | | 3:15:00 PM | | | | 03:45 PM | | | | 3:15:00 PM | | | | |
| Volume | 0 | 0 | 27 | 27 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 19 | | | | | |
| Peak Factor | | | | 0.861 | | | | | | | | 0.816 | | | | | |

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3891
Counted By: IW
Weather: Clear

File Name : fropriP
Site Code : 00000002
Start Date : 3/8/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Prison Street Westbound | | | | | Front Street Northbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | | |
| 03:30 PM | 17 | 66 | 0 | 27 | 110 | 19 | 0 | 21 | 40 | 80 | 0 | 57 | 14 | 0 | 71 | 0 | 261 |
| 03:45 PM | 19 | 41 | 0 | 7 | 67 | 8 | 0 | 22 | 34 | 64 | 0 | 59 | 14 | 0 | 73 | 0 | 204 |
| Total | 36 | 107 | 0 | 34 | 177 | 27 | 0 | 43 | 74 | 144 | 0 | 116 | 28 | 0 | 144 | 0 | 465 |
| 04:00 PM | 27 | 72 | 0 | 9 | 108 | 8 | 0 | 18 | 22 | 48 | 0 | 65 | 12 | 0 | 77 | 0 | 233 |
| 04:15 PM | 15 | 56 | 0 | 22 | 93 | 10 | 0 | 16 | 26 | 52 | 0 | 78 | 17 | 0 | 95 | 0 | 240 |
| 04:30 PM | 14 | 73 | 0 | 27 | 114 | 14 | 0 | 15 | 19 | 48 | 0 | 50 | 7 | 0 | 57 | 0 | 219 |
| 04:45 PM | 14 | 41 | 0 | 13 | 68 | 18 | 0 | 12 | 34 | 64 | 0 | 56 | 17 | 0 | 73 | 0 | 205 |
| Total | 70 | 242 | 0 | 71 | 383 | 50 | 0 | 61 | 101 | 212 | 0 | 249 | 53 | 0 | 302 | 0 | 897 |
| 05:00 PM | 13 | 55 | 0 | 14 | 82 | 13 | 0 | 9 | 17 | 39 | 0 | 48 | 11 | 0 | 59 | 0 | 180 |
| 05:15 PM | 11 | 43 | 0 | 14 | 68 | 19 | 0 | 17 | 23 | 59 | 0 | 43 | 5 | 0 | 48 | 0 | 175 |
| Grand Total | 130 | 447 | 0 | 133 | 710 | 109 | 0 | 130 | 215 | 454 | 0 | 456 | 97 | 0 | 553 | 0 | 1717 |
| Apprch % | 18.3 | 63.0 | 0.0 | 18.7 | | 24.0 | 0.0 | 28.6 | 47.4 | | 0.0 | 82.5 | 17.5 | 0.0 | | | |
| Total % | 7.6 | 26.0 | 0.0 | 7.7 | 41.4 | 6.3 | 0.0 | 7.6 | 12.5 | 26.4 | 0.0 | 26.6 | 5.6 | 0.0 | 32.2 | 0.0 | |

| | Front Street Southbound | | | | Prison Street Westbound | | | | Front Street Northbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | App. Total | Int. Total |
| Peak Hour From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | |
| Intersection | 03:30 PM | | | | | | | | | | | | | |
| Volume | 78 | 235 | 0 | 313 | 45 | 0 | 77 | 122 | 0 | 259 | 57 | 316 | 0 | 751 |
| Percent | 24.9 | 75.1 | 0.0 | | 36.9 | 0.0 | 63.1 | | 0.0 | 82.0 | 18.0 | | | |
| 04:00 Volume | 27 | 72 | 0 | 99 | 8 | 0 | 18 | 26 | 0 | 65 | 12 | 77 | 0 | 202 |
| Peak Factor | | | | | | | | | | | | | | 0.929 |
| High Int. | 04:00 PM | | | | 03:30 PM | | | | 04:15 PM | | | | 3:15:00 PM | |
| Volume | 27 | 72 | 0 | 99 | 19 | 0 | 21 | 40 | 0 | 78 | 17 | 95 | | |
| Peak Factor | | | | 0.790 | | | | 0.763 | | | | 0.832 | | |

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3891
Counted By: IW
Weather: Clear

File Name : fropriP(cruise)
Site Code : 00000002
Start Date : 3/9/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Prison Street Westbound | | | | | Front Street Northbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | | |
| 03:30 PM | 15 | 55 | 0 | 17 | 87 | 12 | 0 | 17 | 28 | 57 | 0 | 56 | 17 | 0 | 73 | 0 | 217 |
| 03:45 PM | 20 | 54 | 0 | 39 | 113 | 11 | 0 | 17 | 39 | 67 | 0 | 60 | 14 | 0 | 74 | 0 | 254 |
| Total | 35 | 109 | 0 | 56 | 200 | 23 | 0 | 34 | 67 | 124 | 0 | 116 | 31 | 0 | 147 | 0 | 471 |
| 04:00 PM | 26 | 54 | 0 | 19 | 99 | 16 | 0 | 9 | 44 | 69 | 0 | 66 | 27 | 0 | 93 | 0 | 261 |
| 04:15 PM | 12 | 55 | 0 | 16 | 83 | 13 | 0 | 11 | 27 | 51 | 0 | 74 | 24 | 0 | 98 | 0 | 232 |
| 04:30 PM | 12 | 61 | 0 | 9 | 82 | 13 | 2 | 14 | 24 | 53 | 0 | 63 | 16 | 0 | 79 | 0 | 214 |
| 04:45 PM | 16 | 50 | 0 | 27 | 93 | 16 | 0 | 14 | 48 | 78 | 0 | 54 | 13 | 0 | 67 | 0 | 238 |
| Total | 66 | 220 | 0 | 71 | 357 | 58 | 2 | 48 | 143 | 251 | 0 | 257 | 80 | 0 | 337 | 0 | 945 |
| 05:00 PM | 23 | 47 | 0 | 22 | 92 | 11 | 0 | 10 | 54 | 75 | 0 | 59 | 9 | 0 | 68 | 0 | 235 |
| 05:15 PM | 12 | 39 | 0 | 16 | 67 | 13 | 0 | 14 | 39 | 66 | 0 | 48 | 20 | 0 | 68 | 0 | 201 |
| Grand Total | 136 | 415 | 0 | 165 | 716 | 105 | 2 | 106 | 303 | 516 | 0 | 480 | 140 | 0 | 620 | 0 | 1852 |
| Apprch % | 19.0 | 58.0 | 0.0 | 23.0 | | 20.3 | 0.4 | 20.5 | 58.7 | | 0.0 | 77.4 | 22.6 | 0.0 | | | |
| Total % | 7.3 | 22.4 | 0.0 | 8.9 | 38.7 | 5.7 | 0.1 | 5.7 | 16.4 | 27.9 | 0.0 | 25.9 | 7.6 | 0.0 | 33.5 | 0.0 | |

| | Front Street Southbound | | | | Prison Street Westbound | | | | Front Street Northbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | App. Total | Int. Total |
| Peak Hour From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | |
| Intersection | 03:45 PM | | | | | | | | | | | | | |
| Volume | 70 | 224 | 0 | 294 | 53 | 2 | 51 | 106 | 0 | 263 | 81 | 344 | 0 | 744 |
| Percent | 23.8 | 76.2 | 0.0 | | 50.0 | 1.9 | 48.1 | | 0.0 | 76.5 | 23.5 | | | |
| 04:00 Volume | 26 | 54 | 0 | 80 | 16 | 0 | 9 | 25 | 0 | 66 | 27 | 93 | 0 | 198 |
| Peak Factor | | | | | | | | | | | | | | 0.939 |
| High Int. | 04:00 PM | | | | 04:30 PM | | | | 04:15 PM | | | | 3:15:00 PM | |
| Volume | 26 | 54 | 0 | 80 | 13 | 2 | 14 | 29 | 0 | 74 | 24 | 98 | | |
| Peak Factor | | | | 0.919 | | | | 0.914 | | | | 0.878 | | |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0528
Counted: TO
Weather: CLEAR

File Name : waipriP (cruise)
Site Code : 00000006
Start Date : 4/18/2006
Page No : 1

Groups Printed- Unshifted

| | Wainee Street Southbound | | | | | Prison Street Westbound | | | | | Wainee Street Northbound | | | | | Prison Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 03:30 PM | 13 | 41 | 41 | 2 | 97 | 8 | 19 | 3 | 0 | 30 | 1 | 25 | 1 | 0 | 27 | 25 | 10 | 4 | 0 | 39 | 193 |
| 03:45 PM | 7 | 74 | 37 | 3 | 121 | 5 | 17 | 12 | 0 | 34 | 5 | 36 | 0 | 0 | 41 | 22 | 10 | 4 | 0 | 36 | 232 |
| Total | 20 | 115 | 78 | 5 | 218 | 13 | 36 | 15 | 0 | 64 | 6 | 61 | 1 | 0 | 68 | 47 | 20 | 8 | 0 | 75 | 425 |
| 04:00 PM | 6 | 70 | 21 | 0 | 97 | 6 | 9 | 11 | 0 | 26 | 1 | 22 | 3 | 0 | 26 | 29 | 14 | 3 | 0 | 46 | 195 |
| 04:15 PM | 6 | 72 | 25 | 0 | 103 | 0 | 14 | 9 | 0 | 23 | 2 | 23 | 0 | 0 | 25 | 27 | 13 | 1 | 0 | 41 | 192 |
| 04:30 PM | 6 | 60 | 30 | 0 | 96 | 1 | 5 | 8 | 0 | 14 | 3 | 16 | 0 | 0 | 19 | 22 | 16 | 3 | 0 | 41 | 170 |
| 04:45 PM | 10 | 49 | 31 | 1 | 91 | 0 | 8 | 10 | 0 | 18 | 3 | 19 | 0 | 0 | 22 | 20 | 9 | 6 | 0 | 35 | 166 |
| Total | 28 | 251 | 107 | 1 | 387 | 7 | 36 | 38 | 0 | 81 | 9 | 80 | 3 | 0 | 92 | 98 | 52 | 13 | 0 | 163 | 723 |
| 05:00 PM | 5 | 48 | 19 | 0 | 72 | 5 | 19 | 13 | 0 | 37 | 2 | 23 | 0 | 0 | 25 | 16 | 7 | 1 | 0 | 24 | 158 |
| 05:15 PM | 6 | 47 | 9 | 0 | 62 | 6 | 17 | 10 | 0 | 33 | 0 | 13 | 0 | 0 | 13 | 23 | 8 | 3 | 0 | 34 | 142 |
| Grand Total | 59 | 461 | 213 | 6 | 739 | 31 | 108 | 76 | 0 | 215 | 17 | 177 | 4 | 0 | 198 | 184 | 87 | 25 | 0 | 296 | 1448 |
| Apprch % | 8 | 62.4 | 28.8 | 0.8 | | 14.4 | 50.2 | 35.3 | 0 | | 8.6 | 89.4 | 2 | 0 | | 62.2 | 29.4 | 8.4 | 0 | | |
| Total % | 4.1 | 31.8 | 14.7 | 0.4 | 51 | 2.1 | 7.5 | 5.2 | 0 | 14.8 | 1.2 | 12.2 | 0.3 | 0 | 13.7 | 12.7 | 6 | 1.7 | 0 | 20.4 | |

| | Wainee Street Southbound | | | | Prison Street Westbound | | | | Wainee Street Northbound | | | | Prison Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:30 PM | | | | | | | | | | | | | | | | | |
| 03:30 PM | **13** | 41 | **41** | 95 | **8** | **19** | 3 | 30 | 1 | 25 | 1 | 27 | 25 | 10 | **4** | 39 | **191** |
| 03:45 PM | 7 | **74** | 37 | **118** | 5 | 17 | **12** | **34** | **5** | **36** | 0 | **41** | 22 | 10 | 4 | 36 | **229** |
| 04:00 PM | 6 | 70 | 21 | 97 | 6 | 9 | 11 | 26 | 1 | 22 | **3** | 26 | **29** | **14** | 3 | **46** | 195 |
| 04:15 PM | 6 | 72 | 25 | 103 | 0 | 14 | 9 | 23 | 2 | 23 | 0 | 25 | 27 | 13 | 1 | 41 | 192 |
| Total Volume | 32 | 257 | 124 | 413 | 19 | 59 | 35 | 113 | 9 | 106 | 4 | 119 | 103 | 47 | 12 | 162 | 807 |
| % App. Total | 7.7 | 62.2 | 30 | | 16.8 | 52.2 | 31 | | 7.6 | 89.1 | 3.4 | | 63.6 | 29 | 7.4 | | |
| PHF | .615 | .868 | .756 | .875 | .594 | .776 | .729 | .831 | .450 | .736 | .333 | .726 | .888 | .839 | .750 | .880 | .881 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0769
Counted: TO
Weather: Clear / Rainy

File Name : waipriA (cruise)
Site Code : 00000005
Start Date : 3/30/2006
Page No : 1

Groups Printed- Unshifted

| | Wainee Street Southbound | | | | | Prison Street Westbound | | | | | Wainee Street Northbound | | | | | Prison Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 08:30 AM | 1 | 11 | 13 | 0 | 25 | 4 | 25 | 19 | 0 | 48 | 7 | 10 | 0 | 0 | 17 | 11 | 13 | 8 | 0 | 32 | 122 |
| 08:45 AM | 2 | 12 | 15 | 0 | 29 | 1 | 39 | 17 | 0 | 57 | 19 | 29 | 1 | 0 | 49 | 6 | 9 | 2 | 0 | 17 | 152 |
| Total | 3 | 23 | 28 | 0 | 54 | 5 | 64 | 36 | 0 | 105 | 26 | 39 | 1 | 0 | 66 | 17 | 22 | 10 | 0 | 49 | 274 |
| 09:00 AM | 2 | 15 | 10 | 0 | 27 | 1 | 28 | 14 | 0 | 43 | 17 | 14 | 0 | 0 | 31 | 6 | 16 | 6 | 0 | 28 | 129 |
| 09:15 AM | 1 | 14 | 13 | 0 | 28 | 5 | 23 | 4 | 0 | 32 | 8 | 21 | 1 | 0 | 30 | 12 | 22 | 6 | 0 | 40 | 130 |
| 09:30 AM | 3 | 8 | 16 | 0 | 27 | 2 | 22 | 10 | 0 | 34 | 8 | 21 | 0 | 0 | 29 | 7 | 18 | 7 | 0 | 32 | 122 |
| 09:45 AM | 2 | 16 | 14 | 0 | 32 | 1 | 21 | 12 | 0 | 34 | 22 | 23 | 0 | 0 | 45 | 12 | 21 | 6 | 0 | 39 | 150 |
| Total | 8 | 53 | 53 | 0 | 114 | 9 | 94 | 40 | 0 | 143 | 55 | 79 | 1 | 0 | 135 | 37 | 77 | 25 | 0 | 139 | 531 |
| 10:00 AM | 4 | 18 | 14 | 0 | 36 | 13 | 27 | 5 | 0 | 45 | 22 | 17 | 2 | 0 | 41 | 16 | 22 | 7 | 0 | 45 | 167 |
| 10:15 AM | 5 | 25 | 18 | 0 | 48 | 18 | 34 | 11 | 0 | 63 | 7 | 20 | 1 | 0 | 28 | 14 | 26 | 7 | 0 | 47 | 186 |
| Grand Total | 20 | 119 | 113 | 0 | 252 | 45 | 219 | 92 | 0 | 356 | 110 | 155 | 5 | 0 | 270 | 84 | 147 | 49 | 0 | 280 | 1158 |
| Apprch % | 7.9 | 47.2 | 44.8 | 0 | | 12.6 | 61.5 | 25.8 | 0 | | 40.7 | 57.4 | 1.9 | 0 | | 30 | 52.5 | 17.5 | 0 | | |
| Total % | 1.7 | 10.3 | 9.8 | 0 | 21.8 | 3.9 | 18.9 | 7.9 | 0 | 30.7 | 9.5 | 13.4 | 0.4 | 0 | 23.3 | 7.3 | 12.7 | 4.2 | 0 | 24.2 | |

| | Wainee Street Southbound | | | | Prison Street Westbound | | | | Wainee Street Northbound | | | | Prison Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 08:30 AM to 10:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 09:30 AM | | | | | | | | | | | | | | | | | |
| 09:30 AM | 3 | 8 | 16 | 27 | 2 | 22 | 10 | 34 | 8 | 21 | 0 | 29 | 7 | 18 | 7 | 32 | 122 |
| 09:45 AM | 2 | 16 | 14 | 32 | 1 | 21 | 12 | 34 | **22** | **23** | 0 | **45** | 12 | 21 | 6 | 39 | 150 |
| 10:00 AM | 4 | 18 | 14 | 36 | 13 | 27 | 5 | 45 | 22 | 17 | **2** | 41 | **16** | 22 | 7 | 45 | 167 |
| 10:15 AM | **5** | **25** | **18** | **48** | **18** | **34** | 11 | **63** | 7 | 20 | 1 | 28 | 14 | **26** | 7 | **47** | **186** |
| Total Volume | 14 | 67 | 62 | 143 | 34 | 104 | 38 | 176 | 59 | 81 | 3 | 143 | 49 | 87 | 27 | 163 | 625 |
| % App. Total | 9.8 | 46.9 | 43.4 | | 19.3 | 59.1 | 21.6 | | 41.3 | 56.6 | 2.1 | | 30.1 | 53.4 | 16.6 | | |
| PHF | .700 | .670 | .861 | .745 | .472 | .765 | .792 | .698 | .670 | .880 | .375 | .794 | .766 | .837 | .964 | .867 | .840 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0769
Counted: TO
Weather: Clear / Rainy

File Name : waipriP
Site Code : 00000005
Start Date : 3/29/2006
Page No : 1

Groups Printed- Unshifted

| | Wainee Street Southbound | | | | | Prison Street Westbound | | | | | Wainee Street Northbound | | | | | Prison Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 03:30 PM | 7 | 44 | 1 | 0 | 52 | 3 | 12 | 6 | 0 | 21 | 9 | 29 | 1 | 0 | 39 | 3 | 16 | 9 | 0 | 28 | 140 |
| 03:45 PM | 4 | 63 | 1 | 0 | 68 | 5 | 12 | 5 | 0 | 22 | 17 | 45 | 1 | 0 | 63 | 11 | 14 | 4 | 0 | 29 | 182 |
| Total | 11 | 107 | 2 | 0 | 120 | 8 | 24 | 11 | 0 | 43 | 26 | 74 | 2 | 0 | 102 | 14 | 30 | 13 | 0 | 57 | 322 |
| 04:00 PM | 5 | 73 | 5 | 0 | 83 | 1 | 13 | 12 | 0 | 26 | 11 | 35 | 0 | 0 | 46 | 13 | 19 | 12 | 0 | 44 | 199 |
| 04:15 PM | 5 | 74 | 3 | 0 | 82 | 3 | 8 | 6 | 0 | 17 | 17 | 36 | 0 | 0 | 53 | 13 | 28 | 7 | 0 | 48 | 200 |
| 04:30 PM | 7 | 56 | 9 | 0 | 72 | 4 | 27 | 5 | 0 | 36 | 16 | 35 | 1 | 0 | 52 | 10 | 16 | 5 | 0 | 31 | 191 |
| 04:45 PM | 7 | 46 | 15 | 0 | 68 | 6 | 25 | 5 | 0 | 36 | 14 | 28 | 0 | 0 | 42 | 15 | 15 | 5 | 0 | 35 | 181 |
| Total | 24 | 249 | 32 | 0 | 305 | 14 | 73 | 28 | 0 | 115 | 58 | 134 | 1 | 0 | 193 | 51 | 78 | 29 | 0 | 158 | 771 |
| 05:00 PM | 14 | 46 | 11 | 0 | 71 | 4 | 20 | 14 | 0 | 38 | 16 | 25 | 1 | 0 | 42 | 16 | 17 | 6 | 0 | 39 | 190 |
| 05:15 PM | 10 | 26 | 5 | 0 | 41 | 6 | 16 | 7 | 0 | 29 | 15 | 19 | 0 | 0 | 34 | 7 | 21 | 0 | 0 | 28 | 132 |
| Grand Total | 59 | 428 | 50 | 0 | 537 | 32 | 133 | 60 | 0 | 225 | 115 | 252 | 4 | 0 | 371 | 88 | 146 | 48 | 0 | 282 | 1415 |
| Apprch % | 11 | 79.7 | 9.3 | 0 | | 14.2 | 59.1 | 26.7 | 0 | | 31 | 67.9 | 1.1 | 0 | | 31.2 | 51.8 | 17 | 0 | | |
| Total % | 4.2 | 30.2 | 3.5 | 0 | 38 | 2.3 | 9.4 | 4.2 | 0 | 15.9 | 8.1 | 17.8 | 0.3 | 0 | 26.2 | 6.2 | 10.3 | 3.4 | 0 | 19.9 | |

| | Wainee Street Southbound | | | | Prison Street Westbound | | | | Wainee Street Northbound | | | | Prison Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:45 PM | | | | | | | | | | | | | | | | | |
| 03:45 PM | 4 | 63 | 1 | 68 | 5 | 12 | 5 | 22 | 17 | 45 | 1 | 63 | 11 | 14 | 4 | 29 | 182 |
| 04:00 PM | 5 | 73 | 5 | 83 | 1 | 13 | 12 | 26 | 11 | 35 | 0 | 46 | 13 | 19 | 12 | 44 | 199 |
| 04:15 PM | 5 | 74 | 3 | 82 | 3 | 8 | 6 | 17 | 17 | 36 | 0 | 53 | 13 | 28 | 7 | 48 | 200 |
| 04:30 PM | 7 | 56 | 9 | 72 | 4 | 27 | 5 | 36 | 16 | 35 | 1 | 52 | 10 | 16 | 5 | 31 | 191 |
| Total Volume | 21 | 266 | 18 | 305 | 13 | 60 | 28 | 101 | 61 | 151 | 2 | 214 | 47 | 77 | 28 | 152 | 772 |
| % App. Total | 6.9 | 87.2 | 5.9 | | 12.9 | 59.4 | 27.7 | | 28.5 | 70.6 | 0.9 | | 30.9 | 50.7 | 18.4 | | |
| PHF | .750 | .899 | .500 | .919 | .650 | .556 | .583 | .701 | .897 | .839 | .500 | .849 | .904 | .688 | .583 | .792 | .965 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826

Counter:D4-3889
Counted:GMT
Weather:Clear

File Name : WaiPriA
Site Code : 00000002
Start Date : 4/26/2006
Page No : 1

Groups Printed- Unshifted

| | Wainee Street Southbound | | | | | Prison Street Westbound | | | | | Wainee Street Northbound | | | | | Prison Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 07:00 AM | 2 | 8 | 10 | 0 | 20 | 6 | 29 | 35 | 3 | 73 | 8 | 26 | 0 | 2 | 36 | 9 | 3 | 0 | 1 | 13 | 142 |
| 07:15 AM | 1 | 14 | 8 | 1 | 24 | 8 | 40 | 15 | 2 | 65 | 8 | 33 | 0 | 0 | 41 | 14 | 1 | 6 | 2 | 23 | 153 |
| 07:30 AM | 6 | 17 | 18 | 1 | 42 | 3 | 56 | 15 | 0 | 74 | 12 | 43 | 4 | 2 | 61 | 29 | 3 | 3 | 0 | 35 | 212 |
| 07:45 AM | 3 | 25 | 13 | 0 | 41 | 8 | 51 | 17 | 2 | 78 | 14 | 39 | 0 | 1 | 54 | 22 | 2 | 5 | 0 | 29 | 202 |
| Total | 12 | 64 | 49 | 2 | 127 | 25 | 176 | 82 | 7 | 290 | 42 | 141 | 4 | 5 | 192 | 74 | 9 | 14 | 3 | 100 | 709 |
| 08:00 AM | 2 | 18 | 10 | 0 | 30 | 18 | 27 | 20 | 2 | 67 | 9 | 39 | 0 | 2 | 50 | 18 | 3 | 3 | 1 | 25 | 172 |
| 08:15 AM | 3 | 10 | 10 | 1 | 24 | 8 | 23 | 10 | 0 | 41 | 7 | 31 | 1 | 1 | 40 | 8 | 1 | 2 | 2 | 13 | 118 |
| 08:30 AM | 1 | 11 | 6 | 2 | 20 | 3 | 32 | 16 | 0 | 51 | 14 | 27 | 0 | 2 | 43 | 7 | 1 | 2 | 1 | 11 | 125 |
| 08:45 AM | 1 | 15 | 15 | 1 | 32 | 6 | 26 | 20 | 2 | 54 | 6 | 24 | 0 | 0 | 30 | 11 | 3 | 1 | 1 | 16 | 132 |
| Total | 7 | 54 | 41 | 4 | 106 | 35 | 108 | 66 | 4 | 213 | 36 | 121 | 1 | 5 | 163 | 44 | 8 | 8 | 5 | 65 | 547 |
| Grand Total | 19 | 118 | 90 | 6 | 233 | 60 | 284 | 148 | 11 | 503 | 78 | 262 | 5 | 10 | 355 | 118 | 17 | 22 | 8 | 165 | 1256 |
| Apprch % | 8.2 | 50.6 | 38.6 | 2.6 | | 11.9 | 56.5 | 29.4 | 2.2 | | 22 | 73.8 | 1.4 | 2.8 | | 71.5 | 10.3 | 13.3 | 4.8 | | |
| Total % | 1.5 | 9.4 | 7.2 | 0.5 | 18.6 | 4.8 | 22.6 | 11.8 | 0.9 | 40 | 6.2 | 20.9 | 0.4 | 0.8 | 28.3 | 9.4 | 1.4 | 1.8 | 0.6 | 13.1 | |

| | Wainee Street Southbound | | | | | Prison Street Westbound | | | | | Wainee Street Northbound | | | | | Prison Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:15 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:15 AM | 1 | 14 | 8 | 1 | 24 | 8 | 40 | 15 | 2 | 65 | 8 | 33 | 0 | 0 | 41 | 14 | 1 | 6 | 2 | 23 | 153 |
| 07:30 AM | 6 | 17 | 18 | 1 | 42 | 3 | 56 | 15 | 0 | 74 | 12 | 43 | 4 | 2 | 61 | 29 | 3 | 3 | 0 | 35 | 212 |
| 07:45 AM | 3 | 25 | 13 | 0 | 41 | 8 | 51 | 17 | 2 | 78 | 14 | 39 | 0 | 1 | 54 | 22 | 2 | 5 | 0 | 29 | 202 |
| 08:00 AM | 2 | 18 | 10 | 0 | 30 | 18 | 27 | 20 | 2 | 67 | 9 | 39 | 0 | 2 | 50 | 18 | 3 | 3 | 1 | 25 | 172 |
| Total Volume | 12 | 74 | 49 | 2 | 137 | 37 | 174 | 67 | 6 | 284 | 43 | 154 | 4 | 5 | 206 | 83 | 9 | 17 | 3 | 112 | 739 |
| % App. Total | 8.8 | 54 | 35.8 | 1.5 | | 13 | 61.3 | 23.6 | 2.1 | | 20.9 | 74.8 | 1.9 | 2.4 | | 74.1 | 8 | 15.2 | 2.7 | | |
| PHF | .500 | .740 | .681 | .500 | .815 | .514 | .777 | .838 | .750 | .910 | .768 | .895 | .250 | .625 | .844 | .716 | .750 | .708 | .375 | .800 | .871 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1- 0527 / D1- 0769
Counted: KT/ TO
Weather: Clear / Rainy

File Name : honpriA
Site Code : 00000007
Start Date : 3/31/2006
Page No : 1

Groups Printed- Unshifted

| | Honoapiilani Hwy Southbound | | | | | Prison Street Westbound | | | | | Honoapiilani Hwy Northbound | | | | | Prison Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 07:00 AM | 0 | 114 | 10 | 0 | 124 | 0 | 0 | 0 | 0 | 0 | 19 | 243 | 0 | 0 | 262 | 0 | 0 | 2 | 0 | 2 | 388 |
| 07:15 AM | 0 | 136 | 15 | 0 | 151 | 0 | 0 | 0 | 0 | 0 | 19 | 208 | 0 | 0 | 227 | 0 | 0 | 3 | 0 | 3 | 381 |
| 07:30 AM | 0 | 130 | 15 | 0 | 145 | 0 | 0 | 0 | 0 | 0 | 13 | 248 | 0 | 0 | 261 | 0 | 1 | 4 | 0 | 5 | 411 |
| 07:45 AM | 0 | 137 | 19 | 0 | 156 | 0 | 0 | 1 | 0 | 1 | 20 | 225 | 0 | 0 | 245 | 0 | 0 | 2 | 0 | 2 | 404 |
| Total | 0 | 517 | 59 | 0 | 576 | 0 | 0 | 1 | 0 | 1 | 71 | 924 | 0 | 0 | 995 | 0 | 1 | 11 | 0 | 12 | 1584 |
| 08:00 AM | 0 | 113 | 9 | 0 | 122 | 0 | 0 | 0 | 0 | 0 | 11 | 171 | 1 | 0 | 183 | 0 | 0 | 4 | 0 | 4 | 309 |
| 08:15 AM | 0 | 112 | 25 | 0 | 137 | 0 | 0 | 0 | 0 | 0 | 20 | 178 | 0 | 0 | 198 | 0 | 0 | 8 | 0 | 8 | 343 |
| 08:30 AM | 0 | 135 | 12 | 0 | 147 | 1 | 0 | 0 | 0 | 1 | 20 | 191 | 0 | 0 | 211 | 0 | 0 | 4 | 0 | 4 | 363 |
| 08:45 AM | 0 | 145 | 28 | 0 | 173 | 0 | 0 | 0 | 0 | 0 | 26 | 170 | 0 | 0 | 196 | 0 | 0 | 14 | 0 | 14 | 383 |
| Total | 0 | 505 | 74 | 0 | 579 | 1 | 0 | 0 | 0 | 1 | 77 | 710 | 1 | 0 | 788 | 0 | 0 | 30 | 0 | 30 | 1398 |
| Grand Total | 0 | 1022 | 133 | 0 | 1155 | 1 | 0 | 1 | 0 | 2 | 148 | 1634 | 1 | 0 | 1783 | 0 | 1 | 41 | 0 | 42 | 2982 |
| Apprch % | 0 | 88.5 | 11.5 | 0 | | 50 | 0 | 50 | 0 | | 8.3 | 91.6 | 0.1 | 0 | | 0 | 2.4 | 97.6 | 0 | | |
| Total % | 0 | 34.3 | 4.5 | 0 | 38.7 | 0 | 0 | 0 | 0 | 0.1 | 5 | 54.8 | 0 | 0 | 59.8 | 0 | 0 | 1.4 | 0 | 1.4 | |

| | Honoapiilani Hwy Southbound | | | | Prison Street Westbound | | | | Honoapiilani Hwy Northbound | | | | Prison Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:00 AM | | | | | | | | | | | | | | | | | |
| 07:00 AM | 0 | 114 | 10 | 124 | 0 | 0 | 0 | 0 | 19 | 243 | 0 | 262 | 0 | 0 | 2 | 2 | 388 |
| 07:15 AM | 0 | 136 | 15 | 151 | 0 | 0 | 0 | 0 | 19 | 208 | 0 | 227 | 0 | 0 | 3 | 3 | 381 |
| 07:30 AM | 0 | 130 | 15 | 145 | 0 | 0 | 0 | 0 | 13 | 248 | 0 | 261 | 0 | 1 | 4 | 5 | 411 |
| 07:45 AM | 0 | 137 | 19 | 156 | 0 | 0 | 1 | 1 | 20 | 225 | 0 | 245 | 0 | 0 | 2 | 2 | 404 |
| Total Volume | 0 | 517 | 59 | 576 | 0 | 0 | 1 | 1 | 71 | 924 | 0 | 995 | 0 | 1 | 11 | 12 | 1584 |
| % App. Total | 0 | 89.8 | 10.2 | | 0 | 0 | 100 | | 7.1 | 92.9 | 0 | | 0 | 8.3 | 91.7 | | |
| PHF | .000 | .943 | .776 | .923 | .000 | .000 | .250 | .250 | .888 | .931 | .000 | .949 | .000 | .250 | .688 | .600 | .964 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0527 / D1-0769
Counted: KT/TO
Weather: Clear / Rainy

File Name : honpriP (cruise)
Site Code : 00000007
Start Date : 3/30/2006
Page No : 1

Groups Printed- Unshifted

| | Honoapiilani Hwy Southbound | | | | | Prison Street Westbound | | | | | Honoapiilani Hwy Northbound | | | | | Prison Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 03:30 PM | 0 | 220 | 11 | 1 | 232 | 0 | 0 | 1 | 0 | 1 | 12 | 243 | 1 | 0 | 256 | 0 | 1 | 20 | 3 | 24 | 513 |
| 03:45 PM | 0 | 225 | 16 | 0 | 241 | 0 | 0 | 1 | 0 | 1 | 17 | 227 | 0 | 1 | 245 | 0 | 1 | 25 | 0 | 26 | 513 |
| Total | 0 | 445 | 27 | 1 | 473 | 0 | 0 | 2 | 0 | 2 | 29 | 470 | 1 | 1 | 501 | 0 | 2 | 45 | 3 | 50 | 1026 |
| 04:00 PM | 0 | 184 | 10 | 0 | 194 | 0 | 0 | 0 | 0 | 0 | 15 | 210 | 1 | 1 | 227 | 0 | 1 | 29 | 0 | 30 | 451 |
| 04:15 PM | 0 | 185 | 14 | 0 | 199 | 0 | 0 | 0 | 1 | 1 | 15 | 212 | 2 | 0 | 229 | 0 | 6 | 29 | 0 | 35 | 464 |
| 04:30 PM | 0 | 144 | 5 | 1 | 150 | 0 | 0 | 0 | 0 | 0 | 16 | 217 | 0 | 1 | 234 | 0 | 0 | 22 | 0 | 22 | 406 |
| 04:45 PM | 0 | 180 | 3 | 0 | 183 | 0 | 0 | 0 | 0 | 0 | 12 | 225 | 2 | 0 | 239 | 0 | 0 | 24 | 0 | 24 | 446 |
| Total | 0 | 693 | 32 | 1 | 726 | 0 | 0 | 0 | 1 | 1 | 58 | 864 | 5 | 2 | 929 | 0 | 7 | 104 | 0 | 111 | 1767 |
| 05:00 PM | 0 | 153 | 6 | 0 | 159 | 0 | 0 | 1 | 0 | 1 | 18 | 227 | 0 | 0 | 245 | 0 | 0 | 21 | 0 | 21 | 426 |
| 05:15 PM | 0 | 143 | 1 | 0 | 144 | 0 | 0 | 0 | 0 | 0 | 13 | 231 | 1 | 0 | 245 | 0 | 0 | 10 | 0 | 10 | 399 |
| Grand Total | 0 | 1434 | 66 | 2 | 1502 | 0 | 0 | 3 | 1 | 4 | 118 | 1792 | 7 | 3 | 1920 | 0 | 9 | 180 | 3 | 192 | 3618 |
| Apprch % | 0 | 95.5 | 4.4 | 0.1 | | 0 | 0 | 75 | 25 | | 6.1 | 93.3 | 0.4 | 0.2 | | 0 | 4.7 | 93.8 | 1.6 | | |
| Total % | 0 | 39.6 | 1.8 | 0.1 | 41.5 | 0 | 0 | 0.1 | 0 | 0.1 | 3.3 | 49.5 | 0.2 | 0.1 | 53.1 | 0 | 0.2 | 5 | 0.1 | 5.3 | |

| | Honoapiilani Hwy Southbound | | | | Prison Street Westbound | | | | Honoapiilani Hwy Northbound | | | | Prison Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:30 PM | | | | | | | | | | | | | | | | | |
| 03:30 PM | 0 | 220 | 11 | 231 | 0 | 0 | 1 | 1 | 12 | 243 | 1 | 256 | 0 | 1 | 20 | 21 | 509 |
| 03:45 PM | 0 | 225 | 16 | 241 | 0 | 0 | 1 | 1 | 17 | 227 | 0 | 244 | 0 | 1 | 25 | 26 | 512 |
| 04:00 PM | 0 | 184 | 10 | 194 | 0 | 0 | 0 | 0 | 15 | 210 | 1 | 226 | 0 | 1 | 29 | 30 | 450 |
| 04:15 PM | 0 | 185 | 14 | 199 | 0 | 0 | 0 | 0 | 15 | 212 | 2 | 229 | 0 | 6 | 29 | 35 | 463 |
| Total Volume | 0 | 814 | 51 | 865 | 0 | 0 | 2 | 2 | 59 | 892 | 4 | 955 | 0 | 9 | 103 | 112 | 1934 |
| % App. Total | 0 | 94.1 | 5.9 | | 0 | 0 | 100 | | 6.2 | 93.4 | 0.4 | | 0 | 8 | 92 | | |
| PHF | .000 | .904 | .797 | .897 | .000 | .000 | .500 | .500 | .868 | .918 | .500 | .933 | .000 | .375 | .888 | .800 | .944 |

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3888
Counted By: KT
Weather: Clear

File Name : frodicP(cruise)
Site Code : 00000001
Start Date : 3/9/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Dickenson Street Westbound | | | | | Front Street Northbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | | |
| 03:30 PM | 18 | 64 | 0 | 42 | 124 | 16 | 0 | 5 | 119 | 140 | 0 | 77 | 10 | 0 | 87 | 0 | 351 |
| 03:45 PM | 19 | 97 | 0 | 33 | 149 | 18 | 0 | 9 | 156 | 183 | 0 | 80 | 14 | 0 | 94 | 0 | 426 |
| Total | 37 | 161 | 0 | 75 | 273 | 34 | 0 | 14 | 275 | 323 | 0 | 157 | 24 | 0 | 181 | 0 | 777 |
| 04:00 PM | 14 | 109 | 0 | 16 | 139 | 12 | 0 | 11 | 88 | 111 | 0 | 69 | 15 | 0 | 84 | 0 | 334 |
| 04:15 PM | 11 | 87 | 0 | 24 | 122 | 12 | 0 | 14 | 87 | 113 | 0 | 70 | 10 | 0 | 80 | 0 | 315 |
| 04:30 PM | 5 | 70 | 0 | 38 | 113 | 8 | 0 | 7 | 58 | 73 | 0 | 53 | 13 | 0 | 66 | 0 | 252 |
| 04:45 PM | 13 | 66 | 0 | 15 | 94 | 16 | 0 | 13 | 25 | 54 | 0 | 60 | 12 | 0 | 72 | 0 | 220 |
| Total | 43 | 332 | 0 | 93 | 468 | 48 | 0 | 45 | 258 | 351 | 0 | 252 | 50 | 0 | 302 | 0 | 1121 |
| 05:00 PM | 16 | 58 | 0 | 27 | 101 | 11 | 0 | 6 | 47 | 64 | 0 | 58 | 11 | 0 | 69 | 0 | 234 |
| 05:15 PM | 10 | 76 | 0 | 14 | 100 | 5 | 0 | 9 | 45 | 59 | 0 | 59 | 9 | 0 | 68 | 0 | 227 |
| Grand Total | 106 | 627 | 0 | 209 | 942 | 98 | 0 | 74 | 625 | 797 | 0 | 526 | 94 | 0 | 620 | 0 | 2359 |
| Apprch % | 11.3 | 66.6 | 0.0 | 22.2 | | 12.3 | 0.0 | 9.3 | 78.4 | | 0.0 | 84.8 | 15.2 | 0.0 | | | |
| Total % | 4.5 | 26.6 | 0.0 | 8.9 | 39.9 | 4.2 | 0.0 | 3.1 | 26.5 | 33.8 | 0.0 | 22.3 | 4.0 | 0.0 | 26.3 | 0.0 | |

| | Front Street Southbound | | | | Dickenson Street Westbound | | | | Front Street Northbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | App. Total | Int. Total |
| Peak Hour From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | |
| Intersection | 03:30 PM | | | | | | | | | | | | | |
| Volume | 62 | 357 | 0 | 419 | 58 | 0 | 39 | 97 | 0 | 296 | 49 | 345 | 0 | 861 |
| Percent | 14.8 | 85.2 | 0.0 | | 59.8 | 0.0 | 40.2 | | 0.0 | 85.8 | 14.2 | | | |
| 03:45 Volume | 19 | 97 | 0 | 116 | 18 | 0 | 9 | 27 | 0 | 80 | 14 | 94 | 0 | 237 |
| Peak Factor | | | | | | | | | | | | | | 0.908 |
| High Int. | 04:00 PM | | | | 03:45 PM | | | | 03:45 PM | | | | 3:15:00 PM | |
| Volume | 14 | 109 | 0 | 123 | 18 | 0 | 9 | 27 | 0 | 80 | 14 | 94 | | |
| Peak Factor | | | | 0.852 | | | | 0.898 | | | | 0.918 | | |

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3888
Counted By: KT
Weather: Clear

File Name : frodicA(cruise)
Site Code : 00000001
Start Date : 3/9/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Dickenson Street Westbound | | | | | Front Street Northbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | | |
| 08:30 AM | 4 | 49 | 0 | 7 | 60 | 10 | 0 | 6 | 15 | 31 | 0 | 26 | 7 | 0 | 33 | 0 | 124 |
| 08:45 AM | 13 | 65 | 0 | 16 | 94 | 17 | 0 | 7 | 28 | 52 | 0 | 31 | 8 | 0 | 39 | 0 | 185 |
| Total | 17 | 114 | 0 | 23 | 154 | 27 | 0 | 13 | 43 | 83 | 0 | 57 | 15 | 0 | 72 | 0 | 309 |
| 09:00 AM | 9 | 65 | 0 | 24 | 98 | 11 | 0 | 10 | 12 | 33 | 0 | 46 | 16 | 0 | 62 | 0 | 193 |
| 09:15 AM | 4 | 57 | 0 | 20 | 81 | 10 | 0 | 10 | 35 | 55 | 0 | 48 | 10 | 0 | 58 | 0 | 194 |
| 09:30 AM | 17 | 78 | 0 | 17 | 112 | 11 | 0 | 8 | 32 | 51 | 0 | 52 | 7 | 0 | 59 | 0 | 222 |
| 09:45 AM | 14 | 61 | 0 | 20 | 95 | 11 | 0 | 9 | 36 | 56 | 0 | 58 | 11 | 0 | 69 | 0 | 220 |
| Total | 44 | 261 | 0 | 81 | 386 | 43 | 0 | 37 | 115 | 195 | 0 | 204 | 44 | 0 | 248 | 0 | 829 |
| 10:00 AM | 9 | 72 | 0 | 18 | 99 | 12 | 0 | 10 | 63 | 85 | 0 | 47 | 21 | 0 | 68 | 0 | 252 |
| 10:15 AM | 16 | 63 | 0 | 6 | 85 | 10 | 0 | 6 | 87 | 103 | 0 | 54 | 16 | 0 | 70 | 0 | 258 |
| Grand Total | 86 | 510 | 0 | 128 | 724 | 92 | 0 | 66 | 308 | 466 | 0 | 362 | 96 | 0 | 458 | 0 | 1648 |
| Apprch % | 11.9 | 70.4 | 0.0 | 17.7 | | 19.7 | 0.0 | 14.2 | 66.1 | | 0.0 | 79.0 | 21.0 | 0.0 | | | |
| Total % | 5.2 | 30.9 | 0.0 | 7.8 | 43.9 | 5.6 | 0.0 | 4.0 | 18.7 | 28.3 | 0.0 | 22.0 | 5.8 | 0.0 | 27.8 | 0.0 | |

| | Front Street Southbound | | | | Dickenson Street Westbound | | | | Front Street Northbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | App. Total | Int. Total |
| Peak Hour From 08:30 AM to 10:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | |
| Intersection | 09:30 AM | | | | | | | | | | | | | |
| Volume | 56 | 274 | 0 | 330 | 44 | 0 | 33 | 77 | 0 | 211 | 55 | 266 | 0 | 673 |
| Percent | 17.0 | 83.0 | 0.0 | | 57.1 | 0.0 | 42.9 | | 0.0 | 79.3 | 20.7 | | | |
| 09:30 Volume | 17 | 78 | 0 | 95 | 11 | 0 | 8 | 19 | 0 | 52 | 7 | 59 | 0 | 173 |
| Peak Factor | | | | | | | | | | | | | | 0.973 |
| High Int. | 09:30 AM | | | | 10:00 AM | | | | 10:15 AM | | | | 8:15:00 AM | |
| Volume | 17 | 78 | 0 | 95 | 12 | 0 | 10 | 22 | 0 | 54 | 16 | 70 | | |
| Peak Factor | | | | 0.868 | | | | 0.875 | | | | 0.950 | | |

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D4-3888
Counted By: KT
Weather: Clear

File Name : frodicP
Site Code : 00000001
Start Date : 3/8/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Dickenson Street Westbound | | | | | Front Street Northbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | App. Total | Int. Total |
| Factor | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | | | |
| 03:30 PM | 13 | 92 | 0 | 32 | 137 | 15 | 0 | 8 | 52 | 75 | 0 | 64 | 12 | 0 | 76 | 0 | 288 |
| 03:45 PM | 19 | 79 | 0 | 68 | 166 | 11 | 0 | 16 | 55 | 82 | 0 | 63 | 21 | 0 | 84 | 0 | 332 |
| Total | 32 | 171 | 0 | 100 | 303 | 26 | 0 | 24 | 107 | 157 | 0 | 127 | 33 | 0 | 160 | 0 | 620 |
| 04:00 PM | 22 | 106 | 0 | 39 | 167 | 17 | 0 | 14 | 56 | 87 | 0 | 89 | 9 | 0 | 98 | 0 | 352 |
| 04:15 PM | 26 | 84 | 0 | 43 | 153 | 15 | 0 | 7 | 60 | 82 | 0 | 76 | 15 | 0 | 91 | 0 | 326 |
| 04:30 PM | 8 | 110 | 0 | 42 | 160 | 13 | 0 | 11 | 57 | 81 | 0 | 57 | 14 | 0 | 71 | 0 | 312 |
| 04:45 PM | 17 | 56 | 0 | 36 | 109 | 16 | 0 | 11 | 63 | 90 | 0 | 67 | 11 | 0 | 78 | 0 | 277 |
| Total | 73 | 356 | 0 | 160 | 589 | 61 | 0 | 43 | 236 | 340 | 0 | 289 | 49 | 0 | 338 | 0 | 1267 |
| 05:00 PM | 17 | 31 | 0 | 21 | 69 | 10 | 0 | 4 | 35 | 49 | 0 | 34 | 7 | 0 | 41 | 0 | 159 |
| 05:15 PM | 9 | 64 | 0 | 27 | 100 | 8 | 0 | 8 | 58 | 74 | 0 | 64 | 6 | 0 | 70 | 0 | 244 |
| Grand Total | 131 | 622 | 0 | 308 | 1061 | 105 | 0 | 79 | 436 | 620 | 0 | 514 | 95 | 0 | 609 | 0 | 2290 |
| Apprch % | 12.3 | 58.6 | 0.0 | 29.0 | | 16.9 | 0.0 | 12.7 | 70.3 | | 0.0 | 84.4 | 15.6 | 0.0 | | | |
| Total % | 5.7 | 27.2 | 0.0 | 13.4 | 46.3 | 4.6 | 0.0 | 3.4 | 19.0 | 27.1 | 0.0 | 22.4 | 4.1 | 0.0 | 26.6 | 0.0 | |

| | Front Street Southbound | | | | Dickenson Street Westbound | | | | Front Street Northbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | App. Total | Int. Total |
| Peak Hour From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | |
| Intersection | 03:45 PM | | | | | | | | | | | | | |
| Volume | 75 | 379 | 0 | 454 | 56 | 0 | 48 | 104 | 0 | 285 | 59 | 344 | 0 | 902 |
| Percent | 16.5 | 83.5 | 0.0 | | 53.8 | 0.0 | 46.2 | | 0.0 | 82.8 | 17.2 | | | |
| 04:00 Volume | 22 | 106 | 0 | 128 | 17 | 0 | 14 | 31 | 0 | 89 | 9 | 98 | 0 | 257 |
| Peak Factor | | | | | | | | | | | | | | 0.877 |
| High Int. | 04:00 PM | | | | 04:00 PM | | | | 04:00 PM | | | | 3:15:00 PM | |
| Volume | 22 | 106 | 0 | 128 | 17 | 0 | 14 | 31 | 0 | 89 | 9 | 98 | | |
| Peak Factor | | | | 0.887 | | | | 0.839 | | | | 0.878 | | |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0528
Counted: TO
Weather: CLEAR

File Name : frodicA
Site Code : 00000004
Start Date : 4/19/2006
Page No : 1

Groups Printed- Unshifted

| | Front Street Southbound | | | | | Dickenson Street Westbound | | | | | Front Street Northbound | | | | | Dickenson Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 07:00 AM | 3 | 47 | 0 | 0 | 50 | 6 | 0 | 2 | 33 | 41 | 0 | 26 | 9 | 0 | 35 | 0 | 0 | 0 | 0 | 0 | 126 |
| 07:15 AM | 3 | 88 | 0 | 0 | 91 | 9 | 0 | 8 | 44 | 61 | 0 | 84 | 12 | 0 | 96 | 0 | 0 | 0 | 0 | 0 | 248 |
| 07:30 AM | 3 | 71 | 0 | 0 | 74 | 7 | 0 | 13 | 29 | 49 | 0 | 83 | 9 | 0 | 92 | 0 | 0 | 0 | 0 | 0 | 215 |
| 07:45 AM | 11 | 42 | 0 | 0 | 53 | 4 | 0 | 10 | 49 | 63 | 0 | 80 | 6 | 0 | 86 | 0 | 0 | 0 | 0 | 0 | 202 |
| Total | 20 | 248 | 0 | 0 | 268 | 26 | 0 | 33 | 155 | 214 | 0 | 273 | 36 | 0 | 309 | 0 | 0 | 0 | 0 | 0 | 791 |
| 08:00 AM | 4 | 28 | 0 | 0 | 32 | 9 | 0 | 6 | 37 | 52 | 0 | 48 | 7 | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 139 |
| 08:15 AM | 11 | 39 | 0 | 0 | 50 | 15 | 0 | 7 | 50 | 72 | 0 | 50 | 8 | 0 | 58 | 0 | 0 | 0 | 0 | 0 | 180 |
| 08:30 AM | 6 | 42 | 0 | 0 | 48 | 11 | 0 | 7 | 57 | 75 | 0 | 28 | 5 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 156 |
| 08:45 AM | 9 | 57 | 0 | 0 | 66 | 9 | 0 | 5 | 67 | 81 | 0 | 51 | 13 | 0 | 64 | 0 | 0 | 0 | 0 | 0 | 211 |
| Total | 30 | 166 | 0 | 0 | 196 | 44 | 0 | 25 | 211 | 280 | 0 | 177 | 33 | 0 | 210 | 0 | 0 | 0 | 0 | 0 | 686 |
| Grand Total | 50 | 414 | 0 | 0 | 464 | 70 | 0 | 58 | 366 | 494 | 0 | 450 | 69 | 0 | 519 | 0 | 0 | 0 | 0 | 0 | 1477 |
| Apprch % | 10.8 | 89.2 | 0 | 0 | | 14.2 | 0 | 11.7 | 74.1 | | 0 | 86.7 | 13.3 | 0 | | 0 | 0 | 0 | 0 | | |
| Total % | 3.4 | 28 | 0 | 0 | 31.4 | 4.7 | 0 | 3.9 | 24.8 | 33.4 | 0 | 30.5 | 4.7 | 0 | 35.1 | 0 | 0 | 0 | 0 | 0 | |

| | Front Street Southbound | | | | Dickenson Street Westbound | | | | Front Street Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:15 AM | | | | | | | | | | | | | | | | | |
| 07:15 AM | 3 | 88 | 0 | 91 | 9 | 0 | 8 | 17 | 0 | 84 | 12 | 96 | 0 | 0 | 0 | 0 | 204 |
| 07:30 AM | 3 | 71 | 0 | 74 | 7 | 0 | 13 | 20 | 0 | 83 | 9 | 92 | 0 | 0 | 0 | 0 | 186 |
| 07:45 AM | 11 | 42 | 0 | 53 | 4 | 0 | 10 | 14 | 0 | 80 | 6 | 86 | 0 | 0 | 0 | 0 | 153 |
| 08:00 AM | 4 | 28 | 0 | 32 | 9 | 0 | 6 | 15 | 0 | 48 | 7 | 55 | 0 | 0 | 0 | 0 | 102 |
| Total Volume | 21 | 229 | 0 | 250 | 29 | 0 | 37 | 66 | 0 | 295 | 34 | 329 | 0 | 0 | 0 | 0 | 645 |
| % App. Total | 8.4 | 91.6 | 0 | | 43.9 | 0 | 56.1 | | 0 | 89.7 | 10.3 | | 0 | 0 | 0 | | |
| PHF | .477 | .651 | .000 | .687 | .806 | .000 | .712 | .825 | .000 | .878 | .708 | .857 | .000 | .000 | .000 | .000 | .790 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0527
Counted: KT
Weather: SUNNY

File Name : waidicP (cruise)
Site Code : 00000005
Start Date : 4/18/2006
Page No : 1

Groups Printed- Unshifted

| | Wainee Street Southbound | | | | | Dickenson Street Westbound | | | | | Wainee Street Northbound | | | | | Dickenson Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 03:30 PM | 6 | 60 | 12 | 0 | 78 | 24 | 12 | 0 | 3 | 39 | 5 | 67 | 10 | 1 | 73 | 14 | 18 | 3 | 3 | 38 | 228 |
| 03:45 PM | 5 | 75 | 12 | 2 | 94 | 44 | 22 | 3 | 2 | 71 | 3 | 67 | 4 | 2 | 76 | 17 | 19 | 13 | 4 | 53 | 294 |
| Total | 11 | 135 | 24 | 2 | 172 | 68 | 34 | 3 | 5 | 110 | 8 | 124 | 14 | 3 | 149 | 31 | 37 | 16 | 7 | 91 | 522 |
| 04:00 PM | 3 | 59 | 15 | 0 | 77 | 35 | 24 | 1 | 0 | 60 | 4 | 60 | 13 | 0 | 77 | 11 | 20 | 5 | 1 | 37 | 251 |
| 04:15 PM | 4 | 60 | 14 | 0 | 78 | 37 | 25 | 3 | 1 | 66 | 3 | 50 | 17 | 0 | 70 | 20 | 20 | 7 | 1 | 48 | 262 |
| 04:30 PM | 4 | 50 | 16 | 0 | 70 | 45 | 17 | 6 | 0 | 68 | 5 | 38 | 17 | 0 | 60 | 11 | 19 | 7 | 2 | 39 | 237 |
| 04:45 PM | 4 | 46 | 10 | 0 | 60 | 30 | 20 | 3 | 0 | 53 | 5 | 46 | 6 | 2 | 59 | 11 | 11 | 8 | 2 | 32 | 204 |
| Total | 15 | 215 | 55 | 0 | 285 | 147 | 86 | 13 | 1 | 247 | 17 | 194 | 53 | 2 | 266 | 53 | 70 | 27 | 6 | 156 | 954 |
| 05:00 PM | 2 | 69 | 19 | 3 | 93 | 13 | 21 | 5 | 4 | 43 | 4 | 50 | 13 | 1 | 68 | 18 | 11 | 4 | 4 | 37 | 241 |
| 05:15 PM | 4 | 57 | 8 | 0 | 69 | 8 | 23 | 3 | 1 | 35 | 2 | 42 | 12 | 4 | 60 | 12 | 18 | 5 | 8 | 43 | 207 |
| Grand Total | 32 | 476 | 106 | 5 | 619 | 236 | 164 | 24 | 11 | 435 | 31 | 410 | 92 | 10 | 543 | 114 | 136 | 52 | 25 | 327 | 1924 |
| Apprch % | 5.2 | 76.9 | 17.1 | 0.8 | | 54.3 | 37.7 | 5.5 | 2.5 | | 5.7 | 75.5 | 16.9 | 1.8 | | 34.9 | 41.6 | 15.9 | 7.6 | | |
| Total % | 1.7 | 24.7 | 5.5 | 0.3 | 32.2 | 12.3 | 8.5 | 1.2 | 0.6 | 22.6 | 1.6 | 21.3 | 4.8 | 0.5 | 28.2 | 5.9 | 7.1 | 2.7 | 1.3 | 17 | |

| | Wainee Street Southbound | | | | Dickenson Street Westbound | | | | Wainee Street Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:45 PM | | | | | | | | | | | | | | | | | |
| 03:45 PM | 5 | 75 | 12 | 92 | 44 | 22 | 3 | 69 | 3 | 67 | 4 | 74 | 17 | 19 | 13 | 49 | 284 |
| 04:00 PM | 3 | 59 | 15 | 77 | 35 | 24 | 1 | 60 | 4 | 60 | 13 | 77 | 11 | 20 | 5 | 36 | 250 |
| 04:15 PM | 4 | 60 | 14 | 78 | 37 | 25 | 3 | 65 | 3 | 50 | 17 | 70 | 20 | 20 | 7 | 47 | 260 |
| 04:30 PM | 4 | 50 | 16 | 70 | 45 | 17 | 6 | 68 | 5 | 38 | 17 | 60 | 11 | 19 | 7 | 37 | 235 |
| Total Volume | 16 | 244 | 57 | 317 | 161 | 88 | 13 | 262 | 15 | 215 | 51 | 281 | 59 | 78 | 32 | 169 | 1029 |
| % App. Total | 5 | 77 | 18 | | 61.5 | 33.6 | 5 | | 5.3 | 76.5 | 18.1 | | 34.9 | 46.2 | 18.9 | | |
| PHF | .800 | .813 | .891 | .861 | .894 | .880 | .542 | .949 | .750 | .802 | .750 | .912 | .738 | .975 | .615 | .862 | .906 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0528 / D1-0768
Counted: IW / GMT
Weather: Clear / Rainy

File Name : waidicA (cruise)
Site Code : 00000004
Start Date : 3/30/2006
Page No : 1

Groups Printed- Unshifted

| | Wainee Street Southbound | | | | | Dickenson Street Westbound | | | | | Wainee Street Northbound | | | | | Dickenson Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 08:30 AM | 0 | 27 | 11 | 0 | 38 | 8 | 11 | 2 | 1 | 22 | 1 | 33 | 7 | 6 | 47 | 8 | 11 | 2 | 6 | 27 | 134 |
| 08:45 AM | 2 | 28 | 11 | 0 | 41 | 11 | 24 | 4 | 0 | 39 | 12 | 31 | 4 | 1 | 48 | 13 | 7 | 6 | 1 | 27 | 155 |
| Total | 2 | 55 | 22 | 0 | 79 | 19 | 35 | 6 | 1 | 61 | 13 | 64 | 11 | 7 | 95 | 21 | 18 | 8 | 7 | 54 | 289 |
| 09:00 AM | 2 | 30 | 15 | 12 | 59 | 11 | 28 | 2 | 4 | 45 | 5 | 25 | 6 | 3 | 39 | 7 | 13 | 4 | 13 | 37 | 180 |
| 09:15 AM | 1 | 24 | 5 | 0 | 30 | 18 | 27 | 3 | 0 | 48 | 5 | 38 | 2 | 2 | 47 | 13 | 10 | 5 | 4 | 32 | 157 |
| 09:30 AM | 2 | 25 | 12 | 0 | 39 | 1 | 26 | 6 | 0 | 33 | 6 | 34 | 8 | 1 | 49 | 12 | 18 | 4 | 1 | 35 | 156 |
| 09:45 AM | 3 | 37 | 17 | 0 | 57 | 10 | 17 | 9 | 0 | 36 | 1 | 45 | 4 | 0 | 50 | 9 | 10 | 2 | 3 | 24 | 167 |
| Total | 8 | 116 | 49 | 12 | 185 | 40 | 98 | 20 | 4 | 162 | 17 | 142 | 20 | 6 | 185 | 41 | 51 | 15 | 21 | 128 | 660 |
| 10:00 AM | 1 | 26 | 13 | 1 | 41 | 9 | 14 | 5 | 3 | 31 | 4 | 38 | 5 | 9 | 56 | 7 | 19 | 6 | 2 | 34 | 162 |
| 10:15 AM | 2 | 28 | 6 | 0 | 36 | 28 | 13 | 6 | 0 | 47 | 4 | 30 | 4 | 0 | 38 | 10 | 8 | 10 | 0 | 28 | 149 |
| Grand Total | 13 | 225 | 90 | 13 | 341 | 96 | 160 | 37 | 8 | 301 | 38 | 274 | 40 | 22 | 374 | 79 | 96 | 39 | 30 | 244 | 1260 |
| Apprch % | 3.8 | 66 | 26.4 | 3.8 | | 31.9 | 53.2 | 12.3 | 2.7 | | 10.2 | 73.3 | 10.7 | 5.9 | | 32.4 | 39.3 | 16 | 12.3 | | |
| Total % | 1 | 17.9 | 7.1 | 1 | 27.1 | 7.6 | 12.7 | 2.9 | 0.6 | 23.9 | 3 | 21.7 | 3.2 | 1.7 | 29.7 | 6.3 | 7.6 | 3.1 | 2.4 | 19.4 | |

| | Wainee Street Southbound | | | | Dickenson Street Westbound | | | | Wainee Street Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 08:30 AM to 10:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 09:00 AM | | | | | | | | | | | | | | | | | |
| 09:00 AM | 2 | 30 | 15 | 47 | 11 | 28 | 2 | 41 | 5 | 25 | 6 | 36 | 7 | 13 | 4 | 24 | 148 |
| 09:15 AM | 1 | 24 | 5 | 30 | 18 | 27 | 3 | 48 | 5 | 38 | 2 | 45 | 13 | 10 | 5 | 28 | 151 |
| 09:30 AM | 2 | 25 | 12 | 39 | 1 | 26 | 6 | 33 | 6 | 34 | 8 | 48 | 12 | 18 | 4 | 34 | 154 |
| 09:45 AM | 3 | 37 | 17 | 57 | 10 | 17 | 9 | 36 | 1 | 45 | 4 | 50 | 9 | 10 | 2 | 21 | 164 |
| Total Volume | 8 | 116 | 49 | 173 | 40 | 98 | 20 | 158 | 17 | 142 | 20 | 179 | 41 | 51 | 15 | 107 | 617 |
| % App. Total | 4.6 | 67.1 | 28.3 | | 25.3 | 62 | 12.7 | | 9.5 | 79.3 | 11.2 | | 38.3 | 47.7 | 14 | | |
| PHF | .667 | .784 | .721 | .759 | .556 | .875 | .556 | .823 | .708 | .789 | .625 | .895 | .788 | .708 | .750 | .787 | .941 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0528 / D1-0768
Counted: IW / GMT
Weather: Clear / Rainy

File Name : waidicP
Site Code : 00000004
Start Date : 3/29/2006
Page No : 1

Groups Printed- Unshifted

| | Wainee Street Southbound | | | | | Dickenson Street Westbound | | | | | Wainee Street Northbound | | | | | Dickenson Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 03:30 PM | 7 | 66 | 25 | 0 | 98 | 21 | 23 | 2 | 0 | 46 | 6 | 64 | 11 | 2 | 83 | 9 | 15 | 8 | 0 | 32 | 259 |
| 03:45 PM | 3 | 56 | 21 | 0 | 80 | 25 | 20 | 5 | 0 | 50 | 6 | 64 | 10 | 0 | 80 | 21 | 20 | 5 | 1 | 47 | 257 |
| Total | 10 | 122 | 46 | 0 | 178 | 46 | 43 | 7 | 0 | 96 | 12 | 128 | 21 | 2 | 163 | 30 | 35 | 13 | 1 | 79 | 516 |
| 04:00 PM | 9 | 63 | 23 | 1 | 96 | 26 | 23 | 6 | 1 | 56 | 5 | 61 | 10 | 2 | 78 | 16 | 18 | 2 | 0 | 36 | 266 |
| 04:15 PM | 2 | 65 | 12 | 0 | 79 | 28 | 15 | 7 | 0 | 50 | 7 | 47 | 7 | 2 | 63 | 17 | 21 | 4 | 2 | 44 | 236 |
| 04:30 PM | 5 | 61 | 15 | 0 | 81 | 19 | 23 | 3 | 0 | 45 | 10 | 46 | 8 | 2 | 66 | 18 | 22 | 7 | 4 | 51 | 243 |
| 04:45 PM | 4 | 58 | 13 | 0 | 75 | 13 | 17 | 6 | 2 | 38 | 6 | 69 | 10 | 1 | 86 | 11 | 24 | 9 | 2 | 46 | 245 |
| Total | 20 | 247 | 63 | 1 | 331 | 86 | 78 | 22 | 3 | 189 | 28 | 223 | 35 | 7 | 293 | 62 | 85 | 22 | 8 | 177 | 990 |
| 05:00 PM | 4 | 58 | 16 | 0 | 78 | 11 | 28 | 4 | 0 | 43 | 7 | 58 | 13 | 13 | 91 | 15 | 20 | 5 | 4 | 44 | 256 |
| 05:15 PM | 6 | 38 | 15 | 0 | 59 | 8 | 20 | 1 | 0 | 27 | 5 | 36 | 8 | 3 | 52 | 13 | 17 | 3 | 2 | 35 | 173 |
| Grand Total | 40 | 465 | 140 | 1 | 646 | 149 | 169 | 34 | 3 | 355 | 52 | 445 | 77 | 25 | 599 | 120 | 157 | 43 | 15 | 335 | 1935 |
| Apprch % | 6.2 | 72 | 21.7 | 0.2 | | 42 | 47.6 | 9.6 | 0.8 | | 8.7 | 74.3 | 12.9 | 4.2 | | 35.8 | 46.9 | 12.8 | 4.5 | | |
| Total % | 2.1 | 24 | 7.2 | 0.1 | 33.4 | 7.7 | 8.7 | 1.8 | 0.2 | 18.3 | 2.7 | 23 | 4 | 1.3 | 31 | 6.2 | 8.1 | 2.2 | 0.8 | 17.3 | |

| | Wainee Street Southbound | | | | Dickenson Street Westbound | | | | Wainee Street Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:30 PM | | | | | | | | | | | | | | | | | |
| 03:30 PM | 7 | 66 | 25 | 98 | 21 | 23 | 2 | 46 | 6 | 64 | 11 | 81 | 9 | 15 | 8 | 32 | 257 |
| 03:45 PM | 3 | 56 | 21 | 80 | 25 | 20 | 5 | 50 | 6 | 64 | 10 | 80 | 21 | 20 | 5 | 46 | 256 |
| 04:00 PM | 9 | 63 | 23 | 95 | 26 | 23 | 6 | 55 | 5 | 61 | 10 | 76 | 16 | 18 | 2 | 36 | 262 |
| 04:15 PM | 2 | 65 | 12 | 79 | 28 | 15 | 7 | 50 | 7 | 47 | 7 | 61 | 17 | 21 | 4 | 42 | 232 |
| Total Volume | 21 | 250 | 81 | 352 | 100 | 81 | 20 | 201 | 24 | 236 | 38 | 298 | 63 | 74 | 19 | 156 | 1007 |
| % App. Total | 6 | 71 | 23 | | 49.8 | 40.3 | 10 | | 8.1 | 79.2 | 12.8 | | 40.4 | 47.4 | 12.2 | | |
| PHF | .583 | .947 | .810 | .898 | .893 | .880 | .714 | .914 | .857 | .922 | .864 | .920 | .750 | .881 | .594 | .848 | .961 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0527
Counted: KT
Weather: SUNNY

File Name : waidicA
Site Code : 00000005
Start Date : 4/19/2006
Page No : 1

Groups Printed- Unshifted

| | Wainee Street Southbound | | | | | Dickenson Street Westbound | | | | | Wainee Street Northbound | | | | | Dickenson Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 07:00 AM | 2 | 23 | 4 | 0 | 29 | 8 | 12 | 0 | 0 | 20 | 2 | 29 | 12 | 1 | 44 | 2 | 9 | 3 | 3 | 17 | 110 |
| 07:15 AM | 2 | 21 | 5 | 0 | 28 | 10 | 9 | 1 | 2 | 22 | 3 | 36 | 9 | 1 | 49 | 0 | 9 | 2 | 1 | 12 | 111 |
| 07:30 AM | 3 | 28 | 8 | 0 | 39 | 9 | 11 | 0 | 3 | 23 | 1 | 40 | 23 | 1 | 65 | 6 | 14 | 2 | 2 | 24 | 151 |
| 07:45 AM | 3 | 21 | 6 | 0 | 30 | 11 | 6 | 1 | 1 | 19 | 5 | 37 | 3 | 0 | 45 | 12 | 11 | 4 | 0 | 27 | 121 |
| Total | 10 | 93 | 23 | 0 | 126 | 38 | 38 | 2 | 6 | 84 | 11 | 142 | 47 | 3 | 203 | 20 | 43 | 11 | 6 | 80 | 493 |
| 08:00 AM | 1 | 12 | 5 | 0 | 18 | 7 | 12 | 1 | 0 | 20 | 1 | 33 | 10 | 3 | 47 | 5 | 7 | 4 | 2 | 18 | 103 |
| 08:15 AM | 0 | 13 | 6 | 0 | 19 | 11 | 15 | 0 | 0 | 26 | 5 | 32 | 4 | 0 | 41 | 7 | 3 | 7 | 1 | 18 | 104 |
| 08:30 AM | 1 | 16 | 10 | 2 | 29 | 8 | 22 | 3 | 2 | 35 | 5 | 30 | 5 | 1 | 41 | 5 | 2 | 5 | 4 | 16 | 121 |
| 08:45 AM | 3 | 16 | 9 | 0 | 28 | 12 | 16 | 1 | 1 | 30 | 2 | 38 | 3 | 1 | 44 | 7 | 11 | 6 | 3 | 27 | 129 |
| Total | 5 | 57 | 30 | 2 | 94 | 38 | 65 | 5 | 3 | 111 | 13 | 133 | 22 | 5 | 173 | 24 | 23 | 22 | 10 | 79 | 457 |
| Grand Total | 15 | 150 | 53 | 2 | 220 | 76 | 103 | 7 | 9 | 195 | 24 | 275 | 69 | 8 | 376 | 44 | 66 | 33 | 16 | 159 | 950 |
| Apprch % | 6.8 | 68.2 | 24.1 | 0.9 | | 39 | 52.8 | 3.6 | 4.6 | | 6.4 | 73.1 | 18.4 | 2.1 | | 27.7 | 41.5 | 20.8 | 10.1 | | |
| Total % | 1.6 | 15.8 | 5.6 | 0.2 | 23.2 | 8 | 10.8 | 0.7 | 0.9 | 20.5 | 2.5 | 28.9 | 7.3 | 0.8 | 39.6 | 4.6 | 6.9 | 3.5 | 1.7 | 16.7 | |

| | Wainee Street Southbound | | | | Dickenson Street Westbound | | | | Wainee Street Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:00 AM | | | | | | | | | | | | | | | | | |
| 07:00 AM | 2 | 23 | 4 | 29 | 8 | 12 | 0 | 20 | 2 | 29 | 12 | 43 | 2 | 9 | 3 | 14 | 106 |
| 07:15 AM | 2 | 21 | 5 | 28 | 10 | 9 | 1 | 20 | 3 | 36 | 9 | 48 | 0 | 9 | 2 | 11 | 107 |
| 07:30 AM | 3 | 28 | 8 | 39 | 9 | 11 | 0 | 20 | 1 | 40 | 23 | 64 | 6 | 14 | 2 | 22 | 145 |
| 07:45 AM | 3 | 21 | 6 | 30 | 11 | 6 | 1 | 18 | 5 | 37 | 3 | 45 | 12 | 11 | 4 | 27 | 120 |
| Total Volume | 10 | 93 | 23 | 126 | 38 | 38 | 2 | 78 | 11 | 142 | 47 | 200 | 20 | 43 | 11 | 74 | 478 |
| % App. Total | 7.9 | 73.8 | 18.3 | | 48.7 | 48.7 | 2.6 | | 5.5 | 71 | 23.5 | | 27 | 58.1 | 14.9 | | |
| PHF | .833 | .830 | .719 | .808 | .864 | .792 | .500 | .975 | .550 | .888 | .511 | .781 | .417 | .768 | .688 | .685 | .824 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0528 / D1-0768
Counted: IW / GMT
Weather: Clear / Rainy

File Name : hondicA
Site Code : 00000006
Start Date : 3/31/2006
Page No : 1

Groups Printed- Unshifted

| | Honoapiilani Hwy Southbound | | | | | Dickenson Street Westbound | | | | | Honoapiilani Hwy Northbound | | | | | Dickenson Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 07:00 AM | 4 | 118 | 21 | 1 | 144 | 6 | 5 | 6 | 0 | 17 | 3 | 227 | 7 | 0 | 237 | 3 | 7 | 0 | 1 | 11 | 409 |
| 07:15 AM | 2 | 132 | 46 | 4 | 184 | 7 | 3 | 10 | 0 | 20 | 3 | 209 | 9 | 0 | 221 | 10 | 7 | 4 | 0 | 21 | 446 |
| 07:30 AM | 4 | 133 | 39 | 6 | 182 | 6 | 8 | 12 | 0 | 26 | 4 | 211 | 19 | 0 | 234 | 17 | 10 | 5 | 0 | 32 | 474 |
| 07:45 AM | 3 | 139 | 18 | 0 | 160 | 8 | 3 | 9 | 0 | 20 | 7 | 207 | 16 | 0 | 230 | 10 | 4 | 2 | 0 | 16 | 426 |
| Total | 13 | 522 | 124 | 11 | 670 | 27 | 19 | 37 | 0 | 83 | 17 | 854 | 51 | 0 | 922 | 40 | 28 | 11 | 1 | 80 | 1755 |
| 08:00 AM | 2 | 121 | 13 | 1 | 137 | 5 | 3 | 8 | 0 | 16 | 6 | 152 | 16 | 0 | 174 | 4 | 3 | 5 | 0 | 12 | 339 |
| 08:15 AM | 5 | 123 | 16 | 1 | 145 | 7 | 1 | 6 | 0 | 14 | 5 | 163 | 6 | 0 | 174 | 10 | 1 | 0 | 0 | 11 | 344 |
| 08:30 AM | 2 | 149 | 16 | 2 | 169 | 4 | 4 | 7 | 1 | 16 | 11 | 163 | 8 | 0 | 182 | 4 | 7 | 5 | 0 | 16 | 383 |
| 08:45 AM | 1 | 169 | 33 | 0 | 203 | 6 | 3 | 5 | 0 | 14 | 12 | 141 | 7 | 0 | 160 | 8 | 5 | 6 | 0 | 19 | 396 |
| Total | 10 | 562 | 78 | 4 | 654 | 22 | 11 | 26 | 1 | 60 | 34 | 619 | 37 | 0 | 690 | 26 | 16 | 16 | 0 | 58 | 1462 |
| Grand Total | 23 | 1084 | 202 | 15 | 1324 | 49 | 30 | 63 | 1 | 143 | 51 | 1473 | 88 | 0 | 1612 | 66 | 44 | 27 | 1 | 138 | 3217 |
| Apprch % | 1.7 | 81.9 | 15.3 | 1.1 | | 34.3 | 21 | 44.1 | 0.7 | | 3.2 | 91.4 | 5.5 | 0 | | 47.8 | 31.9 | 19.6 | 0.7 | | |
| Total % | 0.7 | 33.7 | 6.3 | 0.5 | 41.2 | 1.5 | 0.9 | 2 | 0 | 4.4 | 1.6 | 45.8 | 2.7 | 0 | 50.1 | 2.1 | 1.4 | 0.8 | 0 | 4.3 | |

| | Honoapiilani Hwy Southbound | | | | Dickenson Street Westbound | | | | Honoapiilani Hwy Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:00 AM | | | | | | | | | | | | | | | | | |
| 07:00 AM | 4 | 118 | 21 | 143 | 6 | 5 | 6 | 17 | 3 | 227 | 7 | 237 | 3 | 7 | 0 | 10 | 407 |
| 07:15 AM | 2 | 132 | 46 | 180 | 7 | 3 | 10 | 20 | 3 | 209 | 9 | 221 | 10 | 7 | 4 | 21 | 442 |
| 07:30 AM | 4 | 133 | 39 | 176 | 6 | 8 | 12 | 26 | 4 | 211 | 19 | 234 | 17 | 10 | 5 | 32 | 468 |
| 07:45 AM | 3 | 139 | 18 | 160 | 8 | 3 | 9 | 20 | 7 | 207 | 16 | 230 | 10 | 4 | 2 | 16 | 426 |
| Total Volume | 13 | 522 | 124 | 659 | 27 | 19 | 37 | 83 | 17 | 854 | 51 | 922 | 40 | 28 | 11 | 79 | 1743 |
| % App. Total | 2 | 79.2 | 18.8 | | 32.5 | 22.9 | 44.6 | | 1.8 | 92.6 | 5.5 | | 50.6 | 35.4 | 13.9 | | |
| PHF | .813 | .939 | .674 | .915 | .844 | .594 | .771 | .798 | .607 | .941 | .671 | .973 | .588 | .700 | .550 | .617 | .931 |

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

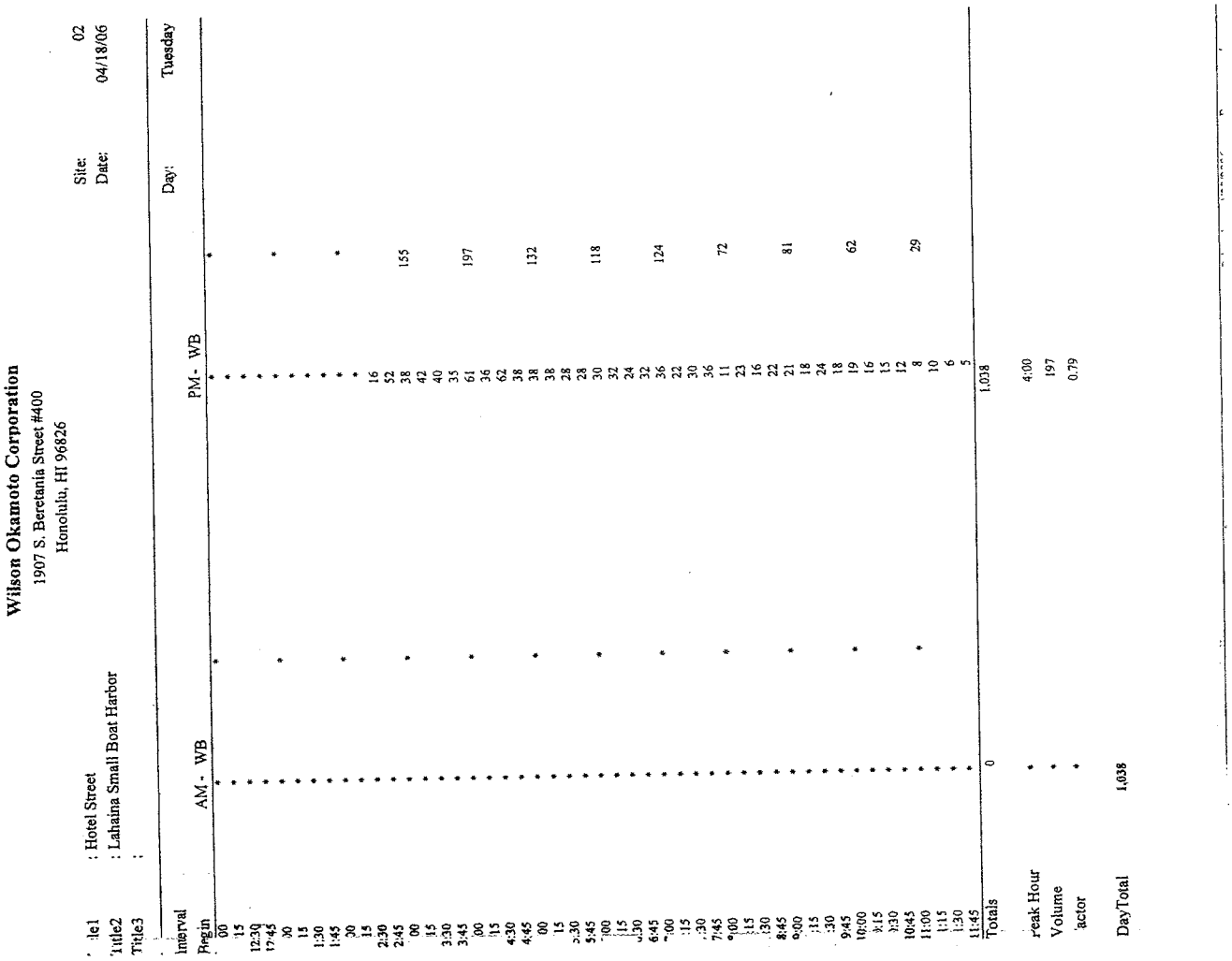
Counter: D1-0528 / D1-0768
Counted: IW/ GMT
Weather: Clear / Rainy

File Name : hondicP (cruise)
Site Code : 00000006
Start Date : 3/30/2006
Page No : 1

Groups Printed- Unshifted

| | Honoapiilani Hwy Southbound | | | | | Dickenson Street Westbound | | | | | Honoapiilani Hwy Northbound | | | | | Dickenson Street Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| 03:30 PM | 3 | 231 | 52 | 2 | 288 | 13 | 6 | 4 | 0 | 23 | 5 | 220 | 18 | 0 | 243 | 18 | 10 | 8 | 0 | 36 | 590 |
| 03:45 PM | 2 | 216 | 46 | 2 | 266 | 11 | 6 | 8 | 0 | 25 | 7 | 218 | 16 | 0 | 241 | 13 | 7 | 6 | 0 | 26 | 558 |
| Total | 5 | 447 | 98 | 4 | 554 | 24 | 12 | 12 | 0 | 48 | 12 | 438 | 34 | 0 | 484 | 31 | 17 | 14 | 0 | 62 | 1148 |
| 04:00 PM | 2 | 173 | 49 | 3 | 227 | 6 | 9 | 8 | 0 | 23 | 9 | 189 | 16 | 0 | 214 | 27 | 12 | 12 | 2 | 53 | 517 |
| 04:15 PM | 4 | 196 | 38 | 1 | 239 | 4 | 0 | 6 | 0 | 10 | 7 | 213 | 7 | 1 | 228 | 1 | 2 | 1 | 1 | 5 | 482 |
| 04:30 PM | 3 | 123 | 13 | 1 | 140 | 6 | 2 | 3 | 0 | 11 | 17 | 190 | 13 | 0 | 220 | 14 | 18 | 18 | 0 | 50 | 421 |
| 04:45 PM | 5 | 194 | 14 | 1 | 214 | 8 | 4 | 7 | 0 | 19 | 7 | 196 | 14 | 0 | 217 | 20 | 11 | 12 | 0 | 43 | 493 |
| Total | 14 | 686 | 114 | 6 | 820 | 24 | 15 | 24 | 0 | 63 | 40 | 788 | 50 | 1 | 879 | 62 | 43 | 43 | 3 | 151 | 1913 |
| 05:00 PM | 3 | 171 | 13 | 0 | 187 | 7 | 4 | 1 | 0 | 12 | 12 | 205 | 15 | 0 | 232 | 16 | 15 | 6 | 0 | 37 | 468 |
| 05:15 PM | 1 | 136 | 14 | 2 | 153 | 5 | 6 | 5 | 0 | 16 | 7 | 213 | 16 | 0 | 236 | 7 | 8 | 3 | 0 | 18 | 423 |
| Grand Total | 23 | 1440 | 239 | 12 | 1714 | 60 | 37 | 42 | 0 | 139 | 71 | 1644 | 115 | 1 | 1831 | 116 | 83 | 66 | 3 | 268 | 3952 |
| Apprch % | 1.3 | 84 | 13.9 | 0.7 | | 43.2 | 26.6 | 30.2 | 0 | | 3.9 | 89.8 | 6.3 | 0.1 | | 43.3 | 31 | 24.6 | 1.1 | | |
| Total % | 0.6 | 36.4 | 6 | 0.3 | 43.4 | 1.5 | 0.9 | 1.1 | 0 | 3.5 | 1.8 | 41.6 | 2.9 | 0 | 46.3 | 2.9 | 2.1 | 1.7 | 0.1 | 6.8 | |

| | Honoapiilani Hwy Southbound | | | | Dickenson Street Westbound | | | | Honoapiilani Hwy Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:30 PM | | | | | | | | | | | | | | | | | |
| 03:30 PM | 3 | 231 | 52 | 286 | 13 | 6 | 4 | 23 | 5 | 220 | 18 | 243 | 18 | 10 | 8 | 36 | 588 |
| 03:45 PM | 2 | 216 | 46 | 264 | 11 | 6 | 8 | 25 | 7 | 218 | 16 | 241 | 13 | 7 | 6 | 26 | 556 |
| 04:00 PM | 2 | 173 | 49 | 224 | 6 | 9 | 8 | 23 | 9 | 189 | 16 | 214 | 27 | 12 | 12 | 51 | 512 |
| 04:15 PM | 4 | 196 | 38 | 238 | 4 | 0 | 6 | 10 | 7 | 213 | 7 | 227 | 1 | 2 | 1 | 4 | 479 |
| Total Volume | 11 | 816 | 185 | 1012 | 34 | 21 | 26 | 81 | 28 | 840 | 57 | 925 | 59 | 31 | 27 | 117 | 2135 |
| % App. Total | 1.1 | 80.6 | 18.3 | | 42 | 25.9 | 32.1 | | 3 | 90.8 | 6.2 | | 50.4 | 26.5 | 23.1 | | |
| PHF | .688 | .883 | .889 | .885 | .654 | .583 | .813 | .810 | .778 | .955 | .792 | .952 | .546 | .646 | .563 | .574 | .908 |




WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter: D1-0527 / D1-0528
Counted: KT / TO
Weather: CLEAR

File Name : hondicP
Site Code : 00000007
Start Date : 4/19/2006
Page No : 1

**Groups Printed- Unshifted**

| | Honoapiilani Hwy Southbound | | | | Dickenson Street Westbound | | | | Honoapiilani Hwy Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| 03:30 PM | 4 | 208 | 33 | 245 | 19 | 12 | 5 | 36 | 8 | 212 | 20 | 240 | 16 | 5 | 8 | 29 | 550 |
| 03:45 PM | 3 | 231 | 30 | 264 | 9 | 8 | 7 | 24 | 4 | 210 | 25 | 239 | 12 | 12 | 8 | 32 | 559 |
| Total | 7 | 439 | 63 | 509 | 28 | 20 | 12 | 60 | 12 | 422 | 45 | 479 | 28 | 17 | 16 | 61 | 1109 |
| 04:00 PM | 6 | 190 | 25 | 221 | 10 | 11 | 2 | 23 | 7 | 193 | 20 | 220 | 9 | 11 | 8 | 28 | 492 |
| 04:15 PM | 2 | 192 | 11 | 205 | 13 | 11 | 3 | 27 | 5 | 206 | 15 | 226 | 20 | 16 | 9 | 45 | 503 |
| 04:30 PM | 2 | 91 | 17 | 110 | 9 | 10 | 1 | 20 | 5 | 187 | 11 | 203 | 10 | 11 | 10 | 31 | 364 |
| 04:45 PM | 1 | 156 | 6 | 163 | 1 | 6 | 5 | 12 | 7 | 223 | 18 | 248 | 10 | 8 | 4 | 22 | 445 |
| Total | 11 | 629 | 59 | 699 | 33 | 38 | 11 | 82 | 24 | 809 | 64 | 897 | 49 | 46 | 31 | 126 | 1804 |
| 05:00 PM | 2 | 158 | 15 | 175 | 1 | 12 | 4 | 17 | 7 | 200 | 18 | 225 | 17 | 18 | 6 | 41 | 458 |
| 05:15 PM | 0 | 51 | 9 | 60 | 6 | 9 | 0 | 15 | 9 | 225 | 9 | 243 | 6 | 12 | 13 | 31 | 349 |
| Grand Total | 20 | 1277 | 146 | 1443 | 68 | 79 | 27 | 174 | 52 | 1656 | 136 | 1844 | 100 | 93 | 66 | 259 | 3720 |
| Apprch % | 1.4 | 88.5 | 10.1 | | 39.1 | 45.4 | 15.5 | | 2.8 | 89.8 | 7.4 | | 38.6 | 35.9 | 25.5 | | |
| Total % | 0.5 | 34.3 | 3.9 | 38.8 | 1.8 | 2.1 | 0.7 | 4.7 | 1.4 | 44.5 | 3.7 | 49.6 | 2.7 | 2.5 | 1.8 | 7 | |

| | Honoapiilani Hwy Southbound | | | | Dickenson Street Westbound | | | | Honoapiilani Hwy Northbound | | | | Dickenson Street Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Left | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 03:30 PM | | | | | | | | | | | | | | | | | |
| 03:30 PM | 4 | 208 | 33 | 245 | 19 | 12 | 5 | 36 | 8 | 212 | 20 | 240 | 16 | 5 | 8 | 29 | 550 |
| 03:45 PM | 3 | 231 | 30 | 264 | 9 | 8 | 7 | 24 | 4 | 210 | 25 | 239 | 12 | 12 | 8 | 32 | 559 |
| 04:00 PM | 6 | 190 | 25 | 221 | 10 | 11 | 2 | 23 | 7 | 193 | 20 | 220 | 9 | 11 | 8 | 28 | 492 |
| 04:15 PM | 2 | 192 | 11 | 205 | 13 | 11 | 3 | 27 | 5 | 206 | 15 | 226 | 20 | 16 | 9 | 45 | 503 |
| Total Volume | 15 | 821 | 99 | 935 | 51 | 42 | 17 | 110 | 24 | 821 | 80 | 925 | 57 | 44 | 33 | 134 | 2104 |
| % App. Total | 1.6 | 87.8 | 10.6 | | 46.4 | 38.2 | 15.5 | | 2.6 | 88.8 | 8.6 | | 42.5 | 32.8 | 24.6 | | |
| PHF | .625 | .889 | .750 | .885 | .671 | .875 | .607 | .764 | .750 | .968 | .800 | .964 | .713 | .688 | .917 | .744 | .941 |

## Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hotel Street
Title2 : Lahaina Small Boat Harbor
Title3 :

Site: 02
Date: 04/19/06

Day: Wednesday

| Interval Begin | AM - WB | | PM - WB | |
|---|---|---|---|---|
| :30 | 8 | 17 | 48 | 177 |
| :15 | 2 | | 43 | |
| 12:30 | 6 | | 44 | |
| 12:45 | 1 | | 42 | |
| :00 | 4 | 10 | 46 | 166 |
| :15 | 0 | | 40 | |
| 1:30 | 4 | | 44 | |
| 1:45 | 2 | | 36 | |
| :00 | 4 | 8 | 35 | 184 |
| :15 | 1 | | 44 | |
| 2:30 | 2 | | 53 | |
| 2:45 | 1 | | 52 | |
| :00 | 2 | 11 | 40 | 168 |
| :15 | 1 | | 52 | |
| 3:30 | 2 | | 30 | |
| 3:45 | 6 | | 46 | |
| :00 | 6 | 18 | 46 | 154 |
| :15 | 3 | | 48 | |
| 4:30 | 6 | | 28 | |
| 4:45 | 3 | | 32 | |
| :00 | 6 | 38 | * | * |
| :15 | 4 | | * | |
| 5:30 | 7 | | * | |
| 5:45 | 21 | | * | |
| :00 | 29 | 105 | * | * |
| :15 | 24 | | * | |
| 6:30 | 20 | | * | |
| 6:45 | 32 | | * | |
| :00 | 39 | 158 | * | * |
| :15 | 53 | | * | |
| :30 | 46 | | * | |
| 7:45 | 20 | | * | |
| :00 | 26 | 137 | * | * |
| :15 | 30 | | * | |
| :30 | 33 | | * | |
| 8:45 | 48 | | * | |
| 9:00 | 32 | 148 | * | * |
| :15 | 25 | | * | |
| :30 | 37 | | * | |
| 9:45 | 54 | | * | |
| 10:00 | 44 | 160 | * | * |
| :15 | 29 | | * | |
| :30 | 47 | | * | |
| 10:45 | 40 | | * | |
| 11:00 | 50 | 194 | * | * |
| :15 | 44 | | * | |
| :30 | 57 | | * | |
| 11:45 | 43 | | * | |
| Totals | 1,004 | | 849 | |
| Peak Hour | 11:00 | | 2:30 | |
| Volume | 194 | | 197 | |
| actor | 0.85 | | 0.93 | |
| DayTotal | 1,853 | | | |



## Wilson Okamoto Coporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Canal Street
Title2 : Lahaina Small Boat Harbor
Title3 :

Site: 100000000000
Date: 03/08/06

Day: Wednesday

| Interval | EBL | | EBR | | Combined | |
|---|---|---|---|---|---|---|
| Begin | AM | PM | AM | PM | AM | PM |
| 12:00 | * | * | * | * | * | * |
| 12:15 | * | * | * | * | * | * |
| 12:30 | * | * | * | * | * | * |
| 12:45 | * | * | * | * | * | * |
| 01:00 | * | * | * | * | * | * |
| 01:15 | * | * | * | * | * | * |
| 01:30 | * | * | * | * | * | * |
| 01:45 | * | * | * | * | * | * |
| 02:00 | * | * | * | * | * | * |
| 02:15 | * | * | * | * | * | * |
| 02:30 | * | * | * | * | * | * |
| 02:45 | * | * | * | * | * | * |
| 03:00 | * | * | * | * | * | * |
| 03:15 | * | 20 | * | 22 | * | 42 |
| 03:30 | * | 32 | * | 24 | * | 56 |
| 03:45 | * | 19 | * | 28 | * | 47 |
| 04:00 | * | 27 105 | * | 32 109 | * | 59 214 |
| 04:15 | * | 28 | * | 32 | * | 60 |
| 04:30 | * | 26 | * | 27 | * | 53 |
| 04:45 | * | 24 | * | 18 | * | 42 |
| 05:00 | * | 16 64 | * | 18 89 | * | 34 153 |
| 05:15 | * | 16 | * | 23 | * | 39 |
| 05:30 | * | 14 | * | 39 | * | 53 |
| 05:45 | * | 18 | * | 9 | * | 27 |
| 06:00 | * | 27 74 | * | 20 60 | * | 47 134 |
| 06:15 | * | 19 | * | 22 | * | 41 |
| 06:30 | * | 16 | * | 14 | * | 30 |
| 06:45 | * | 12 | * | 4 | * | 16 |
| 07:00 | * | 26 72 | * | 14 50 | * | 40 122 |
| 07:15 | * | 16 | * | 4 | * | 20 |
| 07:30 | * | 14 | * | 12 | * | 26 |
| 07:45 | * | 16 | * | 20 | * | 36 |
| 08:00 | * | 8 54 | * | 12 46 | * | 20 100 |
| 08:15 | * | 18 | * | 8 | * | 26 |
| 08:30 | * | 14 | * | 14 | * | 28 |
| 08:45 | * | 14 | * | 12 | * | 26 |
| 09:00 | * | 12 42 | * | 11 38 | * | 23 80 |
| 09:15 | * | 9 | * | 15 | * | 24 |
| 09:30 | * | 7 | * | 12 | * | 19 |
| 09:45 | * | 14 | * | 0 | * | 14 |
| 10:00 | * | 9 30 | * | 6 16 | * | 15 46 |
| 10:15 | * | 8 | * | 2 | * | 10 |
| 10:30 | * | 7 | * | 8 | * | 15 |
| 10:45 | * | 6 | * | 0 | * | 6 |
| 11:00 | * | 6 16 | * | 4 | * | 10 |
| 11:15 | * | 4 | * | 0 | * | 4 |
| 11:30 | * | 4 | * | * | * | * |
| 11:45 | * | 2 | * | 0 | * | 2 |
| Totals | 0 | 528 | 0 | 486 | 0 | 1,010 |
| Split% | * | 52.3 | * | 48.1 | | |
| Day Totals | | 528 | | 486 | | 1,010 |
| Day Splits | | 52.3 | | 48.1 | | |
| ak Hour | * | 03:30 | * | 03:45 | * | 03:30 |
| Volume | * | 106 | * | 119 | * | 222 |
| Factor | * | 0.83 | * | 0.93 | * | 0.93 |

**Wilson Okamoto Coporation**
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Canal Street
Title2 : Lahaina Small Boat Harbor
Title3 :

Site: 100000000000
Date: 03/09/06
Day: Thursday

| Interval | EBL | | | | EBR | | | | Combined | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Begin | AM | | PM | | AM | | PM | | AM | | PM | |
| 12:00 | 2 | 4 | 36 | 137 | 0 | 0 | 31 | 91 | 2 | 4 | 67 | 228 |
| 12:15 | 2 | | 36 | | 0 | | 20 | | 2 | | 56 | |
| 12:30 | 0 | | 30 | | 0 | | 28 | | 0 | | 58 | |
| 12:45 | 0 | | 35 | | 0 | | 12 | | 0 | | 47 | |
| 01:00 | 1 | 6 | 23 | 114 | 0 | 4 | 16 | 115 | 1 | 10 | 39 | 229 |
| 01:15 | 3 | | 34 | | 0 | | 28 | | 3 | | 62 | |
| 01:30 | 2 | | 33 | | 0 | | 33 | | 2 | | 66 | |
| 01:45 | 0 | | 24 | | 4 | | 38 | | 4 | | 62 | |
| 02:00 | 2 | 2 | 30 | 126 | 0 | 2 | 34 | 121 | 2 | 4 | 64 | 247 |
| 02:15 | 0 | | 20 | | 0 | | 39 | | 0 | | 59 | |
| 02:30 | 0 | | 38 | | 2 | | 32 | | 2 | | 70 | |
| 02:45 | 0 | | 38 | | 0 | | 16 | | 0 | | 54 | |
| 03:00 | 2 | 5 | 30 | 148 | * | | 24 | 118 | * | | 54 | 266 |
| 03:15 | 2 | | 32 | | 2 | | 24 | | 4 | | 56 | |
| 03:30 | 1 | | 44 | | 0 | | 36 | | 1 | | 80 | |
| 03:45 | 0 | | 42 | | 0 | | 34 | | 0 | | 76 | |
| 04:00 | 1 | 14 | 23 | 127 | 2 | 15 | 36 | 148 | 3 | 29 | 59 | 275 |
| 04:15 | 6 | | 28 | | 3 | | 38 | | 9 | | 66 | |
| 04:30 | 3 | | 36 | | 8 | | 57 | | 11 | | 93 | |
| 04:45 | 4 | | 40 | | 2 | | 17 | | 6 | | 57 | |
| 05:00 | 4 | 23 | 25 | | 0 | 2 | 26 | | 4 | 25 | 51 | |
| 05:15 | 3 | | 30 | | 2 | | 25 | | 5 | | 55 | |
| 05:30 | 8 | | 0 | | 0 | | 0 | | 8 | | 0 | |
| 05:45 | 8 | | * | | 0 | | * | | 8 | | * | |
| 06:00 | 10 | 64 | * | | 4 | 22 | * | | 14 | 86 | * | |
| 06:15 | 16 | | * | | 5 | | * | | 21 | | * | |
| 06:30 | 18 | | * | | 6 | | * | | 24 | | * | |
| 06:45 | 20 | | * | | 7 | | * | | 27 | | * | |
| 07:00 | 18 | 146 | * | | 12 | 95 | * | | 30 | 241 | * | |
| 07:15 | 54 | | * | | 29 | | * | | 83 | | * | |
| 07:30 | 46 | | * | | 32 | | * | | 78 | | * | |
| 07:45 | 28 | | * | | 22 | | * | | 50 | | * | |
| 08:00 | 32 | 176 | * | | 12 | 70 | * | | 44 | 246 | * | |
| 08:15 | 50 | | * | | 10 | | * | | 60 | | * | |
| 08:30 | 52 | | * | | 26 | | * | | 78 | | * | |
| 08:45 | 42 | | * | | 22 | | * | | 64 | | * | |
| 09:00 | 69 | 205 | * | | 18 | 74 | * | | 87 | 279 | * | |
| 09:15 | 42 | | * | | 20 | | * | | 62 | | * | |
| 09:30 | 42 | | * | | 18 | | * | | 60 | | * | |
| 09:45 | 52 | | * | | 18 | | * | | 70 | | * | |
| 10:00 | 61 | 204 | * | | 16 | 88 | * | | 77 | 292 | * | |
| 10:15 | 46 | | * | | 24 | | * | | 70 | | * | |
| 10:30 | 67 | | * | | 20 | | * | | 87 | | * | |
| 10:45 | 30 | | * | | 28 | | * | | 58 | | * | |
| 11:00 | 56 | 175 | * | | 32 | 129 | * | | 88 | 304 | * | |
| 11:15 | 37 | | * | | 40 | | * | | 77 | | * | |
| 11:30 | 42 | | * | | 38 | | * | | 80 | | * | |
| 11:45 | 40 | | * | | 19 | | * | | 59 | | * | |
| Totals | 1,024 | | 707 | | 503 | | 644 | | 1,525 | | 1,351 | |
| Split% | 67.1 | | 52.3 | | 33.0 | | 47.7 | | | | | |
| Day Totals | | 1,731 | | | | 1,147 | | | | 2,876 | | |
| Day Splits | | 60.2 | | | | 39.9 | | | | | | |
| Peak Hour | 09:45 | | 03:00 | | 10:45 | | 03:45 | | 10:30 | | 03:45 | |
| Volume | 226 | | 148 | | 138 | | 165 | | 310 | | 294 | |
| Factor | 0.84 | | 0.84 | | 0.86 | | 0.72 | | 0.88 | | 0.79 | |

**Wilson Okamoto Coporation**
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Dickenson Street
Title2 : Lahaina Small Boat Harbor
Title3 :

Site: 100000000000
Date: 03/08/06
Day: Wednesday

| Interval | WB | | | | EB | | | | Combined | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Begin | AM | | PM | | AM | | PM | | AM | | PM | |
| 12:00 | * | | * | | * | | * | | * | | * | |
| 12:15 | * | | * | | * | | * | | * | | * | |
| 12:30 | * | | * | | * | | * | | * | | * | |
| 12:45 | * | | * | | * | | * | | * | | * | |
| 01:00 | * | | * | | * | | * | | * | | * | |
| 01:15 | * | | * | | * | | * | | * | | * | |
| 01:30 | * | | * | | * | | * | | * | | * | |
| 01:45 | * | | 25 | | * | | 18 | | * | | 43 | |
| 02:00 | * | | 32 | 182 | * | | 32 | 134 | * | | 64 | 316 |
| 02:15 | * | | 54 | | * | | 10 | | * | | 84 | |
| 02:30 | * | | 48 | | * | | 36 | | * | | 84 | |
| 02:45 | * | | 48 | | * | | 36 | | * | | 84 | |
| 03:00 | * | | 66 | 245 | * | | 38 | 176 | * | | 104 | 421 |
| 03:15 | * | | 55 | | * | | 42 | | * | | 97 | |
| 03:30 | * | | 58 | | * | | 36 | | * | | 94 | |
| 03:45 | * | | 66 | | * | | 60 | | * | | 126 | |
| 04:00 | * | | 67 | 208 | * | | 46 | 160 | * | | 113 | 368 |
| 04:15 | * | | 37 | | * | | 44 | | * | | 81 | |
| 04:30 | * | | 54 | | * | | 40 | | * | | 94 | |
| 04:45 | * | | 50 | | * | | 30 | | * | | 80 | |
| 05:00 | * | | 52 | 193 | * | | 30 | 114 | * | | 82 | 307 |
| 05:15 | * | | 59 | | * | | 24 | | * | | 83 | |
| 05:30 | * | | 42 | | * | | 32 | | * | | 74 | |
| 05:45 | * | | 40 | | * | | 28 | | * | | 68 | |
| 06:00 | * | | 48 | 190 | * | | 33 | 101 | * | | 81 | 291 |
| 06:15 | * | | 60 | | * | | 23 | | * | | 83 | |
| 06:30 | * | | 32 | | * | | 20 | | * | | 52 | |
| 06:45 | * | | 50 | | * | | 25 | | * | | 75 | |
| 07:00 | * | | 38 | 165 | * | | 17 | 100 | * | | 55 | 265 |
| 07:15 | * | | 45 | | * | | 28 | | * | | 73 | |
| 07:30 | * | | 36 | | * | | 20 | | * | | 56 | |
| 07:45 | * | | 46 | | * | | 35 | | * | | 81 | |
| 08:00 | * | | 20 | 119 | * | | 18 | 87 | * | | 38 | 206 |
| 08:15 | * | | 42 | | * | | 22 | | * | | 64 | |
| 08:30 | * | | 33 | | * | | 27 | | * | | 60 | |
| 08:45 | * | | 24 | | * | | 20 | | * | | 44 | |
| 09:00 | * | | 30 | 97 | * | | 18 | 62 | * | | 48 | 159 |
| 09:15 | * | | 20 | | * | | 14 | | * | | 34 | |
| 09:30 | * | | 28 | | * | | 16 | | * | | 44 | |
| 09:45 | * | | 19 | | * | | 14 | | * | | 33 | |
| 10:00 | * | | 12 | 52 | * | | 16 | 57 | * | | 28 | 109 |
| 10:15 | * | | 16 | | * | | 8 | | * | | 24 | |
| 10:30 | * | | 12 | | * | | 12 | | * | | 24 | |
| 10:45 | * | | 12 | | * | | 21 | | * | | 33 | |
| 11:00 | * | | 6 | 46 | * | | 14 | 24 | * | | 20 | 70 |
| 11:15 | * | | 12 | | * | | 4 | | * | | 16 | |
| 11:30 | * | | 15 | | * | | 0 | | * | | 15 | |
| 11:45 | * | | 13 | | * | | 6 | | * | | 19 | |
| Totals | 0 | | 1,522 | | 0 | | 1,033 | | 0 | | 2,555 | |
| Split% | * | | 59.6 | | * | | 40.4 | | | | | |
| Day Totals | | 1,522 | | | | 1,033 | | | | 2,555 | | |
| Day Splits | | 59.6 | | | | 40.4 | | | | | | |
| Peak Hour | * | | 03:15 | | * | | 03:45 | | * | | 03:15 | |
| Volume | * | | 246 | | * | | 190 | | * | | 430 | |
| Factor | * | | 0.92 | | * | | 0.79 | | * | | 0.85 | |

## Wilson Okamoto Coporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Dickenson Street
Title2 : Lahaina Small Boat Harbor
Title3 :

Site: 100000000000
Date: 03/09/06

| Interval | WB | | | | EB | | | | Combined | | | | Day: Thursday |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Begin | AM | | PM | | AM | | PM | | AM | | PM | | |
| 12:00 | 11 | 29 | 61 | 226 | 1 | 8 | 35 | 167 | 12 | 37 | 96 | 393 | |
| 12:15 | 10 | | 42 | | 2 | | 38 | | 12 | | 80 | | |
| 12:30 | 4 | | 66 | | 1 | | 46 | | 5 | | 112 | | |
| 12:45 | 4 | | 57 | | 4 | | 48 | | 8 | | 105 | | |
| 01:00 | 4 | 11 | 64 | 239 | 8 | 14 | 34 | 175 | 12 | 25 | 98 | 414 | |
| 01:15 | 4 | | 50 | | 4 | | 42 | | 8 | | 92 | | |
| 01:30 | 1 | | 66 | | 2 | | 58 | | 3 | | 124 | | |
| 01:45 | 2 | | 59 | | 0 | | 41 | | 2 | | 100 | | |
| 02:00 | 0 | 6 | 36 | 283 | 2 | 12 | 60 | 220 | 2 | 18 | 96 | 503 | |
| 02:15 | 2 | | 84 | | 6 | | 64 | | 8 | | 148 | | |
| 02:30 | 2 | | 98 | | 2 | | 50 | | 4 | | 148 | | |
| 02:45 | 2 | | 65 | | 2 | | 46 | | 4 | | 111 | | |
| 03:00 | 3 | 8 | 62 | 253 | 0 | 5 | 55 | 220 | 3 | 13 | 117 | 473 | |
| 03:15 | 2 | | 54 | | 2 | | 57 | | 4 | | 111 | | |
| 03:30 | 0 | | 65 | | 2 | | 52 | | 2 | | 117 | | |
| 03:45 | 3 | | 72 | | 1 | | 56 | | 4 | | 128 | | |
| 04:00 | 3 | 10 | 69 | 258 | 2 | 2 | 56 | 209 | 5 | 12 | 125 | 467 | |
| 04:15 | 4 | | 66 | | 0 | | 48 | | 4 | | 114 | | |
| 04:30 | 2 | | 55 | | 0 | | 56 | | 2 | | 111 | | |
| 04:45 | 1 | | 68 | | 0 | | 49 | | 1 | | 117 | | |
| 05:00 | 8 | 29 | 58 | | * | 6 | 40 | | 6 | 35 | 98 | | |
| 05:15 | 1 | | 45 | | 2 | | 36 | | 3 | | 81 | | |
| 05:30 | 8 | | 0 | | 2 | | 0 | | 10 | | 0 | | |
| 05:45 | 12 | | * | | 4 | | * | | 16 | | * | | |
| 06:00 | 19 | 101 | * | | 0 | 33 | * | | 19 | 134 | * | | |
| 06:15 | 25 | | * | | 12 | | * | | 37 | | * | | |
| 06:30 | 26 | | * | | 11 | | * | | 37 | | * | | |
| 06:45 | 31 | | * | | 10 | | * | | 41 | | * | | |
| 07:00 | 30 | 192 | * | | 22 | 112 | * | | 52 | 304 | * | | |
| 07:15 | 56 | | * | | 38 | | * | | 94 | | * | | |
| 07:30 | 65 | | * | | 38 | | * | | 103 | | * | | |
| 07:45 | 41 | | * | | 14 | | * | | 55 | | * | | |
| 08:00 | 45 | 189 | * | | 22 | 97 | * | | 67 | 286 | * | | |
| 08:15 | 44 | | * | | 29 | | * | | 73 | | * | | |
| 08:30 | 37 | | * | | 18 | | * | | 55 | | * | | |
| 08:45 | 63 | | * | | 28 | | * | | 91 | | * | | |
| 09:00 | 69 | 219 | * | | 21 | 122 | * | | 90 | 341 | * | | |
| 09:15 | 48 | | * | | 34 | | * | | 82 | | * | | |
| 09:30 | 50 | | * | | 39 | | * | | 89 | | * | | |
| 09:45 | 52 | | * | | 28 | | * | | 80 | | * | | |
| 10:00 | 46 | 198 | * | | 44 | 170 | * | | 90 | 368 | * | | |
| 10:15 | 40 | | * | | 28 | | * | | 68 | | * | | |
| 10:30 | 54 | | * | | 42 | | * | | 96 | | * | | |
| 10:45 | 58 | | * | | 56 | | * | | 114 | | * | | |
| 11:00 | 60 | 239 | * | | 58 | 200 | * | | 118 | 439 | * | | |
| 11:15 | 56 | | * | | 44 | | * | | 100 | | * | | |
| 11:30 | 60 | | * | | 56 | | * | | 116 | | * | | |
| 11:45 | 63 | | * | | 42 | | * | | 105 | | * | | |
| Totals | 1,231 | | 1,362 | | 783 | | 1,067 | | 2,012 | | 2,429 | | |
| Split% | 61.2 | | 56.1 | | 38.9 | | 43.9 | | | | | | |
| Day Totals | | 2,593 | | | | 1,850 | | | | 4,441 | | | |
| Day Splits | | 58.4 | | | | 41.7 | | | | | | | |
| Peak Hour | 11:00 | | 02:15 | | 10:45 | | 01:30 | | 10:45 | | 02:15 | | |
| Volume | 239 | | 309 | | 214 | | 223 | | 448 | | 524 | | |
| Factor | 0.95 | | 0.79 | | 0.92 | | 0.87 | | 0.95 | | 0.89 | | |



## Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Canal Street
Title2 : Lahaina Small Boat Harbor
Title3 :

Site: 100000000000
Date: 04/18/06

| Interval | EBL | | | | EBR | | | | Combined | | | | Day: Tuesday |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Begin | AM | | PM | | AM | | PM | | AM | | PM | | |
| 12:00 | * | | * | | * | | * | | * | | * | | |
| 12:15 | * | | * | | * | | * | | * | | * | | |
| 12:30 | * | | * | | * | | * | | * | | * | | |
| 12:45 | * | | * | | * | | * | | * | | * | | |
| 01:00 | * | | * | | * | | * | | * | | * | | |
| 01:15 | * | | * | | * | | * | | * | | * | | |
| 01:30 | * | | * | | * | | * | | * | | * | | |
| 01:45 | * | | * | | * | | * | | * | | * | | |
| 02:00 | * | | * | | * | | * | | * | | * | | |
| 02:15 | * | | * | | * | | * | | * | | * | | |
| 02:30 | * | | 25 | | * | | 14 | | * | | 39 | | |
| 02:45 | * | | 40 | | * | | 16 | | * | | 56 | | |
| 03:00 | * | | 24 | 98 | * | | 24 | 52 | * | | 48 | 150 | |
| 03:15 | * | | 18 | | * | | 10 | | * | | 28 | | |
| 03:30 | * | | 30 | | * | | 15 | | * | | 45 | | |
| 03:45 | * | | 26 | | * | | 3 | | * | | 29 | | |
| 04:00 | * | | 38 | 110 | * | | 0 | 34 | * | | 38 | 144 | |
| 04:15 | * | | 28 | | * | | 0 | | * | | 28 | | |
| 04:30 | * | | 20 | | * | | 16 | | * | | 36 | | |
| 04:45 | * | | 24 | | * | | 18 | | * | | 42 | | |
| 05:00 | * | | 14 | 57 | * | | 14 | 48 | * | | 28 | 105 | |
| 05:15 | * | | 23 | | * | | 6 | | * | | 29 | | |
| 05:30 | * | | 4 | | * | | 24 | | * | | 28 | | |
| 05:45 | * | | 16 | | * | | 4 | | * | | 20 | | |
| 06:00 | * | | 12 | 55 | * | | 11 | 28 | * | | 23 | 83 | |
| 06:15 | * | | 19 | | * | | 6 | | * | | 25 | | |
| 06:30 | * | | 10 | | * | | 6 | | * | | 16 | | |
| 06:45 | * | | 14 | | * | | 5 | | * | | 19 | | |
| 07:00 | * | | 12 | 64 | * | | 4 | 29 | * | | 16 | 93 | |
| 07:15 | * | | 20 | | * | | 8 | | * | | 28 | | |
| 07:30 | * | | 16 | | * | | 11 | | * | | 27 | | |
| 07:45 | * | | 16 | | * | | 6 | | * | | 22 | | |
| 08:00 | * | | 12 | 56 | * | | 5 | 27 | * | | 17 | 83 | |
| 08:15 | * | | 22 | | * | | 4 | | * | | 26 | | |
| 08:30 | * | | 8 | | * | | 10 | | * | | 18 | | |
| 08:45 | * | | 14 | | * | | 8 | | * | | 22 | | |
| 09:00 | * | | 12 | 51 | * | | 0 | | * | | 12 | | |
| 09:15 | * | | 19 | | * | | 4 | | * | | 23 | | |
| 09:30 | * | | 10 | | * | | 8 | | * | | 18 | | |
| 09:45 | * | | 10 | | * | | * | | * | | * | | |
| 10:00 | * | | 8 | 22 | * | | 4 | 12 | * | | 12 | 34 | |
| 10:15 | * | | 8 | | * | | 2 | | * | | 10 | | |
| 10:30 | * | | 2 | | * | | 2 | | * | | 4 | | |
| 10:45 | * | | 4 | | * | | 4 | | * | | 8 | | |
| 11:00 | * | | 4 | 11 | * | | 0 | 9 | * | | 4 | 20 | |
| 11:15 | * | | 4 | | * | | 6 | | * | | 10 | | |
| 11:30 | * | | 2 | | * | | 3 | | * | | 5 | | |
| 11:45 | * | | 1 | | * | | 0 | | * | | 1 | | |
| Totals | 0 | | 589 | | 0 | | 281 | | 0 | | 860 | | |
| Split% | * | | 68.5 | | * | | 32.7 | | | | | | |
| Day Totals | | | 589 | | | | 281 | | | | 860 | | |
| Day Splits | | | 68.5 | | | | 32.7 | | | | | | |
| Peak Hour | * | | 03:30 | | * | | 02:45 | | * | | 02:45 | | |
| Volume | * | | 122 | | * | | 65 | | * | | 177 | | |
| Factor | * | | 0.80 | | * | | 0.68 | | * | | 0.79 | | |

**Wilson Okamoto Corporation**
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Canal Street
Title2 : Lahaina Small Boat Harbor
Title3 :

Site: 100000000000
Date: 04/19/06

Day: Wednesday

| Interval | EBL | | | | EBR | | | | Combined | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Begin | AM | | PM | | AM | | PM | | AM | | PM | |
| 12:00 | 2 | 5 | 30 | 98 | 3 | 10 | * | | 5 | 15 | 0 | 0 |
| 12:15 | 0 | | 26 | | 4 | | * | | 4 | | 0 | |
| 12:30 | 3 | | 24 | | 1 | | * | | 4 | | 0 | |
| 12:45 | 0 | | 18 | | 2 | | * | | 2 | | 0 | |
| 01:00 | 0 | 2 | 28 | 107 | 6 | 4 | * | | 6 | 6 | 0 | 0 |
| 01:15 | 0 | | 37 | | 0 | | * | | 0 | | 0 | |
| 01:30 | 0 | | 22 | | 0 | | * | | 0 | | 0 | |
| 01:45 | 2 | | 20 | | * | | * | | 0 | | 0 | |
| 02:00 | 2 | 3 | 16 | 86 | * | | * | | 0 | | 0 | 0 |
| 02:15 | 0 | | 20 | | 0 | | * | | 0 | | 0 | |
| 02:30 | 1 | | 20 | | * | | * | | * | | 0 | |
| 02:45 | 0 | | 30 | | 0 | | * | | 0 | | 0 | |
| 03:00 | 1 | 3 | 22 | 71 | * | | * | | * | | 0 | 0 |
| 03:15 | 0 | | 17 | | 0 | | * | | 0 | | 0 | |
| 03:30 | 0 | | 16 | | 0 | | * | | 0 | | 0 | |
| 03:45 | 2 | | 16 | | * | | * | | 0 | | 0 | |
| 04:00 | 1 | 12 | 21 | 77 | * | | * | | * | | 0 | 0 |
| 04:15 | 1 | | 18 | | * | | * | | * | | 0 | |
| 04:30 | 4 | | 18 | | * | | * | | 0 | | 0 | |
| 04:45 | 6 | | 20 | | * | | * | | 0 | | 0 | |
| 05:00 | 1 | 11 | 26 | 59 | * | | * | | * | | 0 | 1 |
| 05:15 | 1 | | 16 | | * | | * | | * | | 0 | |
| 05:30 | 7 | | 17 | | * | | * | | 0 | | 1 | |
| 05:45 | 2 | | 0 | | * | | 0 | | 0 | | 0 | |
| 06:00 | 9 | 41 | * | | * | | * | | 0 | 0 | * | |
| 06:15 | 10 | | * | | * | | * | | 0 | | * | |
| 06:30 | 9 | | * | | * | | * | | 0 | | * | |
| 06:45 | 13 | | * | | * | | * | | 0 | | * | |
| 07:00 | 12 | 98 | * | | * | | * | | 0 | 0 | * | |
| 07:15 | 38 | | * | | * | | * | | 0 | | * | |
| 07:30 | 38 | | * | | * | | * | | 0 | | * | |
| 07:45 | 10 | | * | | * | | * | | 0 | | * | |
| 08:00 | 12 | 49 | * | | * | | * | | 0 | 0 | * | |
| 08:15 | 8 | | * | | * | | * | | 0 | | * | |
| 08:30 | 6 | | * | | * | | * | | 0 | | * | |
| 08:45 | 23 | | * | | * | | * | | 0 | | * | |
| 09:00 | 15 | 63 | * | | * | | * | | 0 | 0 | * | |
| 09:15 | 9 | | * | | * | | * | | 0 | | * | |
| 09:30 | 17 | | * | | * | | * | | 0 | | * | |
| 09:45 | 22 | | * | | * | | * | | 0 | | * | |
| 10:00 | 17 | 74 | * | | * | | * | | 0 | 0 | * | |
| 10:15 | 12 | | * | | * | | * | | 0 | | * | |
| 10:30 | 22 | | * | | * | | * | | 0 | | * | |
| 10:45 | 23 | | * | | * | | * | | 0 | | * | |
| 11:00 | 18 | 65 | * | | * | | * | | 12 | 12 | * | |
| 11:15 | 12 | | * | | * | | * | | 0 | | * | |
| 11:30 | 10 | | * | | * | | * | | 0 | | * | |
| 11:45 | 25 | | * | | * | | * | | 0 | | * | |
| Totals | 426 | | 498 | | 16 | | 0 | | 33 | | 1 | |
| Split% | 1,290.9 | | 9,800.0 | | 48.5 | | 0.0 | | | | | |
| Day Totals | 924 | | | | 16 | | | | 34 | | | |
| Day Splits | 2,717.6 | | | | 47.1 | | | | | | | |
| Peak Hour | 06:45 | | 12:30 | | * | | * | | 12:15 | | 04:45 | |
| Volume | 101 | | 107 | | * | | * | | 16 | | 1 | |
| Factor | 0.66 | | 0.72 | | * | | * | | 0.67 | | 0.25 | |



**Wilson Okamoto Corporation**
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Prison Street
Title2 : Lahaina Small Boat Harbor
Title3 :

Site: 03
Date: 04/18/06

Day: Tuesday

| Interval | WB | | | | EB | | | | Combined | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Begin | AM | | PM | | AM | | PM | | AM | | PM | |
| 12:00 | * | | * | | * | | * | | * | | * | |
| 12:15 | * | | * | | * | | * | | * | | * | |
| 12:30 | * | | * | | * | | * | | * | | * | |
| 12:45 | * | | * | | * | | * | | * | | * | |
| 01:00 | * | | * | | * | | * | | * | | * | |
| 01:15 | * | | * | | * | | * | | * | | * | |
| 01:30 | * | | * | | * | | * | | * | | * | |
| 01:45 | * | | * | | * | | * | | * | | * | |
| 02:00 | * | | 25 | 161 | * | | 65 | 229 | * | | 90 | 390 |
| 02:15 | * | | 50 | | * | | 63 | | * | | 113 | |
| 02:30 | * | | 46 | | * | | 57 | | * | | 103 | |
| 02:45 | * | | 40 | | * | | 44 | | * | | 84 | |
| 03:00 | * | | 70 | 217 | * | | 44 | 184 | * | | 114 | 401 |
| 03:15 | * | | 44 | | * | | 44 | | * | | 88 | |
| 03:30 | * | | 45 | | * | | 48 | | * | | 93 | |
| 03:45 | * | | 58 | | * | | 48 | | * | | 106 | |
| 04:00 | * | | 33 | 147 | * | | 50 | 194 | * | | 83 | 341 |
| 04:15 | * | | 38 | | * | | 52 | | * | | 90 | |
| 04:30 | * | | 40 | | * | | 50 | | * | | 90 | |
| 04:45 | * | | 36 | | * | | 42 | | * | | 78 | |
| 05:00 | * | | 38 | 125 | * | | 38 | 132 | * | | 76 | 257 |
| 05:15 | * | | 26 | | * | | 32 | | * | | 58 | |
| 05:30 | * | | 32 | | * | | 30 | | * | | 62 | |
| 05:45 | * | | 29 | | * | | 32 | | * | | 61 | |
| 06:00 | * | | 29 | 82 | * | | 19 | 79 | * | | 48 | 161 |
| 06:15 | * | | 21 | | * | | 12 | | * | | 33 | |
| 06:30 | * | | 18 | | * | | 30 | | * | | 48 | |
| 06:45 | * | | 14 | | * | | 18 | | * | | 32 | |
| 07:00 | * | | 20 | 64 | * | | 30 | 93 | * | | 50 | 157 |
| 07:15 | * | | 14 | | * | | 25 | | * | | 39 | |
| 07:30 | * | | 10 | | * | | 24 | | * | | 34 | |
| 07:45 | * | | 20 | | * | | 14 | | * | | 34 | |
| 08:00 | * | | 12 | 39 | * | | 16 | 74 | * | | 28 | 113 |
| 08:15 | * | | 10 | | * | | 20 | | * | | 30 | |
| 08:30 | * | | 11 | | * | | 18 | | * | | 29 | |
| 08:45 | * | | 6 | | * | | 20 | | * | | 26 | |
| 09:00 | * | | 17 | 50 | * | | 22 | 72 | * | | 39 | 122 |
| 09:15 | * | | 12 | | * | | 14 | | * | | 26 | |
| 09:30 | * | | 8 | | * | | 18 | | * | | 26 | |
| 09:45 | * | | 13 | | * | | 18 | | * | | 31 | |
| 10:00 | * | | 9 | 27 | * | | 18 | 44 | * | | 27 | 71 |
| 10:15 | * | | 5 | | * | | 13 | | * | | 18 | |
| 10:30 | * | | 6 | | * | | 8 | | * | | 14 | |
| 10:45 | * | | 7 | | * | | 5 | | * | | 12 | |
| 11:00 | * | | 2 | 9 | * | | 4 | 9 | * | | 6 | 18 |
| 11:15 | * | | 2 | | * | | 3 | | * | | 5 | |
| 11:30 | * | | 4 | | * | | 0 | | * | | 4 | |
| 11:45 | * | | 1 | | * | | 2 | | * | | 3 | |
| Totals | 0 | | 921 | | 0 | | 1,110 | | 0 | | 2,031 | |
| Split% | * | | 45.3 | | * | | 54.7 | | | | | |
| Day Totals | 921 | | | | 1,110 | | | | 2,031 | | | |
| Day Splits | 45.3 | | | | 54.7 | | | | | | | |
| Peak Hour | * | | 03:00 | | * | | 02:00 | | * | | 02:15 | |
| Volume | * | | 217 | | * | | 229 | | * | | 414 | |
| Factor | * | | 0.77 | | * | | 0.88 | | * | | 0.91 | |

**Wilson Okamoto Corporation**
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Prison Street
Title2 : Lahaina Small Boat Harbor
Title3 :
Site: 03
Date: 04/19/06
Day: Wednesday

| Interval Begin | WB AM | | WB PM | | EB AM | | EB PM | | Combined AM | | Combined PM | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12:00 | 1 | 8 | 52 | 177 | 5 | 14 | 36 | 140 | 6 | 22 | 88 | 317 |
| 12:15 | 4 | | 34 | | 4 | | 33 | | 8 | | 67 | |
| 12:30 | 2 | | 31 | | 2 | | 38 | | 4 | | 69 | |
| 12:45 | 1 | | 60 | | 3 | | 33 | | 4 | | 93 | |
| 01:00 | 4 | 8 | 78 | 226 | 2 | 8 | 32 | 199 | 6 | 16 | 110 | 425 |
| 01:15 | 2 | | 70 | | 2 | | 76 | | 4 | | 146 | |
| 01:30 | 1 | | 42 | | 2 | | 51 | | 3 | | 93 | |
| 01:45 | 1 | | 36 | | 2 | | 40 | | 3 | | 76 | |
| 02:00 | 0 | 2 | 28 | 142 | 2 | | 30 | 155 | 2 | | 58 | 297 |
| 02:15 | 1 | | 42 | | 0 | | 45 | | 1 | | 87 | |
| 02:30 | 1 | | 34 | | * | | 38 | | * | | 72 | |
| 02:45 | 0 | | 38 | | 0 | | 42 | | 0 | | 80 | |
| 03:00 | 1 | 5 | 46 | 161 | 2 | 2 | 47 | 141 | 3 | 7 | 93 | 302 |
| 03:15 | 1 | | 28 | | 0 | | 23 | | 1 | | 51 | |
| 03:30 | 1 | | 37 | | 0 | | 41 | | 1 | | 78 | |
| 03:45 | 2 | | 50 | | 0 | | 30 | | 2 | | 80 | |
| 04:00 | 1 | 5 | 34 | 130 | 0 | 1 | 40 | 154 | 1 | 6 | 74 | 284 |
| 04:15 | 1 | | 29 | | 0 | | 46 | | 1 | | 75 | |
| 04:30 | 2 | | 36 | | 0 | | 26 | | 2 | | 62 | |
| 04:45 | 1 | | 31 | | 1 | | 42 | | 2 | | 73 | |
| 05:00 | 2 | 13 | 22 | 108 | 1 | 4 | 32 | 78 | 3 | 17 | 54 | 186 |
| 05:15 | 2 | | 48 | | 1 | | 24 | | 3 | | 72 | |
| 05:30 | 1 | | 38 | | 0 | | 22 | | 1 | | 60 | |
| 05:45 | 8 | | 0 | | 2 | | 0 | | 10 | | 0 | |
| 06:00 | 7 | 54 | * | | 10 | 34 | * | | 17 | 88 | * | |
| 06:15 | 16 | | * | | 4 | | * | | 20 | | * | |
| 06:30 | 11 | | * | | 12 | | * | | 23 | | * | |
| 06:45 | 20 | | * | | 8 | | * | | 28 | | * | |
| 07:00 | 41 | 223 | * | | 20 | 163 | * | | 61 | 386 | * | |
| 07:15 | 50 | | * | | 34 | | * | | 84 | | * | |
| 07:30 | 94 | | * | | 55 | | * | | 149 | | * | |
| 07:45 | 38 | | * | | 54 | | * | | 92 | | * | |
| 08:00 | 26 | 123 | * | | 18 | 79 | * | | 44 | 202 | * | |
| 08:15 | 26 | | * | | 16 | | * | | 42 | | * | |
| 08:30 | 21 | | * | | 23 | | * | | 44 | | * | |
| 08:45 | 50 | | * | | 22 | | * | | 72 | | * | |
| 09:00 | 31 | 126 | * | | 20 | 106 | * | | 51 | 232 | * | |
| 09:15 | 30 | | * | | 26 | | * | | 56 | | * | |
| 09:30 | 30 | | * | | 20 | | * | | 50 | | * | |
| 09:45 | 35 | | * | | 40 | | * | | 75 | | * | |
| 10:00 | 29 | 133 | * | | 24 | 119 | * | | 53 | 252 | * | |
| 10:15 | 34 | | * | | 44 | | * | | 78 | | * | |
| 10:30 | 32 | | * | | 25 | | * | | 57 | | * | |
| 10:45 | 38 | | * | | 26 | | * | | 64 | | * | |
| 11:00 | 32 | 147 | * | | 30 | 140 | * | | 62 | 287 | * | |
| 11:15 | 32 | | * | | 24 | | * | | 56 | | * | |
| 11:30 | 41 | | * | | 36 | | * | | 77 | | * | |
| 11:45 | 42 | | * | | 50 | | * | | 92 | | * | |
| Totals | 847 | | 944 | | 672 | | 867 | | 1,518 | | 1,811 | |
| Split% | 55.8 | | 52.1 | | 44.3 | | 47.9 | | | | | |
| Day Totals | | 1,791 | | | | 1,539 | | | | 3,329 | | |
| Day Splits | | 53.8 | | | | 46.2 | | | | | | |
| Peak Hour | 07:00 | | 12:45 | | 07:00 | | 01:00 | | 07:00 | | 12:45 | |
| Volume | 223 | | 250 | | 163 | | 199 | | 386 | | 442 | |
| Factor | 0.59 | | 0.80 | | 0.74 | | 0.65 | | 0.65 | | 0.76 | |



**Wilson Okamoto Corporation**
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Dickenson Street
Title2 : Lahaina Small Boat Harbor
Title3 :
Site: 100000000000
Date: 04/18/06
Day: Tuesday

| Interval Begin | WB AM | WB PM | | EB AM | EB PM | | Combined AM | Combined PM | |
|---|---|---|---|---|---|---|---|---|---|
| 12:00 | * | * | | * | * | | * | * | |
| 12:15 | * | * | | * | * | | * | * | |
| 12:30 | * | * | | * | * | | * | * | |
| 12:45 | * | * | | * | * | | * | * | |
| 01:00 | * | * | | * | * | | * | * | |
| 01:15 | * | * | | * | * | | * | * | |
| 01:30 | * | * | | * | * | | * | * | |
| 01:45 | * | * | | * | * | | * | * | |
| 02:00 | * | * | | * | * | | * | * | |
| 02:15 | * | 22 | | * | 26 | | * | 48 | |
| 02:30 | * | 39 | | * | 62 | | * | 101 | |
| 02:45 | * | 50 | | * | 82 | | * | 132 | |
| 03:00 | * | 45 | 169 | * | 54 | 222 | * | 99 | 391 |
| 03:15 | * | 54 | | * | 50 | | * | 104 | |
| 03:30 | * | 34 | | * | 58 | | * | 92 | |
| 03:45 | * | 36 | | * | 60 | | * | 96 | |
| 04:00 | * | 50 | 164 | * | 65 | 234 | * | 115 | 398 |
| 04:15 | * | 44 | | * | 72 | | * | 116 | |
| 04:30 | * | 34 | | * | 51 | | * | 85 | |
| 04:45 | * | 36 | | * | 46 | | * | 82 | |
| 05:00 | * | 46 | 158 | * | 52 | 211 | * | 98 | 369 |
| 05:15 | * | 36 | | * | 55 | | * | 91 | |
| 05:30 | * | 38 | | * | 42 | | * | 80 | |
| 05:45 | * | 38 | | * | 62 | | * | 100 | |
| 06:00 | * | 33 | 119 | * | 52 | 177 | * | 85 | 296 |
| 06:15 | * | 30 | | * | 34 | | * | 64 | |
| 06:30 | * | 24 | | * | 52 | | * | 76 | |
| 06:45 | * | 32 | | * | 39 | | * | 71 | |
| 07:00 | * | 42 | 137 | * | 61 | 193 | * | 103 | 330 |
| 07:15 | * | 29 | | * | 46 | | * | 75 | |
| 07:30 | * | 27 | | * | 42 | | * | 69 | |
| 07:45 | * | 39 | | * | 44 | | * | 83 | |
| 08:00 | * | 23 | 91 | * | 48 | 156 | * | 71 | 247 |
| 08:15 | * | 25 | | * | 44 | | * | 69 | |
| 08:30 | * | 24 | | * | 38 | | * | 62 | |
| 08:45 | * | 19 | | * | 26 | | * | 45 | |
| 09:00 | * | 20 | 68 | * | 32 | 113 | * | 52 | 181 |
| 09:15 | * | 18 | | * | 32 | | * | 50 | |
| 09:30 | * | 14 | | * | 22 | | * | 36 | |
| 09:45 | * | 16 | | * | 27 | | * | 43 | |
| 10:00 | * | 13 | 63 | * | 36 | 94 | * | 49 | 157 |
| 10:15 | * | 16 | | * | 27 | | * | 43 | |
| 10:30 | * | 18 | | * | 23 | | * | 41 | |
| 10:45 | * | 16 | | * | 8 | | * | 24 | |
| 11:00 | * | 8 | 22 | * | 20 | 53 | * | 28 | 75 |
| 11:15 | * | 5 | | * | 19 | | * | 24 | |
| 11:30 | * | 5 | | * | 6 | | * | 11 | |
| 11:45 | * | 4 | | * | 8 | | * | 12 | |
| Totals | 0 | 1,102 | | 0 | 1,623 | | 0 | 2,725 | |
| Split% | * | 40.4 | | * | 59.6 | | | | |
| Day Totals | | 1,102 | | | 1,623 | | | 2,725 | |
| Day Splits | | 40.4 | | | 59.6 | | | | |
| Peak Hour | * | 02:30 | | * | 03:30 | | * | 02:30 | |
| Volume | * | 188 | | * | 255 | | * | 436 | |
| Factor | * | 0.87 | | * | 0.89 | | * | 0.83 | |

**Wilson Okamoto Corporation**
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Dickenson Street
T :2 : Lahaina Small Boat Harbor
T...3 :

Site: 100000000000
Date: 04/19/06

Day: Wednesday

| Interval | WB | | | | EB | | | | Combined | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B in | AM | | PM | | AM | | PM | | AM | | PM | |
| 2:00 | 2 | 11 | 35 | 123 | 12 | 30 | 70 | 230 | 14 | 41 | 105 | 353 |
| 12:15 | 5 | | 28 | | 8 | | 52 | | 13 | | 80 | |
| 12:30 | 2 | | 34 | | 6 | | 50 | | 8 | | 84 | |
| 2:45 | 2 | | 26 | | 4 | | 58 | | 6 | | 84 | |
| 1:00 | 4 | 14 | 40 | 129 | 6 | 23 | 82 | 278 | 10 | 37 | 122 | 407 |
| 01:15 | 6 | | 28 | | 6 | | 72 | | 12 | | 100 | |
| 01:30 | 2 | | 31 | | 3 | | 66 | | 5 | | 97 | |
| 01:45 | 2 | | 30 | | 8 | | 58 | | 10 | | 88 | |
| 02:00 | 4 | 9 | 30 | 126 | 16 | | 74 | 252 | 20 | | 104 | 378 |
| 02:15 | 2 | | 36 | | * | | 56 | | 0 | | 92 | |
| 02:30 | 2 | | 33 | | * | | 52 | | 0 | | 85 | |
| 02:45 | 1 | | 27 | | * | | 70 | | * | | 97 | |
| 03:00 | 2 | 7 | 30 | 130 | * | | 63 | 253 | 0 | | 93 | 383 |
| 03:15 | 1 | | 32 | | * | | 68 | | * | | 100 | |
| 03:30 | 1 | | 32 | | * | | 54 | | * | | 86 | |
| 03:45 | 3 | | 36 | | * | | 68 | | 0 | | 104 | |
| 04:00 | 5 | 10 | 34 | 122 | * | | 54 | 258 | 0 | | 88 | 380 |
| 04:15 | 0 | | 28 | | 0 | | 72 | | 0 | | 100 | |
| 04:30 | 1 | | 24 | | * | | 60 | | * | | 84 | |
| 04:45 | 4 | | 36 | | * | | 72 | | 0 | | 108 | |
| 05:00 | 4 | 32 | 34 | | * | | 50 | | 0 | 0 | 84 | |
| 05:15 | 6 | | 26 | | * | | 37 | | 0 | | 63 | |
| 05:30 | 6 | | 0 | | * | | 0 | | 0 | | 0 | |
| 05:45 | 16 | | * | | * | | * | | 0 | | * | |
| 06:00 | 16 | 68 | * | | * | | * | | 0 | 14 | * | |
| 06:15 | 14 | | * | | * | | * | | 0 | | * | |
| 06:30 | 13 | | * | | * | | * | | 0 | | * | |
| 06:45 | 25 | | * | | * | | * | | 14 | | * | |
| 07:00 | 16 | 84 | * | | 21 | 92 | * | | 37 | 176 | * | |
| 07:15 | 24 | | * | | 16 | | * | | 40 | | * | |
| 07:30 | 22 | | * | | 25 | | * | | 47 | | * | |
| 07:45 | 22 | | * | | 30 | | * | | 52 | | * | |
| 08:00 | 22 | 111 | * | | 24 | 90 | * | | 46 | 201 | * | |
| 08:15 | 29 | | * | | 24 | | * | | 53 | | * | |
| 08:30 | 33 | | * | | 12 | | * | | 45 | | * | |
| 08:45 | 27 | | * | | 30 | | * | | 57 | | * | |
| 09:00 | 18 | 113 | * | | 20 | 71 | * | | 38 | 184 | * | |
| 09:15 | 24 | | * | | * | | * | | 1 | | * | |
| 09:30 | 38 | | * | | 26 | | * | | 64 | | * | |
| 09:45 | 33 | | * | | 48 | | * | | 81 | | * | |
| 10:00 | 34 | 131 | * | | 28 | 144 | * | | 62 | 275 | * | |
| 10:15 | 28 | | * | | 32 | | * | | 60 | | * | |
| 10:30 | 42 | | * | | 50 | | * | | 92 | | * | |
| 10:45 | 27 | | * | | 34 | | * | | 61 | | * | |
| 11:00 | 29 | 103 | * | | 46 | 120 | * | | 75 | 223 | * | |
| 11:15 | 24 | | * | | 30 | | * | | 54 | | * | |
| 11:30 | 26 | | * | | * | | * | | 24 | | * | |
| 11:45 | 24 | | * | | 46 | | * | | 70 | | * | |
| Totals | 693 | | 690 | | 611 | | 1,358 | | 1,171 | | 2,048 | |
| Split% | 59.2 | | 33.7 | | 52.2 | | 66.3 | | | | | |
| Day Totals | | 1,383 | | | | 1,969 | | | | 3,219 | | |
| ay Splits | | 43.0 | | | | 61.2 | | | | | | |
| Peak Hour | 09:45 | | 03:15 | | 10:15 | | 12:45 | | 09:45 | | 01:00 | |
| Volume | 137 | | 134 | | 162 | | 278 | | 295 | | 407 | |
| actor | 0.82 | | 0.93 | | 0.81 | | 0.85 | | 0.80 | | 0.83 | |



# APPENDIX B

## LEVEL OF SERVICE DEFINITIONS

## LEVEL OF SERVICE DEFINITIONS

## LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

**Level of Service (LOS)** for signalized intersections is defined in terms of delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically a 15-min analysis period. The criteria are given in the following table.

**Table 1: Level-of-Service Criteria for Signalized Intersections**

| Level of Service | Control Delay per Vehicle (sec/veh) |
|---|---|
| A | ≤10.0 |
| B | >10.0 and ≤20.0 |
| C | >20.0 and ≤35.0 |
| D | >35.0 and ≤55.0 |
| E | >55.0 and ≤80.0 |
| F | >80.0 |

Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group.

**Level of Service A** describes operations with low control delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.

**Level of Service B** describes operations with control delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.

**Level of Service C** describes operations with control delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

**Level of Service D** describes operations with control delay greater than 35 and up to 55 sec per vehicle. At level of service D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.



**Level of Service E** describes operation with control delay greater than 55 and up to 80 sec per vehicle. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent.

**Level of Service F** describes operations with control delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.

"Highway Capacity Manual," Transportation Research Board, 2000.

## LEVEL OF SERVICE DEFINITIONS

### LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

**Level of Service (LOS)** criteria are given in Table 1. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue to the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in the queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. If the degree of saturation is greater than about 0.9, average control delay is significantly affected by the length of the analysis period.

**Table 1: Level-of-Service Criteria for Unsignalized Intersections**

| Level of Service | Average Control Delay (Sec/Veh) |
|---|---|
| A | ≤10.0 |
| B | >10.0 and ≤15.0 |
| C | >15.0 and ≤25.0 |
| D | >25.0 and ≤35.0 |
| E | >35.0 and ≤50.0 |
| F | >50.0 |

"Highway Capacity Manual," Transportation Research Board, 2000.

## APPENDIX C

## CAPACITY ANALYSIS CALCULATIONS
## EXISTING PEAK HOUR TRAFFIC ANALYSIS

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Hotel
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Hotel Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 70 | 285 | | | 195 | 115 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 77 | 316 | | | 216 | 127 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | | | 1 | 0 |
| Configuration | LT | | | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | | | |
| Peak Hour Factor, PHF | | | | | | |
| Hourly Flow Rate, HFR | | | | | | |
| Percent Heavy Vehicles | | | | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | | | |
| Configuration | | | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LT | | | | | | | |
| v (vph) | 77 | | | | | | | |
| C(m) (vph) | 1216 | | | | | | | |
| v/c | 0.06 | | | | | | | |
| 95% queue length | 0.20 | | | | | | | |
| Control Delay | 8.2 | | | | | | | |
| LOS | A | | | | | | | |
| Approach Delay | | | | | | | | |
| Approach LOS | | | | | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Hotel
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Hotel Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 46 | 346 | | | 295 | 83 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 51 | 384 | | | 327 | 92 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | | | 1 | 0 |
| Configuration | LT | | | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | | | |
| Peak Hour Factor, PHF | | | | | | |
| Hourly Flow Rate, HFR | | | | | | |
| Percent Heavy Vehicles | | | | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | | | |
| Configuration | | | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LT | | | | | | | |
| v (vph) | 51 | | | | | | | |
| C(m) (vph) | 1140 | | | | | | | |
| v/c | 0.04 | | | | | | | |
| 95% queue length | 0.14 | | | | | | | |
| Control Delay | 8.3 | | | | | | | |
| LOS | A | | | | | | | |
| Approach Delay | | | | | | | | |
| Approach LOS | | | | | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Hotel
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Hotel Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 60 | 314 | | | 166 | 98 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 66 | 348 | | | 184 | 108 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | | | 1 | 0 |
| Configuration | | LT | | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | | | |
| Peak Hour Factor, PHF | | | | | | |
| Hourly Flow Rate, HFR | | | | | | |
| Percent Heavy Vehicles | | | | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | | | |
| Configuration | | | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LT | | | | | | | |
| v (vph) | 66 | | | | | | | |
| C(m) (vph) | 1270 | | | | | | | |
| v/c | 0.05 | | | | | | | |
| 95% queue length | 0.16 | | | | | | | |
| Control Delay | 8.0 | | | | | | | |
| LOS | A | | | | | | | |
| Approach Delay | | | | | | | | |
| Approach LOS | | | | | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Hotel
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Hotel Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 62 | 352 | | | 304 | 93 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 68 | 391 | | | 337 | 103 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | | | 1 | 0 |
| Configuration | | LT | | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | | | |
| Peak Hour Factor, PHF | | | | | | |
| Hourly Flow Rate, HFR | | | | | | |
| Percent Heavy Vehicles | | | | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | | | |
| Configuration | | | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LT | | | | | | | |
| v (vph) | 68 | | | | | | | |
| C(m) (vph) | 1120 | | | | | | | |
| v/c | 0.06 | | | | | | | |
| 95% queue length | 0.19 | | | | | | | |
| Control Delay | 8.4 | | | | | | | |
| LOS | A | | | | | | | |
| Approach Delay | | | | | | | | |
| Approach LOS | | | | | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St//Canal St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Canal Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 217 | | | 161 | |
| Peak-Hour Factor, PHF | | 0.90 | | | 0.90 | |
| Hourly Flow Rate, HFR | | 241 | | | 178 | |
| Percent Heavy Vehicles | | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | | | 1 | |
| Configuration | | T | | | T | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | 201 | | 76 |
| Peak Hour Factor, PHF | | | | 0.90 | | 0.90 |
| Hourly Flow Rate, HFR | | | | 223 | | 84 |
| Percent Heavy Vehicles | | | | 2 | | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | | / | | / |
| Lanes | | | | 1 | | 1 |
| Configuration | | | | L | | R |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | | | | | L | | R |
| v (vph) | | | | | | 223 | | 84 |
| C(m) (vph) | | | | | | 591 | | 865 |
| v/c | | | | | | 0.38 | | 0.10 |
| 95% queue length | | | | | | 1.80 | | 0.32 |
| Control Delay | | | | | | 14.8 | | 9.6 |
| LOS | | | | | | B | | A |
| Approach Delay | | | | | | | 13.4 | |
| Approach LOS | | | | | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St//Canal St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Canal Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 307 | | | 189 | |
| Peak-Hour Factor, PHF | | 0.90 | | | 0.90 | |
| Hourly Flow Rate, HFR | | 341 | | | 210 | |
| Percent Heavy Vehicles | | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | | | 1 | |
| Configuration | | T | | | T | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | 137 | | 144 |
| Peak Hour Factor, PHF | | | | 0.90 | | 0.90 |
| Hourly Flow Rate, HFR | | | | 152 | | 160 |
| Percent Heavy Vehicles | | | | 2 | | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | | / | | / |
| Lanes | | | | 1 | | 1 |
| Configuration | | | | L | | R |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | | | | | L | | R |
| v (vph) | | | | | | 152 | | 160 |
| C(m) (vph) | | | | | | 495 | | 830 |
| v/c | | | | | | 0.31 | | 0.19 |
| 95% queue length | | | | | | 1.32 | | 0.71 |
| Control Delay | | | | | | 15.5 | | 10.4 |
| LOS | | | | | | C | | B |
| Approach Delay | | | | | | | 12.9 | |
| Approach LOS | | | | | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St//Canal St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Canal Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 326 | | | 141 | |
| Peak-Hour Factor, PHF | | 0.90 | | | 0.90 | |
| Hourly Flow Rate, HFR | | 362 | | | 156 | |
| Percent Heavy Vehicles | | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | | | 1 | |
| Configuration | | T | | | T | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | 98 | | 37 |
| Peak Hour Factor, PHF | | | | 0.90 | | 0.90 |
| Hourly Flow Rate, HFR | | | | 108 | | 41 |
| Percent Heavy Vehicles | | | | 2 | | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | 1 | | 1 |
| Configuration | | | | L | | R |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | | | | | L | | R |
| v (vph) | | | | | | 108 | | 41 |
| C(m) (vph) | | | | | | 518 | | 890 |
| v/c | | | | | | 0.21 | | 0.05 |
| 95% queue length | | | | | | 0.79 | | 0.14 |
| Control Delay | | | | | | 13.8 | | 9.2 |
| LOS | | | | | | B | | A |
| Approach Delay | | | | | | | 12.5 | |
| Approach LOS | | | | | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St//Canal St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Canal Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 333 | | | 218 | |
| Peak-Hour Factor, PHF | | 0.90 | | | 0.90 | |
| Hourly Flow Rate, HFR | | 370 | | | 242 | |
| Percent Heavy Vehicles | | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | | | 1 | |
| Configuration | | T | | | T | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | 106 | | 116 |
| Peak Hour Factor, PHF | | | | 0.90 | | 0.90 |
| Hourly Flow Rate, HFR | | | | 117 | | 128 |
| Percent Heavy Vehicles | | | | 2 | | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | 1 | | 1 |
| Configuration | | | | L | | R |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | | | | | L | | R |
| v (vph) | | | | | | 117 | | 128 |
| C(m) (vph) | | | | | | 456 | | 797 |
| v/c | | | | | | 0.26 | | 0.16 |
| 95% queue length | | | | | | 1.03 | | 0.57 |
| Control Delay | | | | | | 15.6 | | 10.4 |
| LOS | | | | | | C | | B |
| Approach Delay | | | | | | | 12.9 | |
| Approach LOS | | | | | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 166 | 33 | 61 | 162 | |
| Peak-Hour Factor, PHF | | 0.86 | 0.86 | 0.88 | 0.88 | |
| Hourly Flow Rate, HFR | | 193 | 38 | 69 | 184 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 29 | | 70 | | | |
| Peak Hour Factor, PHF | 0.78 | | 0.78 | | | |
| Hourly Flow Rate, HFR | 37 | | 89 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 69 | | 126 | | | | |
| C(m) (vph) | | 1081 | | 481 | | | | |
| v/c | | 0.06 | | 0.26 | | | | |
| 95% queue length | | 0.20 | | 1.06 | | | | |
| Control Delay | | 8.6 | | 15.1 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | | | | 15.1 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 263 | 81 | 70 | 224 | |
| Peak-Hour Factor, PHF | | 0.86 | 0.86 | 0.85 | 0.85 | |
| Hourly Flow Rate, HFR | | 305 | 94 | 82 | 263 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 53 | | 51 | | | |
| Peak Hour Factor, PHF | 0.88 | | 0.88 | | | |
| Hourly Flow Rate, HFR | 60 | | 57 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 82 | | 117 | | | | |
| C(m) (vph) | | 919 | | 311 | | | | |
| v/c | | 0.09 | | 0.38 | | | | |
| 95% queue length | | 0.29 | | 1.78 | | | | |
| Control Delay | | 9.3 | | 23.5 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | | | | 23.5 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 232 | 111 | 50 | 118 | |
| Peak-Hour Factor, PHF | | 0.90 | 0.90 | 0.90 | 0.90 | |
| Hourly Flow Rate, HFR | | 257 | 123 | 55 | 131 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | | TR | | LT | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 109 | | 99 | | | |
| Peak Hour Factor, PHF | 0.90 | | 0.90 | | | |
| Hourly Flow Rate, HFR | 121 | | 110 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | LR | | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 55 | | 231 | | | | |
| C(m) (vph) | | 976 | | 417 | | | | |
| v/c | | 0.06 | | 0.55 | | | | |
| 95% queue length | | 0.18 | | 3.59 | | | | |
| Control Delay | | 8.9 | | 24.2 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | | | | 24.2 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 259 | 57 | 78 | 235 | |
| Peak-Hour Factor, PHF | | 0.83 | 0.83 | 0.86 | 0.86 | |
| Hourly Flow Rate, HFR | | 312 | 68 | 90 | 273 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | | TR | | LT | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 45 | | 77 | | | |
| Peak Hour Factor, PHF | 0.76 | | 0.76 | | | |
| Hourly Flow Rate, HFR | 59 | | 101 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | LR | | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 90 | | 160 | | | | |
| C(m) (vph) | | 954 | | 349 | | | | |
| v/c | | 0.09 | | 0.46 | | | | |
| 95% queue length | | 0.31 | | 2.47 | | | | |
| Control Delay | | 9.2 | | 24.0 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | | | | 24.0 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Wainee St/Prison Street
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Wainee Street
Intersection Orientation: EW Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 49 | 87 | 27 | 34 | 104 | 38 |
| Peak-Hour Factor, PHF | 0.87 | 0.87 | 0.87 | 0.70 | 0.70 | 0.70 |
| Hourly Flow Rate, HFR | 56 | 99 | 31 | 48 | 148 | 54 |
| Percent Heavy Vehicles | 2 | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided / | | | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 59 | 81 | 3 | 14 | 67 | 62 |
| Peak Hour Factor, PHF | 0.80 | 0.80 | 0.80 | 0.75 | 0.75 | 0.75 |
| Hourly Flow Rate, HFR | 73 | 101 | 3 | 18 | 89 | 82 |
| Percent Heavy Vehicles | 2 | 2 | 2 | 2 | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No / | | | No / | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |

### Delay, Queue Length, and Level of Service

| Approach | EB | WB | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LTR | LTR | | LTR | | | LTR | |
| v (vph) | 56 | 48 | | 177 | | | 189 | |
| C(m) (vph) | 1370 | 1439 | | 507 | | | 698 | |
| v/c | 0.04 | 0.03 | | 0.35 | | | 0.27 | |
| 95% queue length | 0.13 | 0.10 | | 1.59 | | | 1.11 | |
| Control Delay | 7.7 | 7.6 | | 15.9 | | | 12.1 | |
| LOS | A | A | | C | | | B | |
| Approach Delay | | | | 15.9 | | | 12.1 | |
| Approach LOS | | | | C | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Wainee St/Prison Street
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Wainee Street
Intersection Orientation: EW Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 103 | 47 | 12 | 19 | 59 | 35 |
| Peak-Hour Factor, PHF | 0.88 | 0.88 | 0.88 | 0.83 | 0.83 | 0.83 |
| Hourly Flow Rate, HFR | 117 | 53 | 13 | 22 | 71 | 42 |
| Percent Heavy Vehicles | 2 | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided / | | | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 9 | 106 | 4 | 32 | 257 | 124 |
| Peak Hour Factor, PHF | 0.73 | 0.73 | 0.73 | 0.88 | 0.88 | 0.88 |
| Hourly Flow Rate, HFR | 12 | 145 | 5 | 36 | 292 | 140 |
| Percent Heavy Vehicles | 2 | 2 | 2 | 2 | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No / | | | No / | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |

### Delay, Queue Length, and Level of Service

| Approach | EB | WB | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LTR | LTR | | LTR | | | LTR | |
| v (vph) | 117 | 22 | | 162 | | | 468 | |
| C(m) (vph) | 1476 | 1530 | | 543 | | | 696 | |
| v/c | 0.08 | 0.01 | | 0.30 | | | 0.67 | |
| 95% queue length | 0.26 | 0.04 | | 1.27 | | | 5.86 | |
| Control Delay | 7.6 | 7.4 | | 14.4 | | | 20.6 | |
| LOS | A | A | | B | | | C | |
| Approach Delay | | | | 14.4 | | | 20.6 | |
| Approach LOS | | | | B | | | C | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Wainee St/Prison Street
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Wainee Street
Intersection Orientation: EW Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 74 | 9 | 14 | 20 | 139 | 65 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 82 | 10 | 15 | 22 | 154 | 72 |
| Percent Heavy Vehicles | 2 | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 42 | 141 | 4 | 12 | 64 | 49 |
| Peak Hour Factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 46 | 156 | 4 | 13 | 71 | 54 |
| Percent Heavy Vehicles | 2 | 2 | 2 | 2 | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | No | / |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |

### Delay, Queue Length, and Level of Service

| Approach | EB | WB | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LTR | LTR | | LTR | | | LTR | |
| v (vph) | 82 | 22 | | 206 | | | 138 | |
| C(m) (vph) | 1338 | 1576 | | 657 | | | 809 | |
| v/c | 0.06 | 0.01 | | 0.31 | | | 0.17 | |
| 95% queue length | 0.20 | 0.04 | | 1.36 | | | 0.62 | |
| Control Delay | 7.9 | 7.3 | | 13.0 | | | 10.4 | |
| LOS | A | A | | B | | | B | |
| Approach Delay | | | | 13.0 | | | 10.4 | |
| Approach LOS | | | | B | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Wainee St/Prison Street
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Wainee Street
Intersection Orientation: EW Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 40 | 70 | 32 | 12 | 45 | 29 |
| Peak-Hour Factor, PHF | 0.77 | 0.77 | 0.77 | 0.83 | 0.83 | 0.83 |
| Hourly Flow Rate, HFR | 51 | 90 | 41 | 14 | 54 | 34 |
| Percent Heavy Vehicles | 2 | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 54 | 145 | 2 | 21 | 254 | 10 |
| Peak Hour Factor, PHF | 0.80 | 0.80 | 0.80 | 0.86 | 0.86 | 0.86 |
| Hourly Flow Rate, HFR | 67 | 181 | 2 | 24 | 295 | 11 |
| Percent Heavy Vehicles | 2 | 2 | 2 | 2 | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | No | / |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |

### Delay, Queue Length, and Level of Service

| Approach | EB | WB | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LTR | LTR | | LTR | | | LTR | |
| v (vph) | 51 | 14 | | 250 | | | 330 | |
| C(m) (vph) | 1508 | 1454 | | 712 | | | 757 | |
| v/c | 0.03 | 0.01 | | 0.35 | | | 0.44 | |
| 95% queue length | 0.10 | 0.03 | | 1.61 | | | 2.29 | |
| Control Delay | 7.5 | 7.5 | | 12.8 | | | 13.4 | |
| LOS | A | A | | B | | | B | |
| Approach Delay | | | | 12.8 | | | 13.4 | |
| Approach LOS | | | | B | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Honoapiilani Hwy/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Honoapiilani Hwy
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 80 | 812 | 1 | | 638 | 76 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 88 | 902 | 1 | | 708 | 84 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 1 | 1 | 0 | | 1 | 0 |
| Configuration | L | | TR | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 1 | | 2 | 98 |
| Peak Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 0 | 0 | 1 | | 2 | 108 |
| Percent Heavy Vehicles | 2 | 2 | 2 | | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | | No / |
| Lanes | 0 | 1 | 0 | | 1 | 0 |
| Configuration | | LTR | | | | TR |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | L | | | LTR | | | | TR |
| v (vph) | 88 | | | 1 | | | | 110 |
| C(m) (vph) | 829 | | | 554 | | | | 613 |
| v/c | 0.11 | | | 0.00 | | | | 0.18 |
| 95% queue length | 0.36 | | | 0.01 | | | | 0.65 |
| Control Delay | 9.9 | | | 11.5 | | | | 12.2 |
| LOS | A | | | B | | | | B |
| Approach Delay | | | | 11.5 | | | 12.2 | |
| Approach LOS | | | | B | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Honoapiilani Hwy/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Honoapiilani Hwy
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 59 | 892 | 4 | | 814 | 51 |
| Peak-Hour Factor, PHF | 0.93 | 0.93 | 0.93 | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 63 | 959 | 4 | | 904 | 56 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 1 | 1 | 0 | | 1 | 0 |
| Configuration | L | | TR | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 2 | | 9 | 103 |
| Peak Hour Factor, PHF | 0.50 | 0.50 | 0.50 | | 0.80 | 0.80 |
| Hourly Flow Rate, HFR | 0 | 0 | 4 | | 11 | 128 |
| Percent Heavy Vehicles | 2 | 2 | 2 | | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | | No / |
| Lanes | 0 | 1 | 0 | | 1 | 0 |
| Configuration | | LTR | | | | TR |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | L | | | LTR | | | | TR |
| v (vph) | 63 | | | 4 | | | | 139 |
| C(m) (vph) | 717 | | | 517 | | | | 400 |
| v/c | 0.09 | | | 0.01 | | | | 0.35 |
| 95% queue length | 0.29 | | | 0.02 | | | | 1.58 |
| Control Delay | 10.5 | | | 12.0 | | | | 18.8 |
| LOS | B | | | B | | | | C |
| Approach Delay | | | | 12.0 | | | 18.8 | |
| Approach LOS | | | | B | | | C | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Honoapiilani Hwy/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Honoapiilani Hwy
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 104 | 924 | 0 | | 517 | 86 |
| Peak-Hour Factor, PHF | 0.95 | 0.95 | 0.95 | | 0.92 | 0.92 |
| Hourly Flow Rate, HFR | 109 | 972 | 0 | | 561 | 93 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | 1 | 1 | 0 | | 1 | 0 |
| Configuration | L | | TR | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 1 | | 1 | 22 |
| Peak Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.60 | 0.60 |
| Hourly Flow Rate, HFR | 0 | 0 | 1 | | 1 | 36 |
| Percent Heavy Vehicles | 2 | 2 | 2 | | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | | No / |
| Lanes | 0 | 1 | 0 | | 1 | 0 |
| Configuration | | LTR | | | | TR |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | L | | | LTR | | | | TR |
| v (vph) | 109 | | | 1 | | | | 37 |
| C(m) (vph) | 933 | | | 510 | | | | 740 |
| v/c | 0.12 | | | 0.00 | | | | 0.05 |
| 95% queue length | 0.40 | | | 0.01 | | | | 0.16 |
| Control Delay | 9.4 | | | 12.1 | | | | 10.1 |
| LOS | A | | | B | | | | B |
| Approach Delay | | | | 12.1 | | | 10.1 | |
| Approach LOS | | | | B | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Honoapiilani Hwy/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Honoapiilani Hwy
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 30 | 921 | 3 | | 851 | 54 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 33 | 1023 | 3 | | 945 | 60 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | 1 | 1 | 0 | | 1 | 0 |
| Configuration | L | | TR | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 3 | | 2 | 101 |
| Peak Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.60 | 0.60 |
| Hourly Flow Rate, HFR | 0 | 0 | 3 | | 3 | 168 |
| Percent Heavy Vehicles | 2 | 2 | 2 | | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | | No / |
| Lanes | 0 | 1 | 0 | | 1 | 0 |
| Configuration | | LTR | | | | TR |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | L | | | LTR | | | | TR |
| v (vph) | 33 | | | 3 | | | | 171 |
| C(m) (vph) | 689 | | | 480 | | | | 501 |
| v/c | 0.05 | | | 0.01 | | | | 0.34 |
| 95% queue length | 0.15 | | | 0.02 | | | | 1.54 |
| Control Delay | 10.5 | | | 12.5 | | | | 15.9 |
| LOS | B | | | B | | | | C |
| Approach Delay | | | | 12.5 | | | 15.9 | |
| Approach LOS | | | | B | | | C | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 211 | 55 | 56 | 274 | |
| Peak-Hour Factor, PHF | | 0.95 | 0.95 | 0.87 | 0.87 | |
| Hourly Flow Rate, HFR | | 222 | 57 | 64 | 314 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 44 | | 33 | | | |
| Peak Hour Factor, PHF | 0.72 | | 0.72 | | | |
| Hourly Flow Rate, HFR | 61 | | 45 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 64 | | 106 | | | | |
| C(m) (vph) | | 873 | | 542 | | | | |
| v/c | | 0.07 | | 0.20 | | | | |
| 95% queue length | | 0.24 | | 0.73 | | | | |
| Control Delay | | 9.4 | | 13.3 | | | | |
| LOS | | A | | B | | | | |
| Approach Delay | | | | 13.3 | | | | |
| Approach LOS | | | | B | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 296 | 49 | 62 | 357 | |
| Peak-Hour Factor, PHF | | 0.92 | 0.92 | 0.90 | 0.90 | |
| Hourly Flow Rate, HFR | | 321 | 53 | 68 | 396 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 58 | | 39 | | | |
| Peak Hour Factor, PHF | 0.75 | | 0.75 | | | |
| Hourly Flow Rate, HFR | 77 | | 52 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 68 | | 129 | | | | |
| C(m) (vph) | | 504 | | 258 | | | | |
| v/c | | 0.13 | | 0.50 | | | | |
| 95% queue length | | 0.47 | | 2.87 | | | | |
| Control Delay | | 13.3 | | 32.7 | | | | |
| LOS | | B | | D | | | | |
| Approach Delay | | | | 32.7 | | | | |
| Approach LOS | | | | D | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 273 | 36 | 20 | 248 | |
| Peak-Hour Factor, PHF | | 0.80 | 0.80 | 0.74 | 0.74 | |
| Hourly Flow Rate, HFR | | 341 | 44 | 27 | 335 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 26 | | 33 | | | |
| Peak Hour Factor, PHF | 0.85 | | 0.85 | | | |
| Hourly Flow Rate, HFR | 30 | | 38 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 27 | | 68 | | | | |
| C(m) (vph) | | 889 | | 685 | | | | |
| v/c | | 0.03 | | 0.10 | | | | |
| 95% queue length | | 0.09 | | 0.33 | | | | |
| Control Delay | | 9.2 | | 10.8 | | | | |
| LOS | | A | | B | | | | |
| Approach Delay | | | | 10.8 | | | | |
| Approach LOS | | | | B | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 292 | 57 | 80 | 361 | |
| Peak-Hour Factor, PHF | | 0.88 | 0.88 | 0.97 | 0.97 | |
| Hourly Flow Rate, HFR | | 331 | 64 | 82 | 372 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 58 | | 45 | | | |
| Peak Hour Factor, PHF | 0.95 | | 0.95 | | | |
| Hourly Flow Rate, HFR | 61 | | 47 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 82 | | 108 | | | | |
| C(m) (vph) | | 776 | | 495 | | | | |
| v/c | | 0.11 | | 0.22 | | | | |
| 95% queue length | | 0.35 | | 0.83 | | | | |
| Control Delay | | 10.2 | | 14.3 | | | | |
| LOS | | B | | B | | | | |
| Approach Delay | | | | 14.3 | | | | |
| Approach LOS | | | | B | | | | |

HCS+: Unsignalized Intersections Release 5.2

## ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Wainee St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Wainee St

## Worksheet 2 - Volume Adjustments and Site Characteristics

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Volume | 38 | 55 | 22 | 48 | 70 | 26 | 15 | 147 | 21 | 8 | 116 | 48 |
| % Thrus Left Lane | | | | | | | | | | | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 0.79 | | 0.82 | | 0.86 | | 0.76 | |
| Flow Rate | 144 | | 174 | | 211 | | 225 | |
| % Heavy Veh | 2 | | 2 | | 2 | | 2 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Opposing-Lanes | 1 | | 1 | | 1 | | 1 | |
| Conflicting-lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry group | 1 | | 1 | | 1 | | 1 | |

Duration, T 1.00 hrs.

## Worksheet 3 - Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rates: | | | | | | | | |
| Total in Lane | 144 | | 174 | | 211 | | 225 | |
| Left-Turn | 48 | | 58 | | 17 | | 10 | |
| Right-Turn | 27 | | 31 | | 24 | | 63 | |
| Prop. Left-Turns | 0.3 | | 0.3 | | 0.1 | | 0.0 | |
| Prop. Right-Turns | 0.2 | | 0.2 | | 0.1 | | 0.3 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Adjustments Exhibit 17-33: | | | | | | | | |
| hLT-adj | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| hRT-adj | -0.6 | | -0.6 | | -0.6 | | -0.6 | |
| hHV-adj | 1.7 | | 1.7 | | 1.7 | | 1.7 | |
| hadj, computed | -0.0 | | -0.0 | | -0.0 | | -0.1 | |

## Worksheet 4 - Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow rate | 144 | | 174 | | 211 | | 225 | |
| hd, initial value | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 |
| x, initial | 0.13 | | 0.15 | | 0.19 | | 0.20 | |
| hd, final value | 5.31 | | 5.26 | | 5.09 | | 4.97 | |
| x, final value | 0.21 | | 0.25 | | 0.30 | | 0.31 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 3.3 | | 3.3 | | 3.1 | | 3.0 | |

## Worksheet 5 - Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rate | 144 | | 174 | | 211 | | 225 | |
| Service Time | 3.3 | | 3.3 | | 3.1 | | 3.0 | |
| Utilization, x | 0.21 | | 0.25 | | 0.30 | | 0.31 | |
| Dep. headway, hd | 5.31 | | 5.26 | | 5.09 | | 4.97 | |
| Capacity | 394 | | 424 | | 461 | | 475 | |
| Delay | 9.74 | | 10.06 | | 10.24 | | 10.20 | |
| LOS | A | | B | | B | | B | |
| Approach: | | | | | | | | |
| Delay | 9.74 | | 10.06 | | 10.24 | | 10.20 | |
| LOS | A | | B | | B | | B | |

Intersection Delay 10.09 Intersection LOS B

HCS+: Unsignalized Intersections Release 5.2

## ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Wainee St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Wainee St

## Worksheet 2 - Volume Adjustments and Site Characteristics

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Volume | 62 | 77 | 28 | 140 | 83 | 7 | 15 | 234 | 44 | 18 | 254 | 53 |

% Thrus Left Lane

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 0.81 | | 0.83 | | 0.96 | | 0.87 | |
| Flow Rate | 205 | | 276 | | 303 | | 371 | |
| % Heavy Veh | 2 | | 2 | | 2 | | 2 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Opposing-Lanes | 1 | | 1 | | 1 | | 1 | |
| Conflicting-lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry group | 1 | | 1 | | 1 | | 1 | |

Duration, T 1.00 hrs.

## Worksheet 3 - Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rates: | | | | | | | | |
| Total in Lane | 205 | | 276 | | 303 | | 371 | |
| Left-Turn | 76 | | 168 | | 15 | | 20 | |
| Right-Turn | 34 | | 8 | | 45 | | 60 | |
| Prop. Left-Turns | 0.4 | | 0.6 | | 0.0 | | 0.1 | |
| Prop. Right-Turns | 0.2 | | 0.0 | | 0.1 | | 0.2 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Adjustments Exhibit 17-33: | | | | | | | | |
| hLT-adj | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| hRT-adj | -0.6 | | -0.6 | | -0.6 | | -0.6 | |
| hHV-adj | 1.7 | | 1.7 | | 1.7 | | 1.7 | |
| hadj, computed | 0.0 | | 0.1 | | -0.0 | | -0.1 | |

## Worksheet 4 - Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow rate | 205 | | 276 | | 303 | | 371 | |
| hd, initial value | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 |
| x, initial | 0.18 | | 0.25 | | 0.27 | | 0.33 | |
| hd, final value | 6.85 | | 6.76 | | 6.40 | | 6.24 | |
| x, final value | 0.39 | | 0.52 | | 0.54 | | 0.64 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 4.8 | | 4.8 | | 4.4 | | 4.2 | |

## Worksheet 5 - Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rate | 205 | | 276 | | 303 | | 371 | |
| Service Time | 4.8 | | 4.8 | | 4.4 | | 4.2 | |
| Utilization, x | 0.39 | | 0.52 | | 0.54 | | 0.64 | |
| Dep. headway, hd | 6.85 | | 6.76 | | 6.40 | | 6.24 | |
| Capacity | 451 | | 482 | | 516 | | 543 | |
| Delay | 14.21 | | 16.99 | | 16.81 | | 20.32 | |
| LOS | B | | C | | C | | C | |
| Approach: | | | | | | | | |
| Delay | 14.21 | | 16.99 | | 16.81 | | 20.32 | |
| LOS | B | | C | | C | | C | |

Intersection Delay 17.52 Intersection LOS C

HCS+: Unsignalized Intersections Release 5.2

## ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Wainee St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Wainee St

## Worksheet 2 - Volume Adjustments and Site Characteristics

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Volume | 20 | 43 | 11 | 38 | 38 | 2 | 11 | 142 | 47 | 10 | 93 | 23 |

% Thrus Left Lane

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 0.68 | | 0.98 | | 0.78 | | 0.81 | |
| Flow Rate | 108 | | 78 | | 256 | | 154 | |
| % Heavy Veh | 2 | | 2 | | 2 | | 2 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Opposing-Lanes | 1 | | 1 | | 1 | | 1 | |
| Conflicting-lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry group | 1 | | 1 | | 1 | | 1 | |

Duration, T 1.00 hrs.

## Worksheet 3 - Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rates: | | | | | | | | |
| Total in Lane | 108 | | 78 | | 256 | | 154 | |
| Left-Turn | 29 | | 38 | | 14 | | 12 | |
| Right-Turn | 16 | | 2 | | 60 | | 28 | |
| Prop. Left-Turns | 0.3 | | 0.5 | | 0.1 | | 0.1 | |
| Prop. Right-Turns | 0.1 | | 0.0 | | 0.2 | | 0.2 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Adjustments Exhibit 17-33: | | | | | | | | |
| hLT-adj | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| hRT-adj | -0.6 | | -0.6 | | -0.6 | | -0.6 | |
| hHV-adj | 1.7 | | 1.7 | | 1.7 | | 1.7 | |
| hadj, computed | -0.0 | | 0.1 | | -0.1 | | -0.1 | |

## Worksheet 4 - Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow rate | 108 | | 78 | | 256 | | 154 | |
| hd, initial value | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 |
| x, initial | 0.10 | | 0.07 | | 0.23 | | 0.14 | |
| hd, final value | 4.98 | | 5.15 | | 4.49 | | 4.64 | |
| x, final value | 0.15 | | 0.11 | | 0.32 | | 0.20 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 3.0 | | 3.1 | | 2.5 | | 2.6 | |

## Worksheet 5 - Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rate | 108 | | 78 | | 256 | | 154 | |
| Service Time | 3.0 | | 3.1 | | 2.5 | | 2.6 | |
| Utilization, x | 0.15 | | 0.11 | | 0.32 | | 0.20 | |
| Dep. headway, hd | 4.98 | | 5.15 | | 4.49 | | 4.64 | |
| Capacity | 358 | | 328 | | 506 | | 404 | |
| Delay | 8.86 | | 8.79 | | 9.59 | | 8.79 | |
| LOS | A | | A | | A | | A | |
| Approach: | | | | | | | | |
| Delay | 8.86 | | 8.79 | | 9.59 | | 8.79 | |
| LOS | A | | A | | A | | A | |

Intersection Delay 9.15 Intersection LOS A

HCS+: Unsignalized Intersections Release 5.2

## ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Wainee St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Existing-(Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Wainee St

## Worksheet 2 - Volume Adjustments and Site Characteristics

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Volume | 63 | 74 | 19 | 100 | 81 | 20 | 24 | 236 | 38 | 21 | 250 | 81 |
| % Thrus Left Lane | | | | | | | | | | | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 0.85 | | 0.91 | | 0.92 | | 0.90 | |
| Flow Rate | 183 | | 219 | | 323 | | 390 | |
| % Heavy Veh | 2 | | 2 | | 2 | | 2 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Opposing-Lanes | 1 | | 1 | | 1 | | 1 | |
| Conflicting-lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry group | 1 | | 1 | | 1 | | 1 | |

Duration, T 1.00 hrs.

## Worksheet 3 - Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rates: | | | | | | | | |
| Total in Lane | 183 | | 219 | | 323 | | 390 | |
| Left-Turn | 74 | | 109 | | 26 | | 23 | |
| Right-Turn | 22 | | 21 | | 41 | | 90 | |
| Prop. Left-Turns | 0.4 | | 0.5 | | 0.1 | | 0.1 | |
| Prop. Right-Turns | 0.1 | | 0.1 | | 0.1 | | 0.2 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Adjustments Exhibit 17-33: | | | | | | | | |
| hLT-adj | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| hRT-adj | -0.6 | | -0.6 | | -0.6 | | -0.6 | |
| hHV-adj | 1.7 | | 1.7 | | 1.7 | | 1.7 | |
| hadj, computed | 0.0 | | 0.1 | | -0.0 | | -0.1 | |

## Worksheet 4 - Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow rate | 183 | | 219 | | 323 | | 390 | |
| hd, initial value | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 |
| x, initial | 0.16 | | 0.19 | | 0.29 | | 0.35 | |
| hd, final value | 6.67 | | 6.60 | | 6.03 | | 5.85 | |
| x, final value | 0.34 | | 0.40 | | 0.54 | | 0.63 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 4.7 | | 4.6 | | 4.0 | | 3.8 | |

## Worksheet 5 - Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rate | 183 | | 219 | | 323 | | 390 | |
| Service Time | 4.7 | | 4.6 | | 4.0 | | 3.8 | |
| Utilization, x | 0.34 | | 0.40 | | 0.54 | | 0.63 | |
| Dep. headway, hd | 6.67 | | 6.60 | | 6.03 | | 5.85 | |
| Capacity | 433 | | 469 | | 556 | | 584 | |
| Delay | 13.08 | | 14.01 | | 16.10 | | 18.81 | |
| LOS | B | | B | | C | | C | |
| Approach: | | | | | | | | |
| Delay | 13.08 | | 14.01 | | 16.10 | | 18.81 | |
| LOS | B | | B | | C | | C | |

Intersection Delay 16.14 Intersection LOS C

HCS+: Signalized Intersections Release 5.2

Analyst: KT
Agency: WOC
Date: 4/4/2006
Period: AM Peak Period
Project ID: Lahaina Small Boat Harbor
E/W St: Dickenson Street

Inter.: Honoapiilani Hwy/Dickenson St
Area Type: All other areas
Jurisd: Lahaina, Maui
Year : Existing-(Boat Day)
N/S St: Honoapiilani Hwy

SIGNALIZED INTERSECTION SUMMARY

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| LGConfig | | LTR | | | LTR | | L | TR | | L | TR | |
| Volume | 38 | 23 | 23 | 31 | 13 | 26 | 40 | 728 | 44 | 12 | 655 | 91 |
| Lane Width | | 12.0 | | | 12.0 | | 12.0 | 12.0 | | 12.0 | 12.0 | |
| RTOR Vol | | | 2 | | | 3 | | | 4 | | | 9 |

Duration 0.25 Area Type: All other areas

Signal Operations

| Phase Combination | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EB Left | A | | | | NB Left A | | | |
| Thru | A | | | | Thru | A | | |
| Right | A | | | | Right | A | | |
| Peds | | | | | Peds | | | |
| WB Left | A | | | | SB Left A | | | |
| Thru | A | | | | Thru | A | | |
| Right | A | | | | Right | A | | |
| Peds | | | | | Peds | | | |
| NB Right | | | | | EB Right | | | |
| SB Right | | | | | WB Right | | | |
| Green | 29.0 | | | | 26.0 | 65.0 | | |
| Yellow | 4.0 | | | | 4.0 | 4.0 | | |
| All Red | 1.0 | | | | 1.0 | 1.0 | | |

Cycle Length: 135.0 secs

Intersection Performance Summary

| Appr/ Lane Grp | Lane Group Capacity | Adj Sat Flow Rate (s) | Ratios v/c | Ratios g/C | Lane Group Delay | Lane Group LOS | Approach Delay | Approach LOS |
|---|---|---|---|---|---|---|---|---|
| Eastbound | | | | | | | | |
| LTR | 326 | 1517 | 0.28 | 0.21 | 44.7 | D | 44.7 | D |
| Westbound | | | | | | | | |
| LTR | 322 | 1501 | 0.23 | 0.21 | 44.1 | D | 44.1 | D |
| Northbound | | | | | | | | |
| L | 359 | 1863 | 0.12 | 0.19 | 45.2 | D | | |
| TR | 937 | 1946 | 0.91 | 0.48 | 45.1 | D | 45.1 | D |
| Southbound | | | | | | | | |
| L | 359 | 1863 | 0.04 | 0.19 | 44.4 | D | | |
| TR | 1768 | 3671 | 0.46 | 0.48 | 23.6 | C | 23.9 | C |

Intersection Delay = 35.7 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.2

Analyst: KT
Agency: WOC
Date: 4/4/2006
Period: PM Peak Period
Project ID: Lahaina Small Boat Harbor
E/W St: Dickenson Street

Inter.: Honoapiilani Hwy/Dickenson St
Area Type: All other areas
Jurisd: Lahaina, Maui
Year : Existing-(Boat Day)
N/S St: Honoapiilani Hwy

SIGNALIZED INTERSECTION SUMMARY

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| LGConfig | | LTR | | | LTR | | L | TR | | L | TR | |
| Volume | 59 | 31 | 27 | 34 | 21 | 26 | 28 | 840 | 57 | 11 | 816 | 185 |
| Lane Width | | 12.0 | | | 12.0 | | 12.0 | 12.0 | | 12.0 | 12.0 | |
| RTOR Vol | | | 3 | | | 3 | | | 6 | | | 19 |

Duration 1.00 Area Type: All other areas

Signal Operations

| Phase Combination | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EB Left | A | | | | NB Left A | | | |
| Thru | A | | | | Thru | A | | |
| Right | A | | | | Right | A | | |
| Peds | | | | | Peds | | | |
| WB Left | A | | | | SB Left A | | | |
| Thru | A | | | | Thru | A | | |
| Right | A | | | | Right | A | | |
| Peds | | | | | Peds | | | |
| NB Right | | | | | EB Right | | | |
| SB Right | | | | | WB Right | | | |
| Green | 31.0 | | | | 19.5 | 69.5 | | |
| Yellow | 4.0 | | | | 4.0 | 4.0 | | |
| All Red | 1.0 | | | | 1.0 | 1.0 | | |

Cycle Length: 135.0 secs

Intersection Performance Summary

| Appr/ Lane Grp | Lane Group Capacity | Adj Sat Flow Rate (s) | Ratios v/c | Ratios g/C | Lane Group Delay | Lane Group LOS | Approach Delay | Approach LOS |
|---|---|---|---|---|---|---|---|---|
| Eastbound | | | | | | | | |
| LTR | 323 | 1405 | 0.62 | 0.23 | 50.4 | D | 50.4 | D |
| Westbound | | | | | | | | |
| LTR | 327 | 1425 | 0.29 | 0.23 | 43.5 | D | 43.5 | D |
| Northbound | | | | | | | | |
| L | 269 | 1863 | 0.11 | 0.14 | 50.4 | D | | |
| TR | 1001 | 1944 | 0.94 | 0.51 | 51.2 | D | 51.1 | D |
| Southbound | | | | | | | | |
| L | 269 | 1863 | 0.04 | 0.14 | 49.8 | D | | |
| TR | 1873 | 3638 | 0.59 | 0.51 | 23.3 | C | 23.6 | C |

Intersection Delay = 37.8 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.2

Analyst: KT
Agency: WOC
Date: 4/4/2006
Period: AM Peak Period
Project ID: Lahaina Small Boat Harbor
E/W St: Dickenson Street

Inter.: Honoapiilani Hwy/Dickenson St
Area Type: All other areas
Jurisd: Lahaina, Maui
Year : Existing-(Non Boat Day)
N/S St: Honoapiilani Hwy

SIGNALIZED INTERSECTION SUMMARY

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| LGConfig | | LTR | | | LTR | | L | TR | | L | TR | |
| Volume | 40 | 28 | 11 | 27 | 19 | 37 | 17 | 854 | 51 | 13 | 522 | 124 |
| Lane Width | | 12.0 | | | 12.0 | | 12.0 | 12.0 | | 12.0 | 12.0 | |
| RTOR Vol | | | 1 | | | 4 | | | 5 | | | 12 |

Duration 1.00 Area Type: All other areas

Signal Operations

| Phase Combination | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EB Left | A | | | | NB Left A | | | |
| Thru | A | | | | Thru | A | | |
| Right | A | | | | Right | A | | |
| Peds | | | | | Peds | | | |
| WB Left | A | | | | SB Left A | | | |
| Thru | A | | | | Thru | A | | |
| Right | A | | | | Right | A | | |
| Peds | | | | | Peds | | | |
| NB Right | | | | | EB Right | | | |
| SB Right | | | | | WB Right | | | |
| Green | 28.5 | | | | 22.0 | 69.5 | | |
| Yellow | 4.0 | | | | 4.0 | 4.0 | | |
| All Red | 1.0 | | | | 1.0 | 1.0 | | |

Cycle Length: 135.0 secs

Intersection Performance Summary

| Appr/ Lane Grp | Lane Group Capacity | Adj Sat Flow Rate (s) | Ratios v/c | Ratios g/C | Lane Group Delay | Lane Group LOS | Approach Delay | Approach LOS |
|---|---|---|---|---|---|---|---|---|
| Eastbound | | | | | | | | |
| LTR | 305 | 1444 | 0.41 | 0.21 | 46.9 | D | 46.9 | D |
| Westbound | | | | | | | | |
| LTR | 326 | 1545 | 0.30 | 0.21 | 45.4 | D | 45.4 | D |
| Northbound | | | | | | | | |
| L | 304 | 1863 | 0.06 | 0.16 | 47.8 | D | | |
| TR | 1002 | 1946 | 0.93 | 0.51 | 47.7 | D | 47.7 | D |
| Southbound | | | | | | | | |
| L | 304 | 1863 | 0.05 | 0.16 | 47.7 | D | | |
| TR | 1871 | 3634 | 0.37 | 0.51 | 19.7 | B | 20.3 | C |

Intersection Delay = 37.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.2

Analyst: KT
Agency: WOC
Date: 4/4/2006
Period: PM Peak Period
Project ID: Lahaina Small Boat Harbor
E/W St: Dickenson Street

Inter.: Honoapiilani Hwy/Dickenson St
Area Type: All other areas
Jurisd: Lahaina, Maui
Year : Existing-(Non Boat Day)
N/S St: Honoapiilani Hwy

SIGNALIZED INTERSECTION SUMMARY

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| LGConfig | | LTR | | | LTR | | L | TR | | L | TR | |
| Volume | 57 | 44 | 33 | 51 | 42 | 17 | 24 | 821 | 80 | 15 | 821 | 99 |
| Lane Width | | 12.0 | | | 12.0 | | 12.0 | 12.0 | | 12.0 | 12.0 | |
| RTOR Vol | | | 3 | | | 2 | | | 8 | | | 10 |

Duration 1.00 Area Type: All other areas

Signal Operations

| Phase Combination | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| EB Left | A | | | | NB Left A | | | |
| Thru | A | | | | Thru | A | | |
| Right | A | | | | Right | A | | |
| Peds | | | | | Peds | | | |
| WB Left | A | | | | SB Left A | | | |
| Thru | A | | | | Thru | A | | |
| Right | A | | | | Right | A | | |
| Peds | | | | | Peds | | | |
| NB Right | | | | | EB Right | | | |
| SB Right | | | | | WB Right | | | |
| Green | 29.5 | | | | 21.0 | 69.5 | | |
| Yellow | 4.0 | | | | 4.0 | 4.0 | | |
| All Red | 1.0 | | | | 1.0 | 1.0 | | |

Cycle Length: 135.0 secs

Intersection Performance Summary

| Appr/ Lane Grp | Lane Group Capacity | Adj Sat Flow Rate (s) | Ratios v/c | Ratios g/C | Lane Group Delay | Lane Group LOS | Approach Delay | Approach LOS |
|---|---|---|---|---|---|---|---|---|
| Eastbound | | | | | | | | |
| LTR | 305 | 1395 | 0.58 | 0.22 | 50.0 | D | 50.0 | D |
| Westbound | | | | | | | | |
| LTR | 294 | 1344 | 0.48 | 0.22 | 47.3 | D | 47.3 | D |
| Northbound | | | | | | | | |
| L | 290 | 1863 | 0.09 | 0.16 | 48.9 | D | | |
| TR | 997 | 1937 | 0.93 | 0.51 | 49.9 | D | 49.9 | D |
| Southbound | | | | | | | | |
| L | 290 | 1863 | 0.06 | 0.16 | 48.7 | D | | |
| TR | 1894 | 3679 | 0.54 | 0.51 | 22.3 | C | 22.7 | C |

Intersection Delay = 37.5 (sec/veh) Intersection LOS = D

## APPENDIX D

## CAPACITY ANALYSIS CALCULATIONS
## PROJECTED YEAR 2010 PEAK HOUR TRAFFIC
## ANALYSIS WITH PROJECT

HCS+: Unsignalized Intersections Release 5.2

### TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Hotel
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Hotel Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 70 | 245 | | | 210 | 115 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 77 | 272 | | | 233 | 127 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | | | 1 | 0 |
| Configuration | | LT | | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | | | |
| Peak Hour Factor, PHF | | | | | | |
| Hourly Flow Rate, HFR | | | | | | |
| Percent Heavy Vehicles | | | | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | | | |
| Configuration | | | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LT | | | | | | | |
| v (vph) | 77 | | | | | | | |
| C(m) (vph) | 1199 | | | | | | | |
| v/c | 0.06 | | | | | | | |
| 95% queue length | 0.21 | | | | | | | |
| Control Delay | 8.2 | | | | | | | |
| LOS | A | | | | | | | |
| Approach Delay | | | | | | | | |
| Approach LOS | | | | | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Hotel
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Hotel Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 46 | 319 | | | 324 | 83 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 51 | 354 | | | 360 | 92 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | | | 1 | 0 |
| Configuration | | LT | | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | | | |
| Peak Hour Factor, PHF | | | | | | |
| Hourly Flow Rate, HFR | | | | | | |
| Percent Heavy Vehicles | | | | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | | | |
| Configuration | | | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LT | | | | | | | |
| v (vph) | 51 | | | | | | | |
| C(m) (vph) | 1109 | | | | | | | |
| v/c | 0.05 | | | | | | | |
| 95% queue length | 0.14 | | | | | | | |
| Control Delay | 8.4 | | | | | | | |
| LOS | A | | | | | | | |
| Approach Delay | | | | | | | | |
| Approach LOS | | | | | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Hotel
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Hotel Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 60 | 294 | | | 173 | 98 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 66 | 326 | | | 192 | 108 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | | | 1 | 0 |
| Configuration | | LT | | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | | | |
| Peak Hour Factor, PHF | | | | | | |
| Hourly Flow Rate, HFR | | | | | | |
| Percent Heavy Vehicles | | | | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | | | |
| Configuration | | | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LT | | | | | | | |
| v (vph) | 66 | | | | | | | |
| C(m) (vph) | 1261 | | | | | | | |
| v/c | 0.05 | | | | | | | |
| 95% queue length | 0.17 | | | | | | | |
| Control Delay | 8.0 | | | | | | | |
| LOS | A | | | | | | | |
| Approach Delay | | | | | | | | |
| Approach LOS | | | | | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Hotel
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Hotel Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 62 | 331 | | | 327 | 93 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 68 | 367 | | | 363 | 103 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | | | 1 | 0 |
| Configuration | | LT | | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | | | |
| Peak Hour Factor, PHF | | | | | | |
| Hourly Flow Rate, HFR | | | | | | |
| Percent Heavy Vehicles | | | | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | | | |
| Configuration | | | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LT | | | | | | | |
| v (vph) | 68 | | | | | | | |
| C(m) (vph) | 1095 | | | | | | | |
| v/c | 0.06 | | | | | | | |
| 95% queue length | 0.20 | | | | | | | |
| Control Delay | 8.5 | | | | | | | |
| LOS | A | | | | | | | |
| Approach Delay | | | | | | | | |
| Approach LOS | | | | | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St//Canal St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Canal Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 217 | | | 176 | |
| Peak-Hour Factor, PHF | | 0.90 | | | 0.90 | |
| Hourly Flow Rate, HFR | | 241 | | | 195 | |
| Percent Heavy Vehicles | | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | | | 1 | |
| Configuration | | T | | | T | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | 161 | | 61 |
| Peak Hour Factor, PHF | | | | 0.90 | | 0.90 |
| Hourly Flow Rate, HFR | | | | 178 | | 67 |
| Percent Heavy Vehicles | | | | 2 | | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | 1 | | 1 |
| Configuration | | | | L | | R |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | | | | | L | | R |
| v (vph) | | | | | | 178 | | 67 |
| C(m) (vph) | | | | | | 578 | | 846 |
| v/c | | | | | | 0.31 | | 0.08 |
| 95% queue length | | | | | | 1.33 | | 0.26 |
| Control Delay | | | | | | 14.0 | | 9.6 |
| LOS | | | | | | B | | A |
| Approach Delay | | | | | | | 12.8 | |
| Approach LOS | | | | | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St//Canal St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Canal Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 307 | | | 218 | |
| Peak-Hour Factor, PHF | | 0.90 | | | 0.90 | |
| Hourly Flow Rate, HFR | | 341 | | | 242 | |
| Percent Heavy Vehicles | | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | | | 1 | |
| Configuration | | T | | | T | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | 110 | | 115 |
| Peak Hour Factor, PHF | | | | 0.90 | | 0.90 |
| Hourly Flow Rate, HFR | | | | 122 | | 127 |
| Percent Heavy Vehicles | | | | 2 | | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | 1 | | 1 |
| Configuration | | | | L | | R |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | | | | | L | | R |
| v (vph) | | | | | | 122 | | 127 |
| C(m) (vph) | | | | | | 475 | | 797 |
| v/c | | | | | | 0.26 | | 0.16 |
| 95% queue length | | | | | | 1.03 | | 0.57 |
| Control Delay | | | | | | 15.2 | | 10.4 |
| LOS | | | | | | C | | B |
| Approach Delay | | | | | | | 12.7 | |
| Approach LOS | | | | | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St//Canal St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Canal Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 326 | | | 148 | |
| Peak-Hour Factor, PHF | | 0.90 | | | 0.90 | |
| Hourly Flow Rate, HFR | | 362 | | | 164 | |
| Percent Heavy Vehicles | | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | | | 1 | |
| Configuration | | T | | | T | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | 78 | | 30 |
| Peak Hour Factor, PHF | | | | 0.90 | | 0.90 |
| Hourly Flow Rate, HFR | | | | 86 | | 33 |
| Percent Heavy Vehicles | | | | 2 | | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | 1 | | 1 |
| Configuration | | | | L | | R |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | | | | | L | | R |
| v (vph) | | | | | | 86 | | 33 |
| C(m) (vph) | | | | | | 512 | | 881 |
| v/c | | | | | | 0.17 | | 0.04 |
| 95% queue length | | | | | | 0.60 | | 0.12 |
| Control Delay | | | | | | 13.4 | | 9.2 |
| LOS | | | | | | B | | A |
| Approach Delay | | | | | | | 12.3 | |
| Approach LOS | | | | | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St//Canal St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Canal Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 333 | | | 241 | |
| Peak-Hour Factor, PHF | | 0.90 | | | 0.90 | |
| Hourly Flow Rate, HFR | | 370 | | | 267 | |
| Percent Heavy Vehicles | | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | | | 1 | |
| Configuration | | T | | | T | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | | | | 85 | | 93 |
| Peak Hour Factor, PHF | | | | 0.90 | | 0.90 |
| Hourly Flow Rate, HFR | | | | 94 | | 103 |
| Percent Heavy Vehicles | | | | 2 | | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | / | | | / |
| Lanes | | | | 1 | | 1 |
| Configuration | | | | L | | R |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | | | | | L | | R |
| v (vph) | | | | | | 94 | | 103 |
| C(m) (vph) | | | | | | 441 | | 772 |
| v/c | | | | | | 0.21 | | 0.13 |
| 95% queue length | | | | | | 0.81 | | 0.46 |
| Control Delay | | | | | | 15.4 | | 10.4 |
| LOS | | | | | | C | | B |
| Approach Delay | | | | | | | 12.8 | |
| Approach LOS | | | | | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

## Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 166 | 33 | 61 | 162 | |
| Peak-Hour Factor, PHF | | 0.86 | 0.86 | 0.88 | 0.88 | |
| Hourly Flow Rate, HFR | | 193 | 38 | 69 | 184 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | | / | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 29 | | 70 | | | |
| Peak Hour Factor, PHF | 0.78 | | 0.78 | | | |
| Hourly Flow Rate, HFR | 37 | | 89 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

## Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 69 | | 126 | | | | |
| C(m) (vph) | | 1081 | | 481 | | | | |
| v/c | | 0.06 | | 0.26 | | | | |
| 95% queue length | | 0.20 | | 1.06 | | | | |
| Control Delay | | 8.6 | | 15.1 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | | | | 15.1 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 263 | 81 | 70 | 224 | |
| Peak-Hour Factor, PHF | | 0.86 | 0.86 | 0.85 | 0.85 | |
| Hourly Flow Rate, HFR | | 305 | 94 | 82 | 263 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | | TR | | LT | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 53 | | 51 | | | |
| Peak Hour Factor, PHF | 0.88 | | 0.88 | | | |
| Hourly Flow Rate, HFR | 60 | | 57 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 82 | | 117 | | | | |
| C(m) (vph) | | 919 | | 311 | | | | |
| v/c | | 0.09 | | 0.38 | | | | |
| 95% queue length | | 0.29 | | 1.78 | | | | |
| Control Delay | | 9.3 | | 23.5 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | | | | 23.5 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 232 | 111 | 50 | 118 | |
| Peak-Hour Factor, PHF | | 0.90 | 0.90 | 0.90 | 0.90 | |
| Hourly Flow Rate, HFR | | 257 | 123 | 55 | 131 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | | TR | | LT | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 109 | | 99 | | | |
| Peak Hour Factor, PHF | 0.90 | | 0.90 | | | |
| Hourly Flow Rate, HFR | 121 | | 110 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 55 | | 231 | | | | |
| C(m) (vph) | | 976 | | 417 | | | | |
| v/c | | 0.06 | | 0.55 | | | | |
| 95% queue length | | 0.18 | | 3.59 | | | | |
| Control Delay | | 8.9 | | 24.2 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | | | | 24.2 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 259 | 57 | 78 | 235 | |
| Peak-Hour Factor, PHF | | 0.83 | 0.83 | 0.86 | 0.86 | |
| Hourly Flow Rate, HFR | | 312 | 68 | 90 | 273 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 0 | | 0 1 | | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 45 | | 77 | | | |
| Peak Hour Factor, PHF | 0.76 | | 0.76 | | | |
| Hourly Flow Rate, HFR | 59 | | 101 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No / | | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 90 | | 160 | | | | |
| C(m) (vph) | | 954 | | 349 | | | | |
| v/c | | 0.09 | | 0.46 | | | | |
| 95% queue length | | 0.31 | | 2.47 | | | | |
| Control Delay | | 9.2 | | 24.0 | | | | |
| LOS | | A | | C | | | | |
| Approach Delay | | | | 24.0 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Wainee St/Prison Street
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Wainee Street
Intersection Orientation: EW Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 49 | 87 | 27 | 34 | 104 | 38 |
| Peak-Hour Factor, PHF | 0.87 | 0.87 | 0.87 | 0.70 | 0.70 | 0.70 |
| Hourly Flow Rate, HFR | 56 | 99 | 31 | 48 | 148 | 54 |
| Percent Heavy Vehicles | 2 | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 0 | | 0 | 1 0 | |
| Configuration | | LTR | | | LTR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 59 | 81 | 3 | 14 | 67 | 62 |
| Peak Hour Factor, PHF | 0.80 | 0.80 | 0.80 | 0.75 | 0.75 | 0.75 |
| Hourly Flow Rate, HFR | 73 | 101 | 3 | 18 | 89 | 82 |
| Percent Heavy Vehicles | 2 | 2 | 2 | 2 | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No / | | | No / | |
| Lanes | 0 | 1 0 | | 0 | 1 0 | |
| Configuration | | LTR | | | LTR | |

### Delay, Queue Length, and Level of Service

| Approach | EB | WB | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LTR | LTR | | LTR | | | LTR | |
| v (vph) | 56 | 48 | | 177 | | | 189 | |
| C(m) (vph) | 1370 | 1439 | | 507 | | | 698 | |
| v/c | 0.04 | 0.03 | | 0.35 | | | 0.27 | |
| 95% queue length | 0.13 | 0.10 | | 1.59 | | | 1.11 | |
| Control Delay | 7.7 | 7.6 | | 15.9 | | | 12.1 | |
| LOS | A | A | | C | | | B | |
| Approach Delay | | | | 15.9 | | | 12.1 | |
| Approach LOS | | | | C | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Wainee St/Prison Street
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Wainee Street
Intersection Orientation: EW Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 103 | 47 | 12 | 19 | 59 | 35 |
| Peak-Hour Factor, PHF | 0.88 | 0.88 | 0.88 | 0.83 | 0.83 | 0.83 |
| Hourly Flow Rate, HFR | 117 | 53 | 13 | 22 | 71 | 42 |
| Percent Heavy Vehicles | 2 | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 9 | 106 | 4 | 32 | 257 | 124 |
| Peak Hour Factor, PHF | 0.73 | 0.73 | 0.73 | 0.88 | 0.88 | 0.88 |
| Hourly Flow Rate, HFR | 12 | 145 | 5 | 36 | 292 | 140 |
| Percent Heavy Vehicles | 2 | 2 | 2 | 2 | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | No | / |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |

### Delay, Queue Length, and Level of Service

| Approach | EB | WB | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LTR | LTR | | LTR | | | LTR | |
| v (vph) | 117 | 22 | | 162 | | | 468 | |
| C(m) (vph) | 1476 | 1530 | | 543 | | | 696 | |
| v/c | 0.08 | 0.01 | | 0.30 | | | 0.67 | |
| 95% queue length | 0.26 | 0.04 | | 1.27 | | | 5.86 | |
| Control Delay | 7.6 | 7.4 | | 14.4 | | | 20.6 | |
| LOS | A | A | | B | | | C | |
| Approach Delay | | | | 14.4 | | | 20.6 | |
| Approach LOS | | | | B | | | C | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Wainee St/Prison Street
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Wainee Street
Intersection Orientation: EW Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 74 | 9 | 14 | 20 | 139 | 65 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 82 | 10 | 15 | 22 | 154 | 72 |
| Percent Heavy Vehicles | 2 | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 42 | 141 | 4 | 12 | 64 | 49 |
| Peak Hour Factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 46 | 156 | 4 | 13 | 71 | 54 |
| Percent Heavy Vehicles | 2 | 2 | 2 | 2 | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | No | / |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |

### Delay, Queue Length, and Level of Service

| Approach | EB | WB | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LTR | LTR | | LTR | | | LTR | |
| v (vph) | 82 | 22 | | 206 | | | 138 | |
| C(m) (vph) | 1338 | 1576 | | 657 | | | 809 | |
| v/c | 0.06 | 0.01 | | 0.31 | | | 0.17 | |
| 95% queue length | 0.20 | 0.04 | | 1.36 | | | 0.62 | |
| Control Delay | 7.9 | 7.3 | | 13.0 | | | 10.4 | |
| LOS | A | A | | B | | | B | |
| Approach Delay | | | | 13.0 | | | 10.4 | |
| Approach LOS | | | | B | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Wainee St/Prison Street
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Wainee Street
Intersection Orientation: EW Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 40 | 70 | 32 | 12 | 45 | 29 |
| Peak-Hour Factor, PHF | 0.77 | 0.77 | 0.77 | 0.83 | 0.83 | 0.83 |
| Hourly Flow Rate, HFR | 51 | 90 | 41 | 14 | 54 | 34 |
| Percent Heavy Vehicles | 2 | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 54 | 145 | 2 | 21 | 254 | 10 |
| Peak Hour Factor, PHF | 0.80 | 0.80 | 0.80 | 0.86 | 0.86 | 0.86 |
| Hourly Flow Rate, HFR | 67 | 181 | 2 | 24 | 295 | 11 |
| Percent Heavy Vehicles | 2 | 2 | 2 | 2 | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | No | / |
| Lanes | 0 | 1 | 0 | 0 | 1 | 0 |
| Configuration | | LTR | | | LTR | |

### Delay, Queue Length, and Level of Service

| Approach | EB | WB | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | LTR | LTR | | LTR | | | LTR | |
| v (vph) | 51 | 14 | | 250 | | | 330 | |
| C(m) (vph) | 1508 | 1454 | | 712 | | | 757 | |
| v/c | 0.03 | 0.01 | | 0.35 | | | 0.44 | |
| 95% queue length | 0.10 | 0.03 | | 1.61 | | | 2.29 | |
| Control Delay | 7.5 | 7.5 | | 12.8 | | | 13.4 | |
| LOS | A | A | | B | | | B | |
| Approach Delay | | | | 12.8 | | | 13.4 | |
| Approach LOS | | | | B | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Honoapiilani Hwy/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Honoapiilani Hwy
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 80 | 980 | 1 | | 807 | 76 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 88 | 1088 | 1 | | 896 | 84 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | 1 | 1 | 0 | | 1 | 0 |
| Configuration | L | | TR | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 1 | | 2 | 98 |
| Peak Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 0 | 0 | 1 | | 2 | 108 |
| Percent Heavy Vehicles | 2 | 2 | 2 | | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | No | / |
| Lanes | 0 | 1 | 0 | | 1 | 0 |
| Configuration | | LTR | | | TR | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | L | | | LTR | | | | TR |
| v (vph) | 88 | | | 1 | | | | 110 |
| C(m) (vph) | 704 | | | 446 | | | | 518 |
| v/c | 0.13 | | | 0.00 | | | | 0.21 |
| 95% queue length | 0.43 | | | 0.01 | | | | 0.81 |
| Control Delay | 10.8 | | | 13.1 | | | | 13.8 |
| LOS | B | | | B | | | | B |
| Approach Delay | | | | 13.1 | | | 13.8 | |
| Approach LOS | | | | B | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Honoapiilani Hwy/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Honoapiilani Hwy
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 59 | 1097 | 4 | | 1029 | 51 |
| Peak-Hour Factor, PHF | 0.93 | 0.93 | 0.93 | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 63 | 1179 | 4 | | 1143 | 56 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | 1 | 1 | 0 | | 1 | 0 |
| Configuration | L | | TR | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 2 | | 9 | 103 |
| Peak Hour Factor, PHF | 0.50 | 0.50 | 0.50 | | 0.80 | 0.80 |
| Hourly Flow Rate, HFR | 0 | 0 | 4 | | 11 | 128 |
| Percent Heavy Vehicles | 2 | 2 | 2 | | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | | No / |
| Lanes | 0 | 1 | 0 | | 1 | 0 |
| Configuration | | LTR | | | | TR |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | L | | | LTR | | | | TR |
| v (vph) | 63 | | | 4 | | | | 139 |
| C(m) (vph) | 582 | | | 400 | | | | 271 |
| v/c | 0.11 | | | 0.01 | | | | 0.51 |
| 95% queue length | 0.36 | | | 0.03 | | | | 3.02 |
| Control Delay | 11.9 | | | 14.1 | | | | 32.1 |
| LOS | B | | | B | | | | D |
| Approach Delay | | | | 14.1 | | | 32.1 | |
| Approach LOS | | | | B | | | D | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Honoapiilani Hwy/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Yera 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Honoapiilani Hwy
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 104 | 1097 | 0 | | 681 | 86 |
| Peak-Hour Factor, PHF | 0.95 | 0.95 | 0.95 | | 0.92 | 0.92 |
| Hourly Flow Rate, HFR | 109 | 1154 | 0 | | 740 | 93 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | 1 | 1 | 0 | | 1 | 0 |
| Configuration | L | | TR | | | TR |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 1 | | 1 | 22 |
| Peak Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.60 | 0.60 |
| Hourly Flow Rate, HFR | 0 | 0 | 1 | | 1 | 36 |
| Percent Heavy Vehicles | 2 | 2 | 2 | | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No | / | | | No / |
| Lanes | 0 | 1 | 0 | | 1 | 0 |
| Configuration | | LTR | | | | TR |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | L | | | LTR | | | | TR |
| v (vph) | 109 | | | 1 | | | | 37 |
| C(m) (vph) | 800 | | | 413 | | | | 602 |
| v/c | 0.14 | | | 0.00 | | | | 0.06 |
| 95% queue length | 0.47 | | | 0.01 | | | | 0.20 |
| Control Delay | 10.2 | | | 13.7 | | | | 11.4 |
| LOS | B | | | B | | | | B |
| Approach Delay | | | | 13.7 | | | 11.4 | |
| Approach LOS | | | | B | | | B | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Honoapiilani Hwy/Prison St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Prison Street
North/South Street: Honoapiilani Hwy
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | 30 | 1127 | 3 | | 1067 | 54 |
| Peak-Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.90 | 0.90 |
| Hourly Flow Rate, HFR | 33 | 1252 | 3 | | 1185 | 60 |
| Percent Heavy Vehicles | 2 | -- | -- | | -- | -- |
| Median Type/Storage | TWLTL | | / 1 | | | |
| RT Channelized? | | | | | | |
| Lanes | 1 | 1 0 | | | 1 0 | |
| Configuration | L | TR | | | TR | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 0 | 0 | 3 | | 2 | 101 |
| Peak Hour Factor, PHF | 0.90 | 0.90 | 0.90 | | 0.60 | 0.60 |
| Hourly Flow Rate, HFR | 0 | 0 | 3 | | 3 | 168 |
| Percent Heavy Vehicles | 2 | 2 | 2 | | 2 | 2 |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No / | | | No / | |
| Lanes | 0 | 1 0 | | | 1 0 | |
| Configuration | | LTR | | | TR | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | L | | | LTR | | | | TR |
| v (vph) | 33 | | | 3 | | | | 171 |
| C(m) (vph) | 559 | | | 367 | | | | 379 |
| v/c | 0.06 | | | 0.01 | | | | 0.45 |
| 95% queue length | 0.19 | | | 0.02 | | | | 2.41 |
| Control Delay | 11.8 | | | 14.9 | | | | 22.2 |
| LOS | B | | | B | | | | C |
| Approach Delay | | | | 14.9 | | | 22.2 | |
| Approach LOS | | | | B | | | C | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 211 | 55 | 56 | 274 | |
| Peak-Hour Factor, PHF | | 0.95 | 0.95 | 0.87 | 0.87 | |
| Hourly Flow Rate, HFR | | 222 | 57 | 64 | 314 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | Undivided | | / | | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 0 | | 0 1 | | |
| Configuration | | TR | | LT | | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 44 | | 33 | | | |
| Peak Hour Factor, PHF | 0.72 | | 0.72 | | | |
| Hourly Flow Rate, HFR | 61 | | 45 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | No / | | | / | |
| Lanes | 0 | 0 | | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 64 | | 106 | | | | |
| C(m) (vph) | | 873 | | 542 | | | | |
| v/c | | 0.07 | | 0.20 | | | | |
| 95% queue length | | 0.24 | | 0.73 | | | | |
| Control Delay | | 9.4 | | 13.3 | | | | |
| LOS | | A | | B | | | | |
| Approach Delay | | | | 13.3 | | | | |
| Approach LOS | | | | B | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 296 | 49 | 62 | 357 | |
| Peak-Hour Factor, PHF | | 0.92 | 0.92 | 0.90 | 0.90 | |
| Hourly Flow Rate, HFR | | 321 | 53 | 68 | 396 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | | TR | | LT | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 58 | | 39 | | | |
| Peak Hour Factor, PHF | 0.75 | | 0.75 | | | |
| Hourly Flow Rate, HFR | 77 | | 52 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 68 | | 129 | | | | |
| C(m) (vph) | | 504 | | 359 | | | | |
| v/c | | 0.13 | | 0.36 | | | | |
| 95% queue length | | 0.47 | | 1.66 | | | | |
| Control Delay | | 13.3 | | 20.6 | | | | |
| LOS | | B | | C | | | | |
| Approach Delay | | | | 20.6 | | | | |
| Approach LOS | | | | C | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: AM Peak Period
Intersection: Front St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 273 | 36 | 20 | 248 | |
| Peak-Hour Factor, PHF | | 0.80 | 0.80 | 0.74 | 0.74 | |
| Hourly Flow Rate, HFR | | 341 | 44 | 27 | 335 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | | TR | | LT | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 26 | | 33 | | | |
| Peak Hour Factor, PHF | 0.85 | | 0.85 | | | |
| Hourly Flow Rate, HFR | 30 | | 38 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 27 | | 68 | | | | |
| C(m) (vph) | | 889 | | 685 | | | | |
| v/c | | 0.03 | | 0.10 | | | | |
| 95% queue length | | 0.09 | | 0.33 | | | | |
| Control Delay | | 9.2 | | 10.8 | | | | |
| LOS | | A | | B | | | | |
| Approach Delay | | | | 10.8 | | | | |
| Approach LOS | | | | B | | | | |

HCS+: Unsignalized Intersections Release 5.2

## TWO-WAY STOP CONTROL SUMMARY

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/3/2006
Analysis Time Period: PM Peak Period
Intersection: Front St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Front Street
Intersection Orientation: NS Study period (hrs): 1.00

### Vehicle Volumes and Adjustments

| Major Street: Approach | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| Movement | 1 | 2 | 3 | 4 | 5 | 6 |
| | L | T | R | L | T | R |
| Volume | | 292 | 57 | 80 | 361 | |
| Peak-Hour Factor, PHF | | 0.88 | 0.88 | 0.97 | 0.97 | |
| Hourly Flow Rate, HFR | | 331 | 64 | 82 | 372 | |
| Percent Heavy Vehicles | | -- | -- | 2 | -- | -- |
| Median Type/Storage | TWLTL | | | / 1 | | |
| RT Channelized? | | | | | | |
| Lanes | | 1 | 0 | 0 | 1 | |
| Configuration | | | TR | | LT | |
| Upstream Signal? | | No | | | No | |

| Minor Street: Approach | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|
| Movement | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | T | R | L | T | R |
| Volume | 58 | | 45 | | | |
| Peak Hour Factor, PHF | 0.95 | | 0.95 | | | |
| Hourly Flow Rate, HFR | 61 | | 47 | | | |
| Percent Heavy Vehicles | 2 | | 2 | | | |
| Percent Grade (%) | | 0 | | | 0 | |
| Flared Approach: Exists?/Storage | | | No / | | | / |
| Lanes | 0 | | 0 | | | |
| Configuration | | LR | | | | |

### Delay, Queue Length, and Level of Service

| Approach | NB | SB | Westbound | | | Eastbound | | |
|---|---|---|---|---|---|---|---|---|
| Movement | 1 | 4 | 7 | 8 | 9 | 10 | 11 | 12 |
| Lane Config | | LT | | LR | | | | |
| v (vph) | | 82 | | 108 | | | | |
| C(m) (vph) | | 776 | | 495 | | | | |
| v/c | | 0.11 | | 0.22 | | | | |
| 95% queue length | | 0.35 | | 0.83 | | | | |
| Control Delay | | 10.2 | | 14.3 | | | | |
| LOS | | B | | B | | | | |
| Approach Delay | | | | 14.3 | | | | |
| Approach LOS | | | | B | | | | |

HCS+: Unsignalized Intersections Release 5.2

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## ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Wainee St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Wainee St

### Worksheet 2 - Volume Adjustments and Site Characteristics

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Volume | 38 | 55 | 22 | 48 | 70 | 26 | 15 | 147 | 21 | 8 | 116 | 48 |
| % Thrus Left Lane | | | | | | | | | | | | |

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 0.79 | | 0.82 | | 0.86 | | 0.76 | |
| Flow Rate | 144 | | 174 | | 211 | | 225 | |
| % Heavy Veh | 2 | | 2 | | 2 | | 2 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Opposing-Lanes | 1 | | 1 | | 1 | | 1 | |
| Conflicting-lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry group | 1 | | 1 | | 1 | | 1 | |

Duration, T 1.00 hrs.

### Worksheet 3 - Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rates: | | | | | | | | |
| Total in Lane | 144 | | 174 | | 211 | | 225 | |
| Left-Turn | 48 | | 58 | | 17 | | 10 | |
| Right-Turn | 27 | | 31 | | 24 | | 63 | |
| Prop. Left-Turns | 0.3 | | 0.3 | | 0.1 | | 0.0 | |
| Prop. Right-Turns | 0.2 | | 0.2 | | 0.1 | | 0.3 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Adjustments Exhibit 17-33: | | | | | | | | |
| hLT-adj | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| hRT-adj | -0.6 | | -0.6 | | -0.6 | | -0.6 | |
| hHV-adj | 1.7 | | 1.7 | | 1.7 | | 1.7 | |
| hadj, computed | -0.0 | | -0.0 | | -0.0 | | -0.1 | |

## Worksheet 4 - Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow rate | 144 | | 174 | | 211 | | 225 | |
| hd, initial value | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 |
| x, initial | 0.13 | | 0.15 | | 0.19 | | 0.20 | |
| hd, final value | 5.31 | | 5.26 | | 5.09 | | 4.97 | |
| x, final value | 0.21 | | 0.25 | | 0.30 | | 0.31 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 3.3 | | 3.3 | | 3.1 | | 3.0 | |

## Worksheet 5 - Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rate | 144 | | 174 | | 211 | | 225 | |
| Service Time | 3.3 | | 3.3 | | 3.1 | | 3.0 | |
| Utilization, x | 0.21 | | 0.25 | | 0.30 | | 0.31 | |
| Dep. headway, hd | 5.31 | | 5.26 | | 5.09 | | 4.97 | |
| Capacity | 394 | | 424 | | 461 | | 475 | |
| Delay | 9.74 | | 10.06 | | 10.24 | | 10.20 | |
| LOS | A | | B | | B | | B | |
| Approach: | | | | | | | | |
| Delay | 9.74 | | 10.06 | | 10.24 | | 10.20 | |
| LOS | A | | B | | B | | B | |

Intersection Delay 10.09 Intersection LOS B

HCS+: Unsignalized Intersections Release 5.2

## ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Wainee St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010 w/project (Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Wainee St

## Worksheet 2 - Volume Adjustments and Site Characteristics

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Volume | 62 | 77 | 28 | 140 | 83 | 7 | 15 | 234 | 44 | 18 | 254 | 53 |

% Thrus Left Lane

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 0.81 | | 0.83 | | 0.96 | | 0.87 | |
| Flow Rate | 205 | | 276 | | 303 | | 371 | |
| % Heavy Veh | 2 | | 2 | | 2 | | 2 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Opposing-Lanes | 1 | | 1 | | 1 | | 1 | |
| Conflicting-lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry group | 1 | | 1 | | 1 | | 1 | |

Duration, T 1.00 hrs.

## Worksheet 3 - Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rates: | | | | | | | | |
| Total in Lane | 205 | | 276 | | 303 | | 371 | |
| Left-Turn | 76 | | 168 | | 15 | | 20 | |
| Right-Turn | 34 | | 8 | | 45 | | 60 | |
| Prop. Left-Turns | 0.4 | | 0.6 | | 0.0 | | 0.1 | |
| Prop. Right-Turns | 0.2 | | 0.0 | | 0.1 | | 0.2 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Adjustments Exhibit 17-33: | | | | | | | | |
| hLT-adj | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| hRT-adj | -0.6 | | -0.6 | | -0.6 | | -0.6 | |
| hHV-adj | 1.7 | | 1.7 | | 1.7 | | 1.7 | |
| hadj, computed | 0.0 | | 0.1 | | -0.0 | | -0.1 | |

## Worksheet 4 - Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow rate | 205 | | 276 | | 303 | | 371 | |
| hd, initial value | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 |
| x, initial | 0.18 | | 0.25 | | 0.27 | | 0.33 | |
| hd, final value | 6.85 | | 6.76 | | 6.40 | | 6.24 | |
| x, final value | 0.39 | | 0.52 | | 0.54 | | 0.64 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 4.8 | | 4.8 | | 4.4 | | 4.2 | |

## Worksheet 5 - Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rate | 205 | | 276 | | 303 | | 371 | |
| Service Time | 4.8 | | 4.8 | | 4.4 | | 4.2 | |
| Utilization, x | 0.39 | | 0.52 | | 0.54 | | 0.64 | |
| Dep. headway, hd | 6.85 | | 6.76 | | 6.40 | | 6.24 | |
| Capacity | 451 | | 482 | | 516 | | 543 | |
| Delay | 14.21 | | 16.99 | | 16.81 | | 20.32 | |
| LOS | B | | C | | C | | C | |
| Approach: | | | | | | | | |
| Delay | 14.21 | | 16.99 | | 16.81 | | 20.32 | |
| LOS | B | | C | | C | | C | |

Intersection Delay 17.52 Intersection LOS C



## ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: AM Peak Period
Intersection: Wainee St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Wainee St

## Worksheet 2 - Volume Adjustments and Site Characteristics

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Volume | 20 | 43 | 11 | 38 | 38 | 2 | 11 | 142 | 47 | 10 | 93 | 23 |

% Thrus Left Lane

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 0.68 | | 0.98 | | 0.78 | | 0.81 | |
| Flow Rate | 108 | | 78 | | 256 | | 154 | |
| % Heavy Veh | 2 | | 2 | | 2 | | 2 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Opposing-Lanes | 1 | | 1 | | 1 | | 1 | |
| Conflicting-lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry group | 1 | | 1 | | 1 | | 1 | |

Duration, T 1.00 hrs.

## Worksheet 3 - Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rates: | | | | | | | | |
| Total in Lane | 108 | | 78 | | 256 | | 154 | |
| Left-Turn | 29 | | 38 | | 14 | | 12 | |
| Right-Turn | 16 | | 2 | | 60 | | 28 | |
| Prop. Left-Turns | 0.3 | | 0.5 | | 0.1 | | 0.1 | |
| Prop. Right-Turns | 0.1 | | 0.0 | | 0.2 | | 0.2 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Adjustments Exhibit 17-33: | | | | | | | | |
| hLT-adj | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| hRT-adj | -0.6 | | -0.6 | | -0.6 | | -0.6 | |
| hHV-adj | 1.7 | | 1.7 | | 1.7 | | 1.7 | |
| hadj, computed | -0.0 | | 0.1 | | -0.1 | | -0.1 | |

## Worksheet 4 - Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow rate | 108 | | 78 | | 256 | | 154 | |
| hd, initial value | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 |
| x, initial | 0.10 | | 0.07 | | 0.23 | | 0.14 | |
| hd, final value | 4.98 | | 5.15 | | 4.49 | | 4.64 | |
| x, final value | 0.15 | | 0.11 | | 0.32 | | 0.20 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 3.0 | | 3.1 | | 2.5 | | 2.6 | |

## Worksheet 5 - Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rate | 108 | | 78 | | 256 | | 154 | |
| Service Time | 3.0 | | 3.1 | | 2.5 | | 2.6 | |
| Utilization, x | 0.15 | | 0.11 | | 0.32 | | 0.20 | |
| Dep. headway, hd | 4.98 | | 5.15 | | 4.49 | | 4.64 | |
| Capacity | 358 | | 328 | | 506 | | 404 | |
| Delay | 8.86 | | 8.79 | | 9.59 | | 8.79 | |
| LOS | A | | A | | A | | A | |
| Approach: | | | | | | | | |
| Delay | 8.86 | | 8.79 | | 9.59 | | 8.79 | |
| LOS | A | | A | | A | | A | |

Intersection Delay 9.15 Intersection LOS A

HCS+: Unsignalized Intersections Release 5.2

## ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: KT
Agency/Co.: WOC
Date Performed: 4/4/2006
Analysis Time Period: PM Peak Period
Intersection: Wainee St/Dickenson St
Jurisdiction: Lahaina, Maui
Units: U. S. Customary
Analysis Year: Year 2010w/proj (Non Boat Day)
Project ID: Lahaina Small Boat Harbor
East/West Street: Dickenson Street
North/South Street: Wainee St

## Worksheet 2 - Volume Adjustments and Site Characteristics

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| Volume | 63 | 74 | 19 | 100 | 81 | 20 | 24 | 236 | 38 | 21 | 250 | 81 |

% Thrus Left Lane

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Configuration | LTR | | LTR | | LTR | | LTR | |
| PHF | 0.85 | | 0.91 | | 0.92 | | 0.90 | |
| Flow Rate | 183 | | 219 | | 323 | | 390 | |
| % Heavy Veh | 2 | | 2 | | 2 | | 2 | |
| No. Lanes | 1 | | 1 | | 1 | | 1 | |
| Opposing-Lanes | 1 | | 1 | | 1 | | 1 | |
| Conflicting-lanes | 1 | | 1 | | 1 | | 1 | |
| Geometry group | 1 | | 1 | | 1 | | 1 | |

Duration, T 1.00 hrs.

## Worksheet 3 - Saturation Headway Adjustment Worksheet

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rates: | | | | | | | | |
| Total in Lane | 183 | | 219 | | 323 | | 390 | |
| Left-Turn | 74 | | 109 | | 26 | | 23 | |
| Right-Turn | 22 | | 21 | | 41 | | 90 | |
| Prop. Left-Turns | 0.4 | | 0.5 | | 0.1 | | 0.1 | |
| Prop. Right-Turns | 0.1 | | 0.1 | | 0.1 | | 0.2 | |
| Prop. Heavy Vehicle | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| Geometry Group | 1 | | 1 | | 1 | | 1 | |
| Adjustments Exhibit 17-33: | | | | | | | | |
| hLT-adj | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| hRT-adj | -0.6 | | -0.6 | | -0.6 | | -0.6 | |
| hHV-adj | 1.7 | | 1.7 | | 1.7 | | 1.7 | |
| hadj, computed | 0.0 | | 0.1 | | -0.0 | | -0.1 | |

## Worksheet 4 - Departure Headway and Service Time

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow rate | 183 | | 219 | | 323 | | 390 | |
| hd, initial value | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 | 3.20 |
| x, initial | 0.16 | | 0.19 | | 0.29 | | 0.35 | |
| hd, final value | 6.67 | | 6.60 | | 6.03 | | 5.85 | |
| x, final value | 0.34 | | 0.40 | | 0.54 | | 0.63 | |
| Move-up time, m | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Service Time | 4.7 | | 4.6 | | 4.0 | | 3.8 | |

## Worksheet 5 - Capacity and Level of Service

| | Eastbound | | Westbound | | Northbound | | Southbound | |
|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L1 | L2 | L1 | L2 | L1 | L2 |
| Flow Rate | 183 | | 219 | | 323 | | 390 | |
| Service Time | 4.7 | | 4.6 | | 4.0 | | 3.8 | |
| Utilization, x | 0.34 | | 0.40 | | 0.54 | | 0.63 | |
| Dep. headway, hd | 6.67 | | 6.60 | | 6.03 | | 5.85 | |
| Capacity | 433 | | 469 | | 556 | | 584 | |
| Delay | 13.08 | | 14.01 | | 16.10 | | 18.81 | |
| LOS | B | | B | | C | | C | |
| Approach: | | | | | | | | |
| Delay | 13.08 | | 14.01 | | 16.10 | | 18.81 | |
| LOS | B | | B | | C | | C | |

Intersection Delay 16.14 Intersection LOS C

HCS+: Signalized Intersections Release 5.2

Analyst: KT
Agency: WOC
Date: 4/4/2006
Period: AM Peak Period
Project ID: Lahaina Small Boat Harbor
E/W St: Dickenson Street

Inter.: Honoapiilani Hwy/Dickenson St
Area Type: All other areas
Jurisd: Lahaina, Maui
Year : Year 2010 w/project (Boat Day)
N/S St: Honoapiilani Hwy

## SIGNALIZED INTERSECTION SUMMARY

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| LGConfig | | LTR | | | LTR | | L | TR | | L | TR | |
| Volume | 38 | 23 | 23 | 31 | 13 | 26 | 40 | 893 | 44 | 12 | 824 | 91 |
| Lane Width | | 12.0 | | | 12.0 | | 12.0 | 12.0 | | 12.0 | 12.0 | |
| RTOR Vol | | | 2 | | | 3 | | | 4 | | | 9 |

Duration 0.25 Area Type: All other areas

## Signal Operations

| Phase Combination | 1 | 2 | 3 | 4 | | | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| EB Left | A | | | | NB | Left | A | | | |
| Thru | A | | | | | Thru | | A | | |
| Right | A | | | | | Right | | A | | |
| Peds | | | | | | Peds | | | | |
| WB Left | A | | | | SB | Left | A | | | |
| Thru | A | | | | | Thru | | A | | |
| Right | A | | | | | Right | | A | | |
| Peds | | | | | | Peds | | | | |
| NB Right | | | | | EB | Right | | | | |
| SB Right | | | | | WB | Right | | | | |
| Green | 24.0 | | | | | | 21.5 | 74.5 | | |
| Yellow | 4.0 | | | | | | 4.0 | 4.0 | | |
| All Red | 1.0 | | | | | | 1.0 | 1.0 | | |

Cycle Length: 135.0 secs

## Intersection Performance Summary

| Appr/ Lane Grp | Lane Group Capacity | Adj Sat Flow Rate (s) | Ratios v/c | Ratios g/C | Lane Group Delay | Lane Group LOS | Approach Delay | Approach LOS |
|---|---|---|---|---|---|---|---|---|
| Eastbound | | | | | | | | |
| LTR | 270 | 1520 | 0.34 | 0.18 | 49.3 | D | 49.3 | D |
| Westbound | | | | | | | | |
| LTR | 268 | 1509 | 0.28 | 0.18 | 48.6 | D | 48.6 | D |
| Northbound | | | | | | | | |
| L | 297 | 1863 | 0.15 | 0.16 | 49.1 | D | | |
| TR | 1075 | 1948 | 0.96 | 0.55 | 48.2 | D | 48.2 | D |
| Southbound | | | | | | | | |
| L | 297 | 1863 | 0.04 | 0.16 | 48.1 | D | | |
| TR | 2032 | 3683 | 0.50 | 0.55 | 18.9 | B | 19.2 | B |

Intersection Delay = 35.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.2

Analyst: KT
Agency: WOC
Date: 4/4/2006
Period: PM Peak Period
Project ID: Lahaina Small Boat Harbor
E/W St: Dickenson Street

Inter.: Honoapiilani Hwy/Dickenson St
Area Type: All other areas
Jurisd: Lahaina, Maui
Year : Year 2010 w/project (Boat Day)
N/S St: Honoapiilani Hwy

SIGNALIZED INTERSECTION SUMMARY

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| LGConfig | | LTR | | | LTR | | L | TR | | L | TR | |
| Volume | 59 | 31 | 27 | 34 | 21 | 26 | 28 | 1043 | 57 | 11 | 1031 | 185 |
| Lane Width | | 12.0 | | | 12.0 | | 12.0 | 12.0 | | 12.0 | 12.0 | |
| RTOR Vol | | | 3 | | | 3 | | | 6 | | | 19 |

Duration 1.00 Area Type: All other areas

Signal Operations

| Phase Combination | 1 | 2 | 3 | 4 | | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| EB Left | A | | | | NB Left | A | | | |
| Thru | A | | | | Thru | | A | | |
| Right | A | | | | Right | | A | | |
| Peds | | | | | Peds | | | | |
| WB Left | A | | | | SB Left | A | | | |
| Thru | A | | | | Thru | | A | | |
| Right | A | | | | Right | | A | | |
| Peds | | | | | Peds | | | | |
| NB Right | | | | | EB Right | | | | |
| SB Right | | | | | WB Right | | | | |
| Green | 27.0 | | | | | 11.0 | 82.0 | | |
| Yellow | 4.0 | | | | | 4.0 | 4.0 | | |
| All Red | 1.0 | | | | | 1.0 | 1.0 | | |

Cycle Length: 135.0 secs

Intersection Performance Summary

| Appr/ Lane Grp | Lane Group Capacity | Adj Sat Flow Rate (s) | Ratios v/c | Ratios g/C | Lane Group Delay | Lane Group LOS | Approach Delay | Approach LOS |
|---|---|---|---|---|---|---|---|---|
| Eastbound | | | | | | | | |
| LTR | 279 | 1394 | 0.72 | 0.20 | 59.4 | E | 59.4 | E |
| Westbound | | | | | | | | |
| LTR | 280 | 1401 | 0.34 | 0.20 | 47.1 | D | 47.1 | D |
| Northbound | | | | | | | | |
| L | 152 | 1863 | 0.19 | 0.08 | 58.5 | E | | |
| TR | 1183 | 1947 | 0.97 | 0.61 | 57.7 | E | 57.7 | E |
| Southbound | | | | | | | | |
| L | 152 | 1863 | 0.08 | 0.08 | 57.5 | E | | |
| TR | 2220 | 3655 | 0.61 | 0.61 | 16.9 | B | 17.3 | B |

Intersection Delay = 38.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.2

Analyst: KT
Agency: WOC
Date: 4/4/2006
Period: AM Peak Period
Project ID: Lahaina Small Boat Harbor
E/W St: Dickenson Street

Inter.: Honoapiilani Hwy/Dickenson St
Area Type: All other areas
Jurisd: Lahaina, Maui
Year : Year 2010w/proj (Non Boat Day)
N/S St: Honoapiilani Hwy

SIGNALIZED INTERSECTION SUMMARY

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| LGConfig | | LTR | | | LTR | | L | TR | | L | TR | |
| Volume | 40 | 28 | 11 | 27 | 19 | 37 | 17 | 1024 | 51 | 13 | 686 | 124 |
| Lane Width | | 12.0 | | | 12.0 | | 12.0 | 12.0 | | 12.0 | 12.0 | |
| RTOR Vol | | | 1 | | | 4 | | | 5 | | | 12 |

Duration 1.00 Area Type: All other areas

Signal Operations

| Phase Combination | 1 | 2 | 3 | 4 | | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| EB Left | A | | | | NB Left | A | | | |
| Thru | A | | | | Thru | | A | | |
| Right | A | | | | Right | | A | | |
| Peds | | | | | Peds | | | | |
| WB Left | A | | | | SB Left | A | | | |
| Thru | A | | | | Thru | | A | | |
| Right | A | | | | Right | | A | | |
| Peds | | | | | Peds | | | | |
| NB Right | | | | | EB Right | | | | |
| SB Right | | | | | WB Right | | | | |
| Green | 24.0 | | | | | 16.5 | 79.5 | | |
| Yellow | 4.0 | | | | | 4.0 | 4.0 | | |
| All Red | 1.0 | | | | | 1.0 | 1.0 | | |

Cycle Length: 135.0 secs

Intersection Performance Summary

| Appr/ Lane Grp | Lane Group Capacity | Adj Sat Flow Rate (s) | Ratios v/c | Ratios g/C | Lane Group Delay | Lane Group LOS | Approach Delay | Approach LOS |
|---|---|---|---|---|---|---|---|---|
| Eastbound | | | | | | | | |
| LTR | 247 | 1389 | 0.51 | 0.18 | 52.0 | D | 52.0 | D |
| Westbound | | | | | | | | |
| LTR | 270 | 1519 | 0.37 | 0.18 | 49.7 | D | 49.7 | D |
| Northbound | | | | | | | | |
| L | 228 | 1863 | 0.08 | 0.12 | 52.7 | D | | |
| TR | 1147 | 1948 | 0.96 | 0.59 | 53.0 | D | 53.0 | D |
| Southbound | | | | | | | | |
| L | 228 | 1863 | 0.06 | 0.12 | 52.5 | D | | |
| TR | 2152 | 3655 | 0.40 | 0.59 | 15.1 | B | 15.7 | B |

Intersection Delay = 38.0 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.2

Analyst: KT
Agency: WOC
Date: 4/4/2006
Period: PM Peak Period
Project ID: Lahaina Small Boat Harbor
E/W St: Dickenson Street

Inter.: Honoapiilani Hwy/Dickenson St
Area Type: All other areas
Jurisd: Lahaina, Maui
Year : Year 2010 w/proj(Non Boat Day)
N/S St: Honoapiilani Hwy

SIGNALIZED INTERSECTION SUMMARY

| | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | R | L | T | R | L | T | R | L | T | R |
| No. Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| LGConfig | | LTR | | | LTR | | L | TR | | L | TR | |
| Volume | 57 | 44 | 33 | 51 | 42 | 17 | 24 | 1023 | 80 | 15 | 1036 | 99 |
| Lane Width | | 12.0 | | | 12.0 | | 12.0 | 12.0 | | 12.0 | 12.0 | |
| RTOR Vol | | | 3 | | | 2 | | | 8 | | | 10 |

Duration 1.00 Area Type: All other areas

Signal Operations

| Phase Combination | 1 | 2 | 3 | 4 | | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| EB Left | A | | | | NB Left | A | | | |
| Thru | A | | | | Thru | | A | | |
| Right | A | | | | Right | | A | | |
| Peds | | | | | Peds | | | | |
| WB Left | A | | | | SB Left | A | | | |
| Thru | A | | | | Thru | | A | | |
| Right | A | | | | Right | | A | | |
| Peds | | | | | Peds | | | | |
| NB Right | | | | | EB Right | | | | |
| SB Right | | | | | WB Right | | | | |
| Green | 26.0 | | | | | 12.5 | 81.5 | | |
| Yellow | 4.0 | | | | | 4.0 | 4.0 | | |
| All Red | 1.0 | | | | | 1.0 | 1.0 | | |

Cycle Length: 135.0 secs

Intersection Performance Summary

| Appr/ Lane Grp | Lane Group Capacity | Adj Sat Flow Rate (s) | Ratios v/c | Ratios g/C | Lane Group Delay | Lane Group LOS | Approach Delay | Approach LOS |
|---|---|---|---|---|---|---|---|---|
| Eastbound | | | | | | | | |
| LTR | 264 | 1370 | 0.67 | 0.19 | 57.2 | E | 57.2 | E |
| Westbound | | | | | | | | |
| LTR | 252 | 1307 | 0.56 | 0.19 | 52.3 | D | 52.3 | D |
| Northbound | | | | | | | | |
| L | 172 | 1863 | 0.15 | 0.09 | 56.7 | E | | |
| TR | 1172 | 1941 | 0.97 | 0.60 | 58.0 | E | 58.0 | E |
| Southbound | | | | | | | | |
| L | 172 | 1863 | 0.10 | 0.09 | 56.3 | E | | |
| TR | 2227 | 3689 | 0.57 | 0.60 | 16.5 | B | 17.0 | B |

Intersection Delay = 38.7 (sec/veh) Intersection LOS = D

# APPENDIX G.

# Site Location Alternatives Capital Costs Summary

**Lahaina SBH Ferry Pier Improvements Quantity Takeoff and Cost Estimate**

Prepared by: E. Yuasa, Engineering Division

Date: August 24, 2005

**Quantity Take-off:**

New concrete pier and walkway structures

Concrete walkway approximately 60 feet X 16 feet wide (960 SF)
Support piles: Assume 12 piles (based on concept plan dated 12-27-04)

Concrete Pier approximately 115 feet X 35 feet wide (4,025 SF)
Support piles: Assume 88 piles (based on concept plan dated 12-27-04)

Dredging of entrance channel and turning basin approximately 2,500 CY

Covered Waiting Area: 25' X 100' = 2,500 SF

Administrative Office: 15' X 35' = 525 SF

**Cost Estimate:**

| Item | Quantity | Unit Cost | Total |
|---|---|---|---|
| Mobilization and demobilization | LS | | 300,000 |
| Demolition existing pier structure | 740 SF | 50 | 37,000 |
| Dredging turning basin and entrance channel | 2,500 CY | 100 | 250,000 |
| | | | |
| Concrete walkway and pier: | | | |
| Concrete piles | 100 Each | 20,000 | 2,000,000 |
| Concrete walkway | 960 SF | 300 | 288,000 |
| Concrete pier | 4,025 SF | 350 | 1,408,750 |
| | | | |
| Sewer pump out | 2 Each | 5,000 | 10,000 |
| 3.5 hp grinder sewer pump station | LS | 25,000 | 25,000 |
| Force main from pump out to pump station | 300 LF | 60 | 18,000 |
| Sewer lateral from pump station to County sewer system | 200 LF | 120 | 24,000 |
| Sewer manholes | 2 Each | 7,000 | 14,000 |
| | | | |
| 3" Waterline | 200 | 120 | 24,000 |
| Fire hydrants | 2 | 5,000 | 10,000 |
| 3/4" Waterline and hose bibs | 70 | 80 | 5,600 |
| | | | |
| Relocate fire system cabinet | LS | | 3,000 |

| Item | Quantity | Unit Cost | Total |
|---|---|---|---|
| Drainage system | LS | | 30,000 |
| Electrical upgrades | LS | | 250,000 |
| | | | |
| Ferry terminal building | 2,500 SF | 200 | 500,000 |
| New ferry office | 100 SF | 250 | 25,000 |
| Administrative office | 525 SF | 500 | 262,500 |
| Surfer access | LS | | 30,000 |
| | | | |
| Vehicle and pedestrian traffic improvements | LS | | 245,650 |
| | | | |
| Construction contingency (10%) | | | 576,050 |
| | | | |
| Planning work | LS | | 600,000 |
| Design work | LS | | 600,000 |
| Construction management | LS | | 576,050 |
| Staff services | LS | | 150,000 |
| Archaeological monitoring | LS | | 30,000 |
| | | | |
| Total | | | 8,292,600 |

**Mala Wharf Quantity Takeoff and Cost Estimate**

Quantity Take-off:

New concrete pier and walkway structures

Concrete walkway approximately 392 feet X 16 feet wide (6,272 SF)
Support piles: Assume pair of piles located every 10 feet, 392 feet divided by 10 feet O.C. = 39 piles X 2 = 78 piles

Concrete Pier approximately 110 feet X 35 feet wide (3,850 SF)
Support piles: Assume 4 piles located every 10 feet, 110 feet divided by 10 feet O.C. = 11 piles X 4 = 44 piles

Dredging of entrance channel and turning basin approximately 2,500 CY

North Parking lot: 277' X 120' = 33,240 SF
South Parking lot: 120' X 100' = 12,000 SF
Total 45,240 SF or 838 CY
Assume 6" concrete pavement and 6" basecourse

Existing parking lot: 250' X 100' + 100' X 52' = 30,200 SF

Cost Estimate

| Item | Quantity | Unit Cost | Total |
|---|---|---|---|
| Demolition of existing wharf structure and dredging: | | | |
| Mobilization and demobilization | LS | | 300,000 |
| Demolition | 34,900 SF | 30 | 1,047,000 |
| Dredging turning basin and entrance channel | 2,500 CY | 100 | 250,000 |
| | | | 0 |
| Concrete walkway and pier: | | | 0 |
| Concrete piles | 122 Each | 20,000 | 2,440,000 |
| Concrete walkway | 6,272 SF | 300 | 1,881,600 |
| Concrete pier | 3,850 SF | 350 | 1,347,500 |
| | | | 0 |
| Sewer pump out | LS | | 30,000 |
| Sewer pump station | LS | 31,000 | 31,000 |
| Force main from pump out to pump station | 600 LF | 60 | 36,000 |
| Sewer lateral from pump station to County sewer system | 1,000 LF | 80 | 80,000 |
| Sewer manholes | 3 Each | 7,000 | 21,000 |
| | | | 0 |
| New parking lots (North and South) | 838 CY | 280 | 234,640 |
| Repave existing parking lot | 30,200 SF | 10 | 302,000 |

| Item | Quantity | Unit Cost | Total |
|---|---|---|---|
| Roadway entrance improvements | LS | | 200,000 |
| 8" Waterline | 1,500 | 150 | 225,000 |
| Fire hydrants | 3 | 5,000 | 15,000 |
| Electrical upgrades | LS | | 250,000 |
| Ferry terminal building | 1,000 SF | 500 | 500,000 |
| Construction contingency (10%) | | | 910,000 |
| | | | 0 |
| Planning work | LS | | 600,000 |
| Design work | LS | | 900,000 |
| Construction management | LS | | 900,000 |
| Staff services | LS | | 150,000 |
| Archaeological monitoring | LS | | 30,000 |
| | | | |
| Total | | | 12,680,740 |

**Kekaa Point Quantity Takeoff and Cost Estimate**

Quantity Take-off:

New concrete pier

Concrete Pier approximately 110 feet X 35 feet wide (3,850 SF)
Support piles: Assume 4 piles located every 10 feet, 110 feet divided by 10 feet O.C. = 11 piles X 4 = 44 piles

Dredging of entrance channel and turning basin approximately 2,500 CY

Road side parking: 400' X 20' = 8,000 SF
Access road: 1,000' X 24' = 24,000 SF
Cul-de-sac: 65' x 65' X 3.14 = 13,273 SF
Concrete walkways: 550' X 10' = 5,500 SF
Total 50,773 SF or 940 CY
Assume 6" concrete pavement and 6" basecourse

New Parking garage: 340' X 92' = 31,280 SF

New Breakwater: 550' X 12'

Cost Estimate

| Item | Quantity | Unit Cost | Total |
|---|---|---|---|
| Demolition of existing pier structure and dredging: | | | |
| Mobilization and demobilization | LS | | 300,000 |
| Demolition | LS | | 250,000 |
| Dredging turning basin and entrance channel | 2,500 CY | 100 | 250,000 |
| North breakwater | 550' | 5,000 | 2,750,000 |
| Concrete piles | 44 Each | 20,000 | 880,000 |
| Concrete pier | 3,850 SF | 350 | 1,347,500 |
| | | | |
| Sewer pump out | LS | | 30,000 |
| Sewer pump station | LS | 31,000 | 31,000 |
| Force main from pump out to pump station | 600 LF | 60 | 36,000 |
| Sewer lateral from pump station to private sewer system | 1,000 LF | 80 | 80,000 |
| Sewer manholes | 3 Each | 7,000 | 21,000 |
| | | | |
| New parking, roadway and walkways (6" conc. on 6" basecourse) | 940 CY | 280 | 263,200 |
| Roadway entrance improvements | LS | | 200,000 |
| 8" Waterline | 1,500 | 150 | 225,000 |

| Item | Quantity | Unit Cost | Total |
|---|---|---|---|
| Fire hydrants | 3 | 5,000 | 15,000 |
| Electrical upgrades | LS | | 250,000 |
| Ferry terminal building | 1,400 SF | 250 | 350,000 |
| Parking garage | LS | | 2,000,000 |
| New bridge over drainage canal | LS | | 250,000 |
| Construction contingency (10%) | | | 953,000 |
| | | | |
| Planning work | LS | | 1,200,000 |
| Design work | LS | | 1,000,000 |
| Construction management | LS | | 930,000 |
| Staff services | LS | | 150,000 |
| Archaeological monitoring | LS | | 30,000 |
| | | | |
| Land acquisition and easements | LS | | 5,000,000 |
| Total | | | 18,791,700 |

# APPENDIX H.

# Mala Wharf Marine Species List

Attachment 1.

| MALA WHARF | 5-Jul-05 | TIME: 10:20-11:03 |
|---|---|---|
| FAMILY | FISH NAME | Fork Length (cm.) |
| Pomacentridae | Abudefduf abdominalis | 3-10 |
| Pomacentridae | Abudefduf sordidus | 15 |
| Pomacentridae | Abudefduf vaigiensis | 5 |
| Acanthuridae | Acanthurus achilles | 13 |
| Acanthuridae | Acanthurus dussumieri | 36 |
| Acanthuridae | Acanthurus leucoparieus | 13-20 |
| Acanthuridae | Acanthurus nigrofuscus | 10-13 |
| Acanthuridae | Acanthurus olivaceus | 20 |
| Tetraodontidae | Arothron meleagris | 15-36 |
| Atherinidae | Atherinomorus insularum | 5-6 |
| Aulostomidae | Aulostomus chinensis | 30 |
| Scaridae | Calotomus carolinus | 40-50 |
| Carangidae | Caranx melampygus | 20 |
| Serranidae | Cephalopholis argus | 61+ |
| Chaetodontidae | Chaetodon auriga | 13 |
| Chaetodontidae | Chaetodon lunula | 10 |
| Chaetodontidae | Chaetodon lunulatus | 10 |
| Chaetodontidae | Chaetodon miliaris | 3-5 |
| Chaetodontidae | Chaetodon ornatissimus | 15-18 |
| Chaetodontidae | Chaetodon quadrimaculatus | 10 |
| Pomacentridae | Chromis ovalis | 8 |
| Pomacentridae | Chromis vanderbilti | <3 |
| Pomacentridae | Dascyllus albisella | 5 |
| Carangidae | Decapterus macarellus | 20 |
| Fistulariidae | Fistularia commersonii | 100-120 |
| Chaetodontidae | Forcipiger flavissimus | 13-15 |
| Labridae | Gomphosus varius | 15 |
| Labridae | Halichoeres ornatissimus | 15-18 |
| Lutjanidae | Lutjanus fulvus | 15 |
| Balistidae | Melichthys niger | 20 |
| Mullidae | Mulloidichthys flavolineatus | 30 |
| Mullidae | Mulloidichthys vanicolensis | 25-30 |
| Acanthuridae | Naso brevirostris | 25 |
| Acanthuridae | Naso lituratus | 18 |
| Acanthuridae | Naso unicornis | 30-41 |
| Cirrhitidae | Paracirrhites fosteri | 13 |
| Mullidae | Parupeneus bifasciatus | 20 |
| Mullidae | Parupeneus cyclostomus | 13 |
| Mullidae | Parupeneus multifasciatus | 18-20 |
| Mullidae | Parupeneus porphyreus | 3-15 |
| Belonidae | Platybelone argalus | 25-36 |
| Balistidae | Rhinecanthus rectangulus | 18-20 |
| Scaridae | Scarus psittacus | 25 |
| Pomacentridae | Stegastes fasciolatus | 5-10 |
| Labridae | Stethojulis balteata | 3-13 |
| Labridae | Thalassoma duperrey | 5-13 |
| Labridae | Thalassoma trilobatum | 15 |
| Mullidae | Upeneus arge | 25 |
| Zanclidae | Zanclus cornutus | 13 |

# APPENDIX H-1.

# Keka`a Marine Species List

Attachment 2.

| Keka'a (Ka'anapali) | 5-Jul-05 | TIME: 12:30-13:10 |
|---|---|---|
| **FAMILY** | **FISH NAME** | **Fork Length (cm.)** |
| Pomacentridae | Abudefduf abdominalis | 8 |
| Pomacentridae | Abudefduf sordidus | 10 |
| Pomacentridae | Abudefduf vaigiensis | 3-8 |
| Acanthuridae | Acanthurus achilles | 15 |
| Acanthuridae | Acanthurus leucoparieus | 10-15 |
| Acanthuridae | Acanthurus nigrofuscus | 10-15 |
| Acanthuridae | Acanthurus triostegus | 5-13 |
| Labridae | Anapses cuvier | 3-18 |
| Scaridae | Calotomus carolinus | 46-51 |
| Carangidae | Caranx melampygus | 15 |
| Chaetodontidae | Chaetodon fremblii | 5 |
| Chaetodontidae | Chaetodon multicinctus | 10 |
| Pomacentridae | Chromis hanui | 3 |
| Pomacentridae | Chromis ovalis | 10 |
| Pomacentridae | Chromis vanderbilti | <3 |
| Cirrhitidae | Cirrhitus pinnulatus | 10 |
| Acanthuridae | Ctenochaetus strigosus | 10 |
| Labridae | Halichoeres ornatissimus | 10-15 |
| Mullidae | Mulloidichthys flavolineatus | 15-25 |
| Acanthuridae | Naso unicornis | 30 |
| Ostraciidae | Ostracion meleagris | 10 |
| Mullidae | Parupeneus multifasciatus | 15 |
| Mullidae | Parupeneus porphyreus | 13 |
| Pomacentridae | Plectroglyphidodon johnstonia | 3 |
| Balistidae | Rhinecanthus rectangulus | 18 |
| Pomacentridae | Stegastes fasciolatus | 8 |
| Labridae | Stethojulis balteata | 13 |
| Labridae | Thalassoma duperrey | 13-15 |
| Labridae | Thalassoma trilobatum | 10 |
| Zanclidae | Zanclus cornutus | 13 |
| Acanthuridae | Zebrasoma flavescens | 15-18 |

# APPENDIX I.

# Lahaina Small Boat Harbor Ferry Pier and Comfort Station Improvements Stakeholders Meeting, April 8, 2004

LAHAINA SMALL BOAT HARBOR FERRY PIER AND COMFORT STATION PROJECT

STAKEHOLDER MEETING

ORIGINAL

Held at Lahainaluna Intermediate School, Lahaina, Maui, Hawaii, commencing at 7:00 p.m. on April 8, 2004.

REPORTED BY: LYNANN NICELY, RPR/RMR/CSR #354





MR. THOMPSON: Okay. We're going to go ahead and get started. My name is Steve Thompson, I'm the acting administrator for the Department of Land and Natural Resources, Division of Boating and Ocean Recreation. We're here tonight to talk about a proposed project to make some improvements to the Lahaina Harbor, specifically an additional new proposed pier for the ferries and a significant improvement to the comfort station.

First I would like to introduce a couple of honored guests from our legislative branch. We have Council Member Joanne Johnson. Thank you for coming, appreciate you taking the time. Leslie Couch is representing Representative Brian Blundell.

MS. COUCH: And I have a message from Representative Blundell to let you know that he will remain -- even though he couldn't be here tonight, he is going to remain very much involved in the whole process.

MR. THOMPSON: I know he's been in communication with our office already about it. And I believe Donald Couch is here representing Mayor Arakawa. Okay. Thank you. And Kyle Ginoza, the director of the Maui County Department of Transportation.

We have Mr. Eric Yuasa, he's the project engineer from DLNR. He's the person that knows the most about this project. And we have a consultant team of Steve Wong and Jong Namgung from Mitsunaga & Associates. And we have Mike Munekiyo and Glenn Tadaki.

On behalf of the chairperson of the Department of Land and Natural Resources, Peter Young, we would like to thank you for taking time off from your busy schedules to come tonight and to meet with us and to be a part of the planning team. We're here tonight to hear from everyone and to try to be sure that all of your concerns and comments are taken into consideration as this planning for this project continues. Like I said earlier, it is for a ferry pier and a comfort station.

We need to emphasize that this project is in the planning phase and that we do not at any time have any design or construction money. So we right now have an appropriation pending at the legislature for just the comfort station, but we have federal monies available with the appropriate state match for the ferry pier and the comfort station. So there is actually two ways we may be able to fund an improvement to the comfort station and using the ferry





monies, a way to create a new ferry pier. So we have to seek that federal funding after the planning phase. And the federal funding will also help pay for the planning.

You're going to see conceptual plans tonight and they by no means are finalized. They're very preliminary and part of why we're here tonight is to find out what you like or don't like, what we did right or what we did wrong, so that you can help us make this plan fit the community. Later on you'll have an opportunity to provide us your comments and we would like you to do that very freely. We do have a reporter here to take down your notes so that we won't miss them and we can refer back to them later.

The existing pier down at the harbor is used by both recreational and commercial boats, cruise ship tenders, and ferries. Today is "boat day" and on boat day we all know it's one of the busiest harbor if not the busiest harbor in the state. Lots of congestion, lots of activities.

We have both of the ferry operators represented here tonight and I think they will tell you that there have been times where they have been unable to load or unload their passengers in a timely manner because of the amount of activity at the

harbor.

We have a lot of different activities all going on in that one little spot. We have the fueling station, we have the sewage pump out, we've got the surfers, we've got the cruisers, the recreational guys, we've got the commercial operators, and we have the ferries, and on certain days like today we have the cruise ship operators. So there is clearly a lot going on in that limited space.

Also, the existing bathroom or comfort station is inadequate and in disrepair and does not meet American with Disability Act guidelines and we are required to make them come within compliance with the ADA.

The existing comfort station is 15 feet by 25 feet and approximately 375 square feet. It has two sinks, two toilets, and two urinals on the men's side; two sinks and three toilets on the women's side. The proposal that you see tonight can only accommodate the local community but also the increased activity due to the ferries, would make the women's side have nine toilets and the men's side have six stalls and three urinals.

The federal funding that is available is from the Federal Transit Administration. They have





actually -- were here in the past and are very favorable in terms of considering authorizing federal funds for this project. They have also recently travelled in the last couple of weeks with us to the island of Lanai, looking at what the improvements could be made there, and they're also considering improvements to Kaunakakai.

Federal Transit Administration -- the acronym is FTA. So if you hear FTA tonight, those are the federal folks that have the grant money. The ratio is 4 to 1, so the state puts in -- for every dollar the state puts in, the federals will match it with four. The state's share is from an Appropriation Act 259, session laws 2001. We've got all kinds of complicated stuff in here. But it provides $20,000 for the comfort station on the state side.

After the planning, we would apply for the money from the FTA for design and construction. FTA has already earmarked $25 million to support ferry operations in Hawaii: $5 million in fiscal year 2003, $10 million in fiscal year 2004, and another $10 million in fiscal year 2005. That's quite a bit of money and something that we wouldn't want to pass by. The federal folks told us that if the State of Hawaii doesn't make use of it, Alaska is chomping at the bit

for it.

Some of the money in Hawaii is actually going to improve the ferries that take people out to the Arizona Memorial. It's unrelated to the DLNR, but it is part of that federal appropriation.

Now I would like to turn it over to Eric Yuasa, who is a design engineer with the Department of Land and Natural Resources and he can actually tell you about some of the guts of the program. And then after the engineers and the consultants are done explaining things, we'll give you guys an opportunity to comment back with us. Thank you.

MR. YUASA: Thank you, Steve. Again, my name is Eric Yuasa and I'm the project manager for this project.

Right now we want to emphasize that we're in the planning phase only. And again, there is no design or construction money available for the project. But what we do is we hope to seek I guess Federal Transit Administration funding after the planning phase is completed.

Right now the planning phase consists of preparation of conceptual plans, the environmental impact statement, and the necessary permits for the project. Some of the permits include the Special





Management Area Use Permit, the Shoreline Setback Variance Approval, Historic District Approval Application, Conservation District Use Application, Department of Army Permit, Water Quality Certification, and a Coastal Zone Management Consistency Certification.

Okay. Right now we're up against a real stringent deadline in order to qualify for the FTA funding. We need to complete the planning phase by April 2005. So right now we have basically one year to complete an EIS in order to qualify for the $10 million in Federal Transit Administration funding that becomes available October 1st, 2005.

Right now I would like to introduce Steve Wong from Mitsunaga & Associates. Mitsunaga & Associates are our consultant for the planning phase portion. And he would like to I guess go over some of the conceptual plans that he's come up with. And these conceptual plans are based on I guess watching the operations at the pier on the peak boat days and talking to I guess some of the harbor agents and people I guess that use some of the commercial pier -- commercial and recreational pier.

MR. WONG: I'm Steve Wong, I'm the architect on this project for Mitsunaga & Associates. We do

have a structural engineer here.

I'm going to show you again some very conceptual planning plans. It's just -- it's my idea, looking at Lahaina and that, but you know as the community, I consider this like a mini-charette. Architects like to do that, they like to hold these mini design charettes and actually get your -- you know, when you're designing a house, to get your ideas on this. So this is just a starting point. It's only on paper. Not nothing is set. We'd like to hear your comments. You could tell us go jump in the lake or whatever, but we'll show you some -- I have two schemes. If you have any questions, please feel free to bring up the question.

Sheet 1. Okay. This is a plan view. What this shows is this is highlighting a -- this is the existing pier right now. And the Carthaginian is on this side. The existing pier. What this plan shows is the new pier and a small multi-purpose pier. There are no impacts to the land. What we're doing is we're having a gangway after that new pier out to this multi-purpose pier. And it's a small pier, it's 15 feet wide by 90 feet long. It's like a floating dock. I guess what it can be used here is maybe a historical canoe or a surfer access for this pier. This is not





the ferry pier.

This is the ferry pier and we'll go to that now. Okay. This is just scheme 1. This is just a simple ferry pier, but it's 48 feet wide by 146 feet long. So it's about the same -- about the same length as the existing pier.

You see these boats here. This is an accessible ramp coming down. This is scheme 1. We have a more -- we have a more elaborate scheme which we'll show now. Based on other agencies and, you know, other requirements. This is like a two-story scheme. This is the first floor where the ferry would dock. Passenger arrival area. There is a second floor, administrative office, rest room, concession space.

What I tried to do here conceptually is to be aware of the cultural and the rich history of Lahaina Town, the design, and it's a similar design to Pioneer Inn. You can tell by the French doors, the double pitched roof, the gable. The materials used is like the roughsawn lumber, that kind of thing. The colors of Lahaina. There is an elevator for handicap accessibility. Janitor closet. Public restrooms on the second floor. There is a complete walking deck around it. Stairways down. Exits. So that's the

more elaborate scheme, the two-story scheme.

And lastly, this is the new comfort station. What is envisioned is actually deleting the old comfort station and actually building a new one, a bigger comfort station with more water closets. As you can see, the women have a lot of water closets, lavs, and a men's side. And it's a similar design, the double-pitched roof.

This is like a site plan. And a few more parking stalls for accessibility. It will be all completely accessible once we get into the design. More green space around it.

VOICE: Where is the existing rock wall?

MR. WONG: It's kind of -- you mean on the ocean side?

VOICE: And the side as well. Where the coconut trees are.

MR. WONG: We have an existing plan, so --

MR. YUASA: We have a court reporter, so we would ask if you could come up and identify yourself if you have any questions.

MR. COUCH: I'm Don Couch, asking for the mayor. Where is the existing rock wall for the comfort station? What are you going to have to take down as far as trees and rock walls?





MR. WONG: We're trying to put it in the same envelope as -- same envelope as the existing, and then come out, come out towards the, what you call it, the Kaanapali side. So it will be kind of the same envelope. Hopefully we don't have to demolish any rock walls. It's like on the same footprint and then come out this way. So it won't touch that rock wall.

So basically that's what -- as the archite actually most of the pier is like a structural job. What I've been retained to do is try to add a few more architectural features into the plan so it fits into the environment. And what we would like -- we would appreciate your comments. And that's it.

MS. COUCH: Thank you. Leslie Couch for Representative Blundell.

How much dredging do you anticipate doing for this?

MR. WONG: How much dredging will be required to construct this facility?

MR. NAMGUNG: Unfortunately, we cannot tel you the quantity of the dredging. Right now the survey is going on. We saw the map, this harbor map area, area map, about 15 years old. We have 10 years old, 20 years old survey maps that are 10 feet different ocean bottom. So every time they have

hurricane, they're putting in the sand, after that push out. So we don't know what is condition right now. So we can tell you based on after I finish the survey.

MS. COUCH: And how many boats at this particular point do you think will be able to fit into the piers as far as how many ferries, how many tenders? Can two ferry boats fit into there at the same time?

MR. NAMGUNG: There is one -- one boat can stay. So this one here. And there is one more this side. And possibly one more other side. This is the new ferry pier we're proposing. So two or three.

MS. COUCH: And the Carthaginian would be on the other side of the multipurpose pier?

MR. THOMPSON: Yeah, I want to try to make that a little clearer. This is the existing pier. This is the proposed new ferry pier. And this pier here is proposed to accommodate the replacement vessel for the Carthaginian. And this is now the accessway to the Carthaginian. I know when I saw this drawing, I assumed that this would be gone, okay. So this would be an existing operator and you could put one on either side.

The issue of -- your question about dredging,





we believe that the original dredge includes the area of this pier. It may not extend out this far. And so one of the ways to mitigate having to dredge or how much you have to dredge is to make that a floating pier rather than a fixed pier. But then there is another concern with how much coverage it would get -- they don't have it on the drawing -- how much coverage or protection it would get from the breakwater out here. So you may have to have piles positioned fairly closely to accommodate a floating dock without protection.

Part of what I know I wanted to hear tonight or at least get a sense of is the community's concern or support or lack of support for trying to take care of this need.

So that we can get the notes, we would like you to come up so everyone can hear and then identify yourself so the reporter can get it.

MR. MOORE: Thank you. My name is Tom Moore and I have a boat down on the harbor since 1970 now and I've matched the first Carthaginian go up, I've matched the cruise ships arrive, and I have to say I'm dismayed this is even happening.

The Carthaginian to be stuck out on a little finger pier out here is just ridiculous. To suggest

that dredging is not necessary is ridiculous. The Carthaginian breaks loose on its existing situation on a relatively stable platform. What's happening is that the cruise ships are moving in and shoving what we know as Lahaina out, plain and simple. And a little finger pier to support the Carthaginian will shove it back in the corner is just outrageous. I can't believe that this is even going on. And not to mention logistics, like just getting -- I live a couple blocks down from here. This is what you're creating here already with existing situation. It's log jam. You're bringing two more piers. Where is everybody going to park? Where are all the taxis going to go? And not to be too facetious, let's get rid of the Pioneer Inn, it's in the way. Need parking for the cruise -- you're turning Lahaina into a cruise ship terminal.

And I have been in other parts of the world like St. Thomas, they call it Charlotte Amalya. The locals call it Toilet Amalya because of the cruise ships. And the argument is that we need the economy, the tourist economy. This isn't going to aid Lahaina's tourist economy; it's going to destroy it. Thank you.

MR. THOMPSON: Thank you for your comments. I





do want to make very clear, though, that the funding source for this improvement cannot be tied to a cruise ship; it can only be tied to the ferries. So what we are looking at from our perspective right now is not any increase in activity, but simply a way to try to resolve some of the density or the user conflict all occurring at the one facility.

MR. MOORE: How can you say that?

MR. THOMPSON: If you'll let me finish. I'll answer whatever question you have.

MR. MOORE: It's not a question; it's a statement.

MR. THOMPSON: The pier would be paid for with federal funds earmarked specifically for ferries. It's a way to make an improvement to the facility at a 1-to-4 match, so we get a pretty good bang for our buck.

Everyone uses the bathroom. The bathroom is also a part of that project. I think that's a win-win. Your concerns are why we're here tonight Especially the security of whatever the replacement boat is for the Carthaginian. I have been told -- I don't know if it's factual or not -- that it may be like a double hulled canoe like the Hokalea. But I know when I saw this, I was concerned about its

protection, just I think like you're commenting. But our plan is not a way to bring in more cruise ships. I know that's a concern.

MR. MOORE: What is it for? You're turning it into a cruise ship terminal.

MR. THOMPSON: No, it's a way to -- it's like putting another lane on the road so that the traffic isn't --

MR. MOORE: Let the cruise ships build their own harbor like they do elsewhere. Believe me, boys and girls, it's going to ruin Lahaina.

MR. THOMPSON: I saw another hand. Yes, Greg. Can you come up and identify yourself, please?

MR. HOLLIS: Good evening, my name is Greg Hollis. I represent the Ocean Tourism Coalition. And hearing what Tom is talking about, there is some concerns. I agree I think some dredging is going to have to take place, but I'm not so sure that that's a bad thing. We've been needing some dredging for a long time in the harbors and this may be an opportunity to get some of it.

But I would like to see that extended further into the harbor. We have an existing problem with boat turn arounds and things like that. By adding another pier, while I'm in support of a ferry





terminal, I think we've seem with the ferries going to Molokai are getting bigger, the ferries going to Lanai are getting bigger, I think that's a positive thing, it's better utilization for the residents on both Lanai and Molokai, for the services these two ferries are providing, and we do need to accommodate a place that they can land. And the existing pier is not sufficient to accommodate that and the existing ha[illegible] users.

But there is some other things that need to be done in conjunction with this so that we don't create a huge bottleneck right at the entrance of the harbor. One of the things that I would like to see added to this plan is to pave the existing break wall and make that so it's an accessible area so that you can better utilize the back row slips, those from, say, 45 to 99, and in that process when you are dredging the harbor, dredge the harbor such that say from slips 22 all the way around to 99 can be moved out against the break wall. You've got anywhere from 15 to 30 feet of wasted space that's currently where a catwalk is. You move the boats back. You don't necessarily increase the usage or anything else, you just give a little bit more berth inside the harbor for turning and accommodating the existing users. When you're in

there dredging, take all of that into account at one time.

You also need to look at your ADA accessibility in the harbor and to the backside of the harbor as well. Currently I know that our finger piers and things like that are not ADA accessible and when we're doing any new projects, I think we need to give some prudence to that. I strongly support the ferry pier because I believe those are some things if I heard correctly are going to be addressed at that time. But you can't just focus on that one section because that's the bottleneck of our harbor. And you do a lot of build out and improvements in that one area and you don't take into account the rest of the harbor, you're going to have everything funneling down and more congestion created right in the worst possible place. Thank you.

MR. THOMPSON: Thank you. Come on up.

MR. BAUGHMAN: Hi, my name is Kevin Baughman and I support this new ferry pier as well, especially with the addition of the floating pier. Since Carthaginian is going to be removed, that would probably be a better accommodation for a double canoe and stuff like that.

Going back to the comfort station a little





bit, one of the things I didn't hear mentioned was showers. Right now you've got a lot of commercial activity. There is a lot of repairs that go on at nighttime and stuff. And people have to dive in the harbor sometimes to do underwear repairs and checks on vessels, things like that. It would be really nice if you could somehow include some showers with even maybe warm water, welcome to the 21st century, so that t. people that are regular harbor users have access to those facilities.

I like what you're doing and I think it needs to happen and I also support Greg's ideas about pushing the catwalks out to the edge and surfacing those break waters that are out there now. Thank you.

MR. THOMPSON: In Kona storms don't the waves come over the breakwater? If you put them all the way back, wouldn't they be impacted by that surge?

MR. HOLLIS : We're impacted by the surge anyway.

MR. THOMPSON: Please, we would like to he. from each of you if you have something to say. That's why we're here tonight, so that we can learn from you. Let's let this man go first.

MR. FOLEY: I'm Mike Foley, the Maui County planning director.

The first question I have is the location of the restrooms. Is it proposed -- are the restrooms proposed to be where the existing restrooms are?

MR. THOMPSON: Yes, they are, but it's bigger and it would extend -- it's my understanding it will extent a little bit in the direction of the Pioneer Inn. And we understand that that does enter into some county property and we've had some preliminary discussions with the county on that.

MR. FOLEY: Well, my first reaction is that you're talking about two additional piers with a lot of additional boats and the restrooms couldn't be further away. If you're going to build restrooms, you need to build them where the people are. The restrooms now are a long ways from the existing pier and they would be even further from the two new piers.

Our primary concern is going to be related to the impact on the historical resources and how much additional, you know, pedestrian traffic and vehicular traffic will be generated. There is certain no parking for the ferry passengers and you're talking about no restrooms for them either -- unless you build the building. And I think -- I'm just guessing, but I think there will be a lot of people very concerned about building a building out over the water in an





area that's very scenic. I'm not commenting on the architectural design of the building itself; I'm just wondering whether that's a good place for a building.

But my initial reaction is that the restrooms need to be by the additional facilities, not way down at the other end of the harbor.

MR. THOMPSON: We too have contemplated that and we have some cultural and historical concerns here. I mean, this would be the logical place. I think due to that, that's why the first design or the first conceptual drawing had them here actually on the ferry pier. This pier is proposed at this time -- and of course it's subject to change -- but to be built in the manner of the current pier. But again, our plan is not to be increasing activity. Our plan is to just make safer and more orderly the existing amount of activity.

Someone else with a comment? Yes, sir.

MR. FREELAND: My name is Keoki Freeland, I'm the executive director of the Lahaina Restoration Foundation.

First of all, I would like to say that the Lahaina Restoration Foundation is for the proper expansion and increased capacity to the Lahaina Harbor, but we do have some concerns in this plan

here. I would like to share some of that with you.

First of all, this project does fall within the Maui County Historic District Number 1; therefore, this project should be put forth through the cultural resource commission for review and approval. And I think you folks have already said that. But also, this project falls within the boundaries of the Lahaina National Historic Landmark. And since federal funds will be used, the National Trust for Historic Preservation should also be included in the permit process. Under the National Restoration Act of 1966, this body reviews all projects where federal funds are used that may have an impact on a national historic landmark. So this needs to go in front of them for review as well.

Now, we are concerned because, you know, we've had the Carthaginian in there for a long time, about building two new piers and I'm going to term it like in harm's way without much protection from high surf. Depending on which way the waves are coming -- Carthaginian is here right now -- the harbor sometimes has no protection at all to the Carthaginian. For instance, if the waves are coming in this direction, okay, that ship breaks lines like crazy and we're trying to keep it in place. Now you're talking about





moving it even farther away from the harbor, this pier here as well as a cultural type vessel out there that's going to be even more in harm's way.

Now, also you said you're not too sure how the dredging is going to work. However, because we've had so much trouble with the Carthaginian over here, I've stood out here on this pier and watched what's happening every time we have some high surf. You a reef out here that goes all the way to Mala Wharf. And when the waves are pouring in, virtually everything inside the reef, the tide is higher outside the ocean. The tide wants to go back out, but it cannot because the waves are coming in. So it finds a low spot. And where is that? It's the entrance to the harbor. The water comes rushing down in this direction, bumps against the hull of the Carthaginian, and roars out that way.

Now, if you're going to dredge over here, you're going to -- this is what you need to do to try and work out. If you don't have any protection ou here, how are you going to keep this thing from filling up with sand again real quick? Or is it going to continue to erode away and affect the historical sites? That's what we would like for you to take a look at.

Now, as far as the design of the comfort station, it looks pretty good to me. But location, like Mr. Foley says, is a problem. But I don't see where else you can put it.

Now, I understood that there was going to be kind of like a staging area for the people coming off of the boats. Is that what's going to be on the pier or is it another facility altogether?

MR. THOMPSON: The only staging area that I'm aware of in this stage and this idea is right here on the pier itself.

MR. FREELAND: Thank you, that answers my questions.

MR. THOMPSON: Thank you. Who's next? Please, we would like to hear from all of you.

MS. LINDSEY: My name is Mary Helen Lindsey, I'm also with the Lahaina Restoration Foundation. And as you just heard, restoration foundation, we're here to preserve what we have. Now, how many feet away are we from the birthing stone?

MR. THOMPSON: Eric, you know that.

MS. LINDSEY: So the question is how many feet. I can see it on paper. But I can't tell you -- can you tell me?

MR. YUASA: About 60, 75 feet. Maybe eighty





feet.

MS. LINDSEY: Where is the floating pier? And here's the birthing stone? No, I'm talking about the ones you folks are projecting. I don't care about the main pier; what I care is what the projection you folks are bringing to us.

MR. THOMPSON: Here's the concern, the distance from here to the birthing stone.

MR. YUASA: Right now it's 60 feet, so I guess it would be another 60 feet. But keep in mind that this distance from the pier to the shore is about 35 feet. So we're not touching the land side. We're not making a land side ramp. We're connecting off of the new ferry pier. We're making a walkway to the floating pier.

MS. LINDSEY: All right, now, because that's very important in our history and we would not like to see -- any dredging should go on, it may do something to it. And if the walls are -- if we do have high surf and stuff, if the walls, because we have those objects in the water it's going to make it turn, just like when you have sand and whatever you dredge out is going to come. Whether it's going to build or take away -- I think it will do both, it depends on how bad our surf has been.

Then I heard you say that you're going to have a place for the surfers. You know, we heard that a long time ago and it was never done. And if you can just keep in mind -- I'm going to go with what I have. Why is the bathroom connected to us having that? If we don't have what you have projected here, does that mean the bathroom is going to sit aside?

MR. THOMPSON: Not necessarily.

MS. LINDSEY: We went through all of this about our bathroom and we thought the funding was going to be allocated. Evidently it has not been, correct?

MR. THOMPSON: Actually the need for the bathroom has been so well documented, we are right now approaching obtaining the funding to do the bathroom on two separate completely different tracks. One is in the state legislature right now with an appropriation and another would be with the federal ferry monies. It's kind of like it would be a very good thing if they both came through. It would be clearly in our best interests to use the federal money because of the match. But if that didn't -- that fell out or we couldn't get all the permits in the amount of time that are required for the federal job and the state appropriation is approved, we'll know that





within another month, we intend to build the comfort station.

Now, how big it is, exactly where it is, that's why we're here tonight. But clearly there is a need for a new bathroom.

MS. LINDSEY: And that's true. So what I have just heard from you is that it was -- it's through the state legislature right now and is going for fundi is that correct?

MR. THOMPSON: Yes. And it's also under consideration separately as a part of this ferry project. And I believe that if for some reason the pier fell through, we could still be able to do the bathroom as a part of the ferry project because it would still service the ferry passengers.

MS. LINDSEY: Okay. I would like a definition of what is a ferry and what is a tender, and is that going to be used also for a tender.

MR. THOMPSON: Okay. A tender is the boat that's shuttling passengers to and from the cruise ships. The ferry is a vessel that is used to take people from island to island or within different harbors within the island, so it's not going to another ship offshore.

The ferry money is tied to a ferry to the

exclusion of a cruise ship. But the pier -- and correct me if I am wrong, Eric -- once it's constructed, is not for the exclusive use of a ferry, but it can't be -- it can't be only for a cruise ship. I can tell you -- I know the man in the back has a strong concern. We're not trying to sneak in another cruise ship tender here. We're trying to accommodate an already overcrowded situation, making use of an opportunity of some grant money to do it. That's what's really going on here.

MS. LINDSEY: All right. I've heard what you just said. Now, you have to get an environmental impact statement; is that correct?

MR. THOMPSON: Yes.

MS. LINDSEY: I heard that.

MR. THOMPSON: There was a whole litany of permits that were required.

MS. LINDSEY: So do you have Army Corp of Engineers doing this?

MR. THOMPSON: They would be included in the permitting process.

MS. LINDSEY: And you foresee the time limit as a fast track or is this going to be a slow moving thing?

MR. THOMPSON: The Army Corps would not be the





primary agency. And it's my understanding we have to reach a certain point in that process in order to qualify for the funding, but with the understanding that all of those permits may not have been captured or approved or issued by then.

MS. LINDSEY: I realize that the Lanai and the Molokai is having a whole lot of problems because of its tender uses and because of the sharing of the boats that come in for whale watch and for those fishing boats and for a fueling and all of that. And I feel very, very supportive of the Molokai and Lanai, but I don't know how to do it. I do not. I am truly not in favor of what's going to happen because I'm afraid of our birthing stone, the hanau stone, and open space, which we will not -- the whole harbor will no long better -- there will be no open space. And also the surf will change. You dredge. Dredging will change the whole place. And before -- I can understand you wanting to put in that design because that used to be -- you went back to where the Queen Palace -- I mean where it was, is that right, Keoki? Kamehameha. So I see you're putting that design there. But again, open space. We need open space. We don't need to have more clutter. And that's my concern. You're going to get an environmental impact

statement, that's great, because you will hear both sides and I think the other -- the negative side will come out stronger. Thank you.

MR. THOMPSON: Thank you. If you picture this ferry pier without this building on it, that may be a way to mitigate your concern about open space. Okay. Who can we hear from now? Mr. John.

MR. JOHN: My name is Dave John, I represent the Molokai Ferry. And this is the first time I've seen any of this. We've already heard some pretty strong objections and I think they're well founded. The harbor obviously is over used. The ferries have been pushed in on the existing users of the harbor. And they have tolerated the ferries, just barely. But our facilities are dramatically overburdened.

In looking at this, I would just make a couple suggestions. They're just suggestions. We only have one creator in this world, but we all have -- we have millions and millions of critics. So let me just make a suggestion. I'm not a creator. I would strongly suggest not tying in anything to our rock wall there. I would make this a very simple finger pier that can be used on both sides. I would move this whole mess in as tight as you can, giving as much space to our birthing stone as possible.





I would keep your piers as simple as possible, only driving a couple piles, whether it's a fixed pier on a pile or a floating pier. If you just had a couple piles, you would minimize concerns of erosion, changes to our current patterns, changes to our surfing patterns. I think we've all seen the Carthaginian sitting here -- absolutely we have times of high surf, the water roars out the harbor. You will even see the buoy s being drug underwater as the surge is racing out the channel, which makes the little turning area here very hazardous because you have a lot of current sometimes three or four knots.

But in a nutshell, I would keep a pier out from here. I wouldn't tie into the existing park area. And I would just have a couple -- one very simple finger pier. I don't think you want a great big wide pier there. I think you want a very simple pier.

As far as the comfort station, I'm really concerned about that because we can't even maintai. the existing tiny little facility we have which is in the absolute wrong place. I think we should leave that facility there, but I would -- if I can see that one more time, I would really recommend that we remove the harbor agent office as it is, we build a two-story

structure much like Maalaea has where the harbor agents would be upstairs and have better view of what's going on, and just put the restrooms underneath and put it right here. Now, the harbor agents already have restrooms. It would be a wonderful thing if we could expand those restrooms and let the general public use it. Because most of the passenger use is here, especially when you start dealing with older people and people with disabilities, having them try to walk all the way down the harbor and use the other facility is pretty tough. The other facility is adequate for the existing boat owners. But when you start having a lot of tourists there, and tourism is just going to increase, I would strongly recommend having the restroom facilities where the people are. I think it just makes sense.

Although nobody wants to see a two-story anything, I think kind of like a harbor office like the control tower type mentality could fit in.

And then we have the other great big issue. You've got piers, you've got places for all the boats, but where do people park, where do people offload, where do the buses park. That's really doesn't have anything to do with the water end, but it's all part of the whole thing.





But in a nutshell, keep your improvements to the water to a minimum, minimum impact, you'll have much better community support. And granted, these areas can be tough to use when we have periods of high surf, but we always don't have high surf. So if you get 90 percent utilization, it's better than nothing. So those are my comments. And I have to go drive a boat here in about 10 minutes, so I'll let the next person carry on.

MR. THOMPSON: Thank you. Anybody else?

MS. NISHIYAMA: Aloha. My name is Patricia Nishiyama [inaudible]. I'm with Na Kapuna O Maui. And here I am to tell you this area is kapu. I'm sorry. The pohaku is very, very sacred to us. So kapuna will take a stand. The pohaku is the piko of our [inaudible] and they do not want it to be disturbed at all. So I am here to say that this area is kapu. Mahalo.

MR. THOMPSON: Thank you.

MR. KHAN: Aloha, everybody, my name is Stu Khan, I'm the president of the Mala Wharf Fishing & Recreation Association. I've also been a member of the Harbor Advisories Committees for the last 20 years and we've certainly going over a lot of this information.

I would say that the comfort station improvements are needed and you must direct your action at that. As far as the other part which you presented to us tonight, I think with the historic changes that would be impacted on this open space area immediately ought to entice you into looking for another area.

Now, let me read to you from a 1974 State of Hawaii Department of Land and Natural Resources short form. "The destiny of these island as a winter playground for America is something that probably few really appreciate and Maui to have a full part in this future because she has what the tourist wants. But several big things must be accomplished in the meantime. We need a wharf, we need a road, we need parking," et cetera. He concluded by saying, "Big, of course all these things are big, but they're coming." Now, you understand this is in 1974. "We cannot stop destiny, though we may delay it." Then along all of the West Maui coast, there is no deep water port. Landings at various points were built to handle freight and passengers. Some landings were privately financed, others through a combination of government and private capital. Since most of Pioneer Mill's company is shipping was for sugar and freight, concern





for passengers or tourists, the latter of little consequence in early Lahaina was small. But shipping did increase and in the 1920s Baldwin Packers Limited built their new cannery wharf for $250,000. The idea was that both interisland and Trans0- Pacific passenger ships could tie up.

Now, we all know that the Mala Wharf that was created actually got in the way of the current and boats that were coming there. And as a result, it was condemned almost from the very first three days.

So what I would like to do is present an alternative. And I've not heard an alternative. The alternative that I would like to present -- and I have talked to the Army Corp of Engineers and I'm currently in contact with the Department of Planning engineers to see how this is going to work out. And I think I've figured a way to avoid the graveyards at Mala, to separate the tourist influx from the recreational and commercial boaters at Mala by using the open space above the Kahoma Stream. The Army Corps of Enginee has said that if we span the stream, not put anything in the bottom but span the stream, we can actually put something -- a walkway, a causeway that actually meets a county road. The county road goes to the bathroom at Mala, which has a shower. Behind the bathroom is a

county lot which is not been designated anything but could serve as a staging area for the mayor's jitney plan that would go down Front Street, turn around at 505, come back to the Mala area. The area is certainly big enough for the large buses and the taxis.

As you walk out the causeway, it would ramp down to the current height of the Mala Wharf, go out to the end, and because of the current problem, one would have to put like an end on the end so that when the boats tie up, they're in line with the current and not being buffered by the current.

On the other side we have the old Mala Wharf. Well, the old Mala Wharf is old and it needs to be dropped. When it's dropped, concrete culverts can be placed on the dropped portion and the rocks at Mala put on top of that. We would then end up with a south breakwater, a north breakwater, and a partial west breakwater, and an extra ramp for the recreational and commercial boaters at Mala Wharf.

Now, because a county road would be used and the open space of the Kahoma Stream, no impact of the graveyard sites at Mala would be affected at all because we would go right down the side, over the apron, ramp down, go out as far as we need to go, put





in 150 foot what you're talking about on the end at the right angle so that these ferries and cruise ship riders can tie up there. As a result, they would be taken to county parking lot which will take them into town.

Right now, with all the congestion at Lahaina Harbor, a lot of the people don't even stay in Lahaina Town. They get on buses and they go. They're not there. They come back, they get back on the boat, and they're gone.

So I have a kind of sketch drawing that I kind of made out -- I'll pass this along to you. But it basically looks like an arrow where the main section of the arrow is -- I believe it's 120 degrees azimuth, and that's this portion over here, and runs in the Kahoma Stream. Then it goes outside with the extension. On the land side we have the Mala Wharf which now becomes a breakwater and then we end up with three ramp access points at Mala Wharf.

Not sure what else to say other than to sa that this is an alternative. It would totally obviate the use of anything in front of the historic open space. Nobody has mentioned the lighthouse, which is also historic. So from actually this point right here to the hanau stone is historic. And the historic

register as a historic site points to this area out one mile. So the people who originally discussed the historic consequences of what can be done in Lahaina were very concerned about impacting this open space. And I think to present a plan to our community without looking at other alternatives is kind of lacking on you guys' part. Because we're both -- we're all part of this same thing as far as what the ocean does and how we interact with the ocean. If we don't -- if we don't interact with the ocean in a pono way, the ocean is going to kick us back. And there is no sense in doing this kind of thing in Lahaina when you have the option of doing it down at Mala. Thank you.

MR. THOMPSON: Thank you.

MR. BALL: Good evening. I'm Lindsey Ball. I'm the principal of King Kamehameha III Elementary School. I don't know anything about the piers or the boats or anything. But when you talk about the comfort station, the current one is right at the corner of Canal Street, which is right near one of our entrances. I would like to see it moved towards near where the people need it most. Unfortunately, a lot of tourists get misdirected to our campus, so it's kind of a safety issue and now we've had to take extra precautions keeping people off campus, locking the





gates and so forth. I would like to see it moved down closer to the piers.

I just have a question, though. I am a surfer as well. By dredging, what would that do to the harbor break?

MR. THOMPSON: Well, the study on that is still underway. But we believe that the dredging would be only in this immediate area, not on the re where the waves are forming. So I think it's too early to really answer that scientifically, but the sense is it would not. But what I'm hearing for the first time tonight is a concern about what I would call the longshore transport of the water or the storm surge and its exit out there. But I mean that's a part of what these types of guys have to do and part of the permitting process, those questions and issues get identified and answered. Someone else, please? Anybody.

MR. KALUA: Good evening. Zeke Kalua, Executive Director, West Maui Tax Payers Associatio Just for clarification, the design is 00 pretty much everything that you've presented looks pretty elaborate. Is that based on the standards to qualify for the federal funding to build these? Because I totally understand where the gentleman from Molokai is

coming from. I was a resident of Molokai for six years and we've got really basic harbors over there, really basic.

MR. THOMPSON: Actually we have a proposal for Kaunakakai as well. I think the question, Eric, is is this based on an engineering need -- a perception of the need for the ferries or is this based on a criteria to qualify for the funding or a little bit of both.

MR. YUASA: Right now, like we said, these plans are really conceptual plans and it wasn't really designed this way to meet any kind of Federal Transit Administration kind of requirement. They pretty much gave us pretty wide I guess discretion as to what type of facilities can be best used to enhance the ferry operations. And I think what our consultants did was they looked at the existing operations and they looked at ways to make it better and make it safer.

MR. KALUA: The only reason I wanted to clarify that is because if the consensus of this room was to totally agree with what the gentleman from Molokai said as far as narrowing the harbors, I just wanted to get a more clear view of what we can actually suggest to you. As far as the width itself, you know, does it have to be 140 feet long, does it





have to be 48 feet wide, does it have to connect right there to the wall, do we have to have the floating dock as opposed to another portion of maybe a breakwater or even or more permanent pier on the other end.

I haven't lived in Lahaina all my life, but I've witnessed a lot that's happened with the Carthaginian. And when I look at the outside floating dock, if it was a matter of people just using it to access surf, that's one point, but the deliberation between putting a replica of the Carthaginian versus a double hulled canoe is still in the air, it's not been decided. So just that that may be another point for you to seriously consider. If the Carthaginian was to receive a replica that looked somewhat similar to it, in your personal opinion would that floating dock be enough to sustain that kind of a vessel anyway. And when we consider the type of people that visited the Carthaginian prior to its demise, you know, we've got people that access that that can barely walk, we've got people in wheelchairs, we've got kids that are running up and down. I would hate to see that floating dock all of a sudden have a huge staircase going straight up to the boat because it's nine feet above the level of the floating dock.

MR. THOMPSON: Thank you. Your comments are exactly why we're here tonight because we thought it was important to be able to accommodate the organization that now has the Carthaginian. But clearly if you put a Carthaginian there versus a low free board no windage kind of a double hulled canoe, it significantly alters what the structural engineer has to do.

When I listen to Mr. Young, I too thought that was an innovative idea. We've had lots of internal talks and that hadn't come up. So the airplane ticket was already paid for. But at the same time, I'm trying to -- while he was speaking, I'm thinking of the number of people take come on -- I've ridden -- rode the ferry to Lanai and I've seen the lines and I think part of it, I'm sure, is just to accommodate safety, you have enough walkway on either side of the gangway, you have enough walkway to go each side. I'm just trying to get inside their heads. Part of it may be how strong it has to be built because the breakwater doesn't cover. There is probably lots of considerations. But we're listening and we go back and try to digest all that we hear.

Anybody else?

MR. KHAN: Once again, I'm Stuart Khan,





president of Mala Wharf Fishing & Recreation Association. I just wanted to bring up to date the people who are here who have not attended Harbor Advisory Committee meetings. During Chuck Penken's tenure, the only thing that we could do in the Lahaina Harbor was to dredge to the catwalk on the mauka side and the makai side which would add about 100 feet in the harbor. Those documents should be in your file somewhere.

The other thing that I wanted to bring up, and it's only been mentioned casually, is that for the last 10 years or so we've been trying to put in a surfer swim step pretty much right here, somewhere in here, where the surfers could go into the water, go out to the reef, and come back and have a shower stall. That surfer swim steps was at the top of every agenda meeting for every Harbor Advisory Committee meeting for the last five years. And it's -- there is still no surfer swim steps.

MR. THOMPSON: I can tell you that was one the first things the harbor master's brought to our attention. And we had conceptually thought to include that here as a way to try to keep the surfers a further distance from the motorized ferries, just for safety purposes. We do recognize the need to try to

help? Yeah. I mean, I too am a surfer. I mean, as a young kid I'd probably jump off the end. But they would clearly be better here. I think it might even be better there. Where it's better, I don't know, but that's why we're here tonight.

MR. KHAN: Okay. I just don't want you to use this plan as a way to get the surfer swim steps in down by the hanau stone. That would be nuts. Interfering with this historic view, whether it's from the land or the ocean, is going against historic principles that we live in here in Lahaina. We don't want to change our history. We want the people who come to see our history. If we start building things like that, we have already destroyed our history and that's not good progress.

MR. THOMPSON: Thank you. Let me just address a couple of his comments about dredging, and it's been a topic for others as well.

Again, the surveys are being taken to determine what -- to what extent, if any, dredging would have to take place. But when we use the term dredging here in tonight's presentation, we're talking about new dredging in areas that have not been dredged or are not part of the current channel. Clearly what we call maintenance dredging has to occur periodically





because harbors silt up and the control depth gets shallower. And I think the permit that the gentleman just talked about are the limitations. We have standing permits at different harbors -- and I don't know the status of the one for Lahaina -- that allow a certain amount to be taken out periodically and it's usually a very small amount. It happens routinely at ramps. It's my understanding here on Maui Kihei r. [illegible] is in need of it right now. So my sense is when you are talking about you can only go in certain areas, it was related to that standing permit. If you get to a point where you needed to do a lot of dredging like maybe the entire harbor basin, that would be a separate permitting process through the Corps.

But for tonight's topic, so we're all on the same page, is say to build this or put the pilings in or say if the Carthaginian replacement was on this side rather than this side, this area may not have ever been dredged. And then it would be new dredging. We're not talking about maintenance dredging.

I understand your concern. I'm just trying to make sure we're all clear and we don't know to what extent, if any, it would need to be done. And clearly that has to be disclosed. I understand people are very vehemently opposed to that, some of you, and

others would probably find it acceptable. But I just want to clarify where we're at on that.

MR. FOLEY: I want to take to ask a couple more questions and also make a couple more statements. I'm sorry, Mike Foley, county planning director.

One facility that I've heard a lot of demand for in this harbor and other harbors that I haven't heard about tonight is pump out stations. The boats, as you know, have no pump out facilities. There has been one historically somewhere at Lahaina Harbor, but my understanding is that it seldom works and is sometimes locked. But basically it isn't available. A pump out station is a very necessary feature for Lahaina Harbor.

The other thing I wanted to do is second Keoki's statement about putting the Carthaginian's replacement out there at the north end of the finger -- of that new multipurpose pier would place that vessel, whatever it is, in a tremendous amount of exposure. And if it's a vessel like the Carthaginian, it's not going to live as long as the Carthaginian did.

The other thing I wanted to ask about is the EIS. A couple of the issues that the EIS have to address are the impacts of dredging on the harbor, the





impacts of dredging on surfing. I have a question as to what agency will be the accepting agency. Do you know that yet?

MR. YUASA: The governor will be the accepting agency.

MR. FOLEY: Who?

MR. YUASA: The governor. Through I guess the Office of Environmental Quality.

MR. FOLEY: The other thing I wanted to mention is alternatives. The Environmental Impact Statement, as you know, requires examination of alternatives. And several alternatives need to be address. One is no project. One is one pier instead of two piers. And another would be to build the pier somewhere else. And also to build the other facilities in a different location like especially the restrooms.

And I agree with Keoki that it's going to be very hard to find another location for the restrooms, but they're really not appropriate next to the elementary school and they're really necessary down here where all the people get off the boats, not at the other end of the harbor, as I said before.

The other thing is that the EIS needs to examine how much advantage or -- I don't know how

exactly to phrase it, but it's very naive to think that this isn't going to generate more cruise ship use because the tenders are going to have a significantly easier time landing at Lahaina Harbor than they do now. So by having two additional locations for tenders from cruise ships, you're obviously making it a lot easier for the cruise ships to use their tenders. And I'm not saying that that's good or bad, but it definitely should be analyzed in the Environmental Impact Statement.

And with respect to your timing, this project needs to go through state, federal, county agencies including, as Keoki said, this is a national landmark and it has to go through the Cultural Resources Commission. It also has to go through the Maui Planning Commission for the SMA application. And I don't know what your schedule is for reviewing the EIS, but the county's schedule is 10 months. So build that into your -- build that into your process. That's assuming you go through the planning commission and the CRC in one meeting and nobody has done that lately.

MR. THOMPSON: Thank you. Anyone else?

MS. COUCH: Leslie Couch for Representative Blundell. Have you taken into consideration the





security issues with the cruise ships if they use that -- the middle pier?

MR. THOMPSON: Yeah. In fact, that's a good question, we should have covered that. At this time the security for cruise ships is required and at this time it is not required for the ferries. So the concern that some expressed about the cruise ship activity, the cruise ship activity would have to remain where the security is. I don't know if the ferry operators have ever received any comments about security requirements in the wind -- I'm not aware of any as -- as involved with the harbors, but I would not be surprised to see that coming in the future. But right now the security issue is only for cruise ships and we wouldn't be putting security at each spot. But I'll tell you, I have considered that it should be considered during the design when you get further along in case security is required for ferries.

MR. BRUN: Hello, my name is Tom Brun, I h. Kamehameha Sails down at the harbor. And as one who does operate out of there every day, I would like to reiterate that you will need to dredge to put anything here. It's not a maybe; it will be. And it is very exposed. And a little finger pier, whether there is a

Carthaginian or replica there, will get trashed.

It won't affect the surf. It's way inside of the surf line. But that area gets wild. I have old 8 millimeter footage from the '70s if you would like to see it. It's not protected; it's wild.

My other concern is back to once you get everybody on land, everybody -- there is still no accommodations for all the people in the cars and the parking. Like right now, I old ride my old Schwinn bicycle with a six gallon gas tank to get fuel on that loading dock and I have to go through quite a little process just to get there. So Dave's idea of having a comfort station there when the cruise ships is in won't work because of security.

And like I say, more facilities is going to bring in more. And it's so choked right now, I don't know what you're planning as far as the land part of the deal. Obviously I'm opposed to the whole idea for many different reasons. Not to mention the harbor itself right now. Talk about deplorable conditions. Down where I work in the harbor, the railings are falling in, the electricity is falling in the water. What about -- those to me would be improvements. This to me isn't an improvement. It's in a lot of ways an unwanted addition to the harbor. And I think there is





a lot more thinking to do before you start diving in.

Because like this pier here, I guarantee you it won't last one kona. I don't care how many pilings you put down. And just we are concerned with the harbor that exists is falling into the ground. So who's funding all of this? Why can't some funding go to the existing harbor?

Go back to -- Mala Wharf would be place -- the cruise ships want to come in, take them to another place. It's changing the face of Lahaina dramatically from one end to the other and I would just like to say once again I'm vehemently opposed. Thank you.

MR. THOMPSON: Thank you.

MR. WHITEHEAD: My name is Tony Whitehead and I would just like to say -- to kind of say what he's saying about this floating pier. I wouldn't even see it lasting a year. Just because it's just going to get pounded. And we know we have a hard time getting the maintenance done on the harbor as it is. And this is something that they are going to be blocking Fr Street to pick it up off the beach to put it on a trailer to put it back out there. Bad problem.

And if you ever noticed inside where they do park the ferries, they drive pylons, and that's where they got the docks to walk out on to. If you go look

at them, they were put in like -- I'm guessing -- last year. I could be a little wrong. But they're like leaning about that far because you've got 50 or 60 tons of boat pushing up against them and it just can't handle it. So I think the pylon trying to hold anything where the surf is coming in, I mean, I just -- I don't see it lasting -- if it made it a year, I would be surprised.

MR. THOMPSON: Thank you. Greg?

MR. HOLLIS: Again, my name is Greg Hollis from the Ocean Tourism Coalition. I've heard a lot of discussion and it's been enlightening listening to some of the other comments. I think the engineering and the capabilities with the new materials, we should explore how to protect all of our sacred areas along that coastline regardless of whether this finger pier is built or not because the current situation with the water flushing back through is going to eventually erode away or build up. It comes and goes with the change in the season. But it's something that does need to be addressed.

I think that the idea of floating piers, though, should be given some more research and some more merit. It's used in a lot of harbors throughout the world with a great deal of success. And the one





thing that we were not unique in is having surge current, strong storms, things like that hitting us. And the floating pier situation in other areas have been met with great success. But it needs to be engineered properly. So tying the two -- again what we've commented, taking some consideration to what's happening inside the harbor, this has to be a total plan. You can't just address the bottleneck at th end because you're going to create more problems than we solve. But addressing the rest of the harbor using the same floating piers or something along that line, you can gain a lot of space internally in the turning basin. It's been common, it's been sent to the Department of Land and Natural Resources numerous times, to move the footprint inside the harbor gives a lot more space and ability for boats to maneuver without changing the outside. You don't have to do -- affect the surf zone and those kinds of things. And you're going to have to do something. Because under the current situation on the existing loading dock, you can have three vessels basically around the dock as a general rule. And with certain catamarans on the face, other vessels are eliminated from being able to even enter the harbor because of the spacing. You add another pier and you don't address that concern, you

now have increased it from three potential vessels around the bottleneck to doubling it to six. And you still haven't addressed -- what I'm seeing here is again just addressing the pier and the loading dock, not taking into account the rest of the harbor. And you have to look at it as a total picture or you will create more problems than you'll solve.

One thing that I've heard about the comfort stations and different things, we want to be careful about where we congregate people. The comfort station is going to be a positive thing and it's readily accessible. It could also be a negative thing in that that's where everybody is going to go. So you want to take that into account in your placement. And I wouldn't necessarily rule out having multiple comfort stations because if we make better utilization of the rest of the harbor inside, you can move a lot of your pedestrian traffic and other harbor users further -- and having more accessibility in the harbor which puts the comfort station that's in place right now under more utilization. So there is conceivable the need to have that comfort station upgraded and an alternate site somewhere closer to where the ferries land. Thank you.

MR. THOMPSON: Thank you. With your concern





about floating docks, you should know that these gentlemen's firm, Mitsunaga & Associates, have designed two floating docks for the Ala Wai Harbor. So they have a lot of experience I think in evaluating different design concepts of floating docks.

Anybody else?

MR. BAUGHMAN: Thank you. Once again, I am Kevin Baughman. I do have a boat out there on a mooring. And my wife and I have tried to come in before and be able to use the facilities for refueling and stuff like that and the major thing that we're trying to address here are the ferry boats coming in and out, which also does seem to alleviate some of the traffic or spread out some of the traffic from when the cruise ships do come in.

The fact is, these harbors were built as small boat harbors approximately 40 years ago and during this time we've seen a lot of commercial activity grow and we're not addressing that. I would like to say that -- I like Stuart's ideas about the cruise ship and dealing with those. I think we need to have some more public forums on that. Until we do, what we need to do is address some of the security issues. You were talking about parking for the restrooms and stuff. When they do have cruise ships come in that

are already on the schedule, they shut off the parking in Canal Street so that parking area you have out there wouldn't be allowed to be used by anybody unless you make changes to the security that's going on.

The other thing is you're tying in this new large pier to the seawall there and that becomes a security zone. What I think might be more appropriate is to put the walkway from the existing pier going over and then you could have security area there without affecting the open space, the historical space that everybody is dealing with.

And going back to the openness, that really does need to be addressed as far as the waves coming in and stuff like that because what everybody has testified to is that the buoys get washed out of the channel and stuff like that, it does happen. There is definitely a force to be dealt with there and that needs to be considered in the plans. That's pretty much what I have for right now. Thank you.

MR. THOMPSON: Thank you.

MR. KHAN: Stuart Khan again. As I've listened tonight, I've not heard anybody say what the numbers of cruise ships are. And just for your information and our information, when we first started looking at the cruise ships back in the '80s, there





were only two or three. Right now there are more than 70 out of 230-plus cruise ship vessels that are eligible to visit Lahaina. And it's increasing. Every year another cruise ship comes in, bringing more people. In March we had 15,000 people come off the cruise ships into Lahaina Harbor. Thank you.

MS. BAUGHMAN: Good evening. My name is Pam Baughman. I'm Kevin's wife. As he said, we do hav 46-foot sailboat and about two years ago we ended up having to moor alongside the Carthaginian during one of the storms. We got the heck beaten out of us. I mean we broke lines, we did a lot of damage to our boat because of the surge.

I have a big concern about the parking. Also, it's like where do you put the cars? We do have a permit that we sometimes do get into that little parking lot that's over on the far end of the harbor and you have to get there early in the morning around 7:00 or you don't get a space. There are illegal cars that are parked there that do not have stickers. I around the tree, same thing, you know, it's like where do you put all these cars? That's all I have to say. That is a good idea, but we do have, you know, a lot of problems.

MR. THOMPSON: Thank you. Okay. One more

time, sure.

MR. FREELAND: Keoki Freeland again. I just want to talk a little bit more about the dredging. If this is the Carthaginian right here, can anybody remember when the channel was dredged last? It's been years. And the channel is still deep enough. Why? It's my opinion is because every time the surf comes up, it sluices out the channel and it's cleaning it out. That surge is to strong, it's sluicing it out.

Now, if you go out there tomorrow at low tide, take a look at this area. You can walk and lucky if the water is going to hit your hips, it's that shallow. Even a canoe cannot go over here without dredging. If you dredge, you're going to have to dredge all the way out this way. And what we're concerned is it's either going to fill up with sand right away after the first big surf, or it's going to undermine everything, which is a real problem if that happens because all this historical stuff would be in great danger. That's what we're very much concerned with.

MR. THOMPSON: Thank you. As we're winding down tonight, I don't want you to think this is your last opportunity to comment. You should feel free to send us at the Department of Land and Natural





Resources Boating Division any comments. You can send them by fax, mail, you could drop them off. We have forms here. Okay. Can we show where those are again right here? And if you don't get a form or you think of something after you turn the form in, you can turn it in at the harbor master's office, ask them to get it to us in Honolulu.

I think before we close, I would like to t. everybody for coming, taking time from your busy schedule and for sharing freely with us. I know I heard several things tonight that I had not considered or heard in numerous pre kind of planning meetings on this project. It's been very valuable.

Unless someone else has another comment, anybody? Okay. We have one more. Good.

MS. MOORE: Diane Moore, Friends of Mokula Maui Nei. The whole business about the harbor, the number one concern is the restroom facilities and that has been all of our concern that live and work in Lahaina. I think we're being distracted by what you're trying to do with the facilities for the tenders. The ferries is a different issue, with Molokai and Lanai.

Affecting our historical site is a very, very important concern for a lot of us. The use of another

location I think is a great idea, Mala ramp. I don't know what is involved in that, but why can't we use that area. It used to be there for some reason. Why it was destroyed and -- I believe through Iniki it was. Then can we rebuild that? Can we use that area for some of the tendering that we're talking about?

Existing problems right now I believe is the timing of the arrivals of the tenders. If we took a look or maybe speak with the harbor master, which I'm surprised not any of them are here, I don't see anybody anyways.

MR. THOMPSON: They're actually working with a cruise ship.

MS. MOORE: Exactly. That's what I thought. Maybe we could suggest timing. In other words, there is early morning where all the fishing boats go out. There is different times in the day that we could use for the tenders versus the ferries.

The business I'm in, I work with the cruise ships so this would affect me. But my biggest concern is what's happening at Lahaina Harbor. If you try to go back to where you had all the ferries coming in and the tenders coming in at the same time, there is no way you're going to be able to handle all the people. We have a tough enough time right now. Not only just





parking, but the buses -- because all the tenders from the cruise ships, they all want to go on the tours and you've got several buses. So if you add more spaces for the tenders to come in, they are going to want more buses and where are we going to put everyone? So if we maybe use another location for some of these tours or buses and all that, like Mala ramp, then you would alleviate that problem.

MR. THOMPSON: I can share with you, I went -- not this most recent meeting, but a month ago I went to a Mala Harbor Advisory meeting and the issue -- the primary issue there was a few of the boats from Kaanapali coming in there. And it seemed to me -- I only have one meeting's worth of experience, but there seemed to be a lot of concern about the level of commercial activity there. So as I hear the comments of the alternative location, clearly that has to be explored as part of the permitting process and we certainly haven't discounted it, but I'm not so sure the Mala folks -- although I know he represents M there -- I would be curious to learn if they would seriously consider or accept cruise ships or ferries coming to Mala. I mean, that would be a whole other community issue.

MS. MOORE: There is also, as far as the

floating dock idea, I mean, that's just ridiculous. There is another location in Lahaina Harbor that used to be like a ramp. It's down further. I don't know if that's another thing that you can look at in your planning or have you looked at it, as far as I don't know if tenders can use it but maybe some of the other boats that we have can use that area. I used to have a sailboat at Lahaina and that's why I'm familiar with some of this stuff.

And again, the biggest concern I have is the traffic issue, not only of cars as of people and taking care of our existing people that we have right now instead of creating more problems, you know, by bringing in more people, we need to resolve handling the people we do have come in to Lahaina.

MR. THOMPSON: I can tell you in meetings with the federal folks with respect to the proposed projects we have for Manele at Lanai, we do know that roadway improvements can be included as a part of that funding source. Everything is so limited in Lahaina with -- there seems to be something everywhere. So it's a very big challenge. But I understand your concern. And I do recognize that we have a responsibility to take into consideration clearly what goes on in the land side in addition to the water





side. So thank you.

MR. KHAN: Stuart Khan again. I would just like to respond about the Mala area. It's not the ramp that we're talking about. We're talking about totally separating this commercial activity -- even the access. Even the access, it's a county road access that goes right up to the Kahoma Stream. We're looking at a span across the Kahoma Stream that goe down to the water, goes out quite a ways to where maybe where the old wharf used to go. That was about 900 feet. And then taking a portion of that off to the what would be the north side to allow the commercial activity.

The ramp would get the benefit of an additional ramp place and we do have a cap on the commercial permits from the land side; that's 15. And as a result, people who use Mala ramp would not interact with the tourists or the ferry population at all.

The county road goes right into an area tha has been laid dormant and is county owned and could very well be the area where the large buses and the taxicabs and others use for parking, staging.

What we do find at Mala now is that the large buses go down into Mala ramp and they hang out there.

So trying to look at it in a very overall kind of way, it seems to me if we can keep those two separate, the recreational and this highly commercial area, that -- and the main separation is from the graves. The graves go right down to the ocean. They come back up to a crypt. They go across over to Wilson's yard. They cross the Mala Wharf approach road and go on to the berm at the Puupiha Cemetery. So as long as those things are avoided and not disturbed, I don't think there would be much objection from the Mala Wharf community.

MR. THOMPSON: All right. I think we'll conclude the meeting now. I would like to, for the record, those of you that need an address, you can send comments to the Department of Land and Natural Resources, Division of Boating and Ocean Recreation. The address is 333 Queen street, Suite 300, Honolulu, Hawaii, 96813. We also have the form here or you could also send them to the Engineering Division at P.O. Box 373, Honolulu, 96809. That would be the Department of Land and Natural Resources, Engineering Division.

VOICE: Do you have email addresses?

MR. THOMPSON: Yeah, We have e-mail addresses. Those are kind of long. Eric, yours is -- do you have





it on here?

MR. YUASA: You can e-mail me at ERIC.T.YUASA@hawaii.gov.

MR. THOMPSON: And if somebody forgets all that stuff or puts a dot in the wrong place, you can always go to the harbor master's office and they know how to find us. Thanks again for coming out tonight. Drive safely on the way home. Thank you. Aloha.

(WHEREUPON, the public meeting was concluded at 8:50 p.m.)

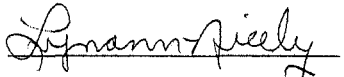
C E R T I F I C A T E

STATE OF HAWAII )
) SS.
COUNTY OF MAUI )

I, LYNANN NICELY, RPR, Notary Public for the State of Hawaii, certify:

That on the 8th day of April, 2004, the proceedings was taken by me in machine shorthand and were thereafter reduced to print under my supervision by means of computer-assisted transcription; that the foregoing represents, to my best ability, a true and accurate transcript of the proceedings had in the foregoing matter.

I further certify that I am not attorney for any of the parties hereto, nor in any way interested in the outcome of the cause named in the caption.
Dated this 14th day of April, 2004



NOTARY PUBLIC, State of Hawaii

My commission expires: 1/24/2006

# APPENDIX J.

# Lahaina Small Boat Harbor Ferry Pier Improvements, Environmental Impact Statement Public Scoping Meeting, December 8, 2004

# ORIGINAL

LAHAINA SMALL BOAT HARBOR

FERRY PIER IMPROVEMENTS

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC SCOPING MEETING

DECEMBER 8, 2004, 6:00 PM

AT LAHAINALUNA INTERMEDIATE

LAHAINA, MAUI, HAWAII





MR. RICE: Good evening. My name is Richard Rice. Hi. Good evening, everybody. My name is Richard Rice. I'm much louder than the microphone, so we'll have to use it a little bit as we go on.

I want to thank you all for coming here. This is an extremely important step that we want to go ahead with the community in looking for your input on this improvement to the harbor. I know a lot of you got here earlier and had a chance to look around at it and some of the details. And we're going to have some experts come up and talk to you on it.

I forgot, I didn't introduce myself. My name is Richard Rice. I'm the administrator for the Small Boat Harbors. And I have my Harbormaster here, Hal, and the power behind the throne, Stacey. So any real questions, they have the answers to.

I want to jump ahead right now and have Mich Hirano, who is our consultant, the gentleman who understands all these wonderful architectural drawings, step up and go through some of these issues. Again, this is focusing on just what can we do for health and safety within Lahaina Harbor. This is not about the whole community, other parts have impact on that one, but it's important to the EIS that we understand those impacts. So there are several levels to this one.

Mich, you want to go ahead and get me out of hot water?

MR. HIRANO: Thank you, Richard.

Good evening, folks. As Richard said, my name is Mich Hirano, and I'm with Munekiyo & Hiraga. Our firm has been hired to prepare the Environmental Impact Statement for the project, as well as to do the project permitting. And tonight I would like to just briefly describe the project and what the scoping meeting is about.

We don't want to get into the issues of the project at this particular time in terms of the -- I guess the details, but we do want to hear from you with regard -- in regards to the -- I guess the importance that will be placed on certain aspects that you feel we should be aware of as we prepare the Environmental Impact Statement.

So I hope you can all see this slide. I'll just move out of the way.

This is a scoping meeting. And the Notice of Intent was issued by the Federal Transit Authority in November, I think it was November 23rd there was a notice of intent that a Federal Environmental Impact Statement will be prepared for the project.

So can we just have the next slide?

The project sponsor is the State of Hawaii, Department of Land and Natural Resources. The property, the





harbor, is owned by the State of Hawaii, Department of Land and Natural Resources, and, of course, is administered by the Boating and Ocean Recreation Division.

The Environmental Impact Consultant Team, I'd just like to show you -- Next slide. The Environmental Impact Statement consultant team, Mitsunaga & Associates is the general contractor or general consultant. Steve Long, vice president of Mitsunaga & Associates, is here tonight, and they're doing the architectural work, conceptional design, and the hydrographic survey for the project.

Our firm, Munekiyo & Hiraga, we're responsible for the preparation of the Environmental Impact Statement. We're doing the project permitting.

Edward K. Noda & Associates are doing the coastal processing, the marine water quality analysis, and the marine biology.

Pacific Legacy, Incorporated will be doing the Archeological Inventory Survey, the Cultural Impact Assessment, and what they call the Section 106 Consultation with the Native Hawaiian organizations in the area.

Okay. Next slide.

With respect to tonight's purpose, the EIS scoping objectives -- And I would just like to go over them very briefly to give you a context in which we want to have your comments received this evening. The EIS scoping

objective is to insure that all significant issues related to this proposed action are identified and addressed. That is our responsibility as preparers of the Environmental Impact Statement; however, we rely on a lot of public comment and a lot of public input in order to determine and get a sense of what is important and what we should be looking at and what we should be assessing as we prepare the Environmental Impact Statement.

It would be helpful if the comments should focus on proposing alternatives that have may have less impacts while achieving similar transportation objectives. And I think it's important to remember that this particular project is in response to a need that has been identified in the Lahaina Small Boat Harbor. And so our work is to respond to that need through design solutions as well as through mitigation.

The other aspect of the scoping is to identify specific socio-economic and environmental issues to be evaluated in the EIS. And as I said, we rely on your input to provide that guidance for us as well. We do our own research, but we also rely on public input, and that will be included in the Environmental Impact Statement.

Just some general orientation for you, and I'm sure that you all are very familiar with the area, but this is just the regional location map. As you know,





Lahaina, this is the Lahaina Small Boat Harbor. And the project location is the proposed ferry pier.

This is an air photo of the boat harbor. The existing pier is right here; of course, the breakwater; the slips within the harbor; Kamehameha III School; the courthouse; Pioneer Inn. This is the existing harbor, the existing pier in the harbor. This is the "Carthaginian." This is a tender boat just leaving the harbor; surf breaks in and around the harbor; and Front Street running along here.

In terms of just background, the Lahaina Harbor was originally built and dredged in 1955. It consisted of a single breakwater, a pier, and a restroom facility. In the mid 1980's interisland ferry services began operating between Lahaina Small Boat Harbor and the Manele Small Boat Harbor on Lanai, as well as between the Lahaina Small Boat Harbor and the Kaunakakai Small Boat Harbor on Molokai. In the 1990's operational and safety deficiencies became an issue, were identified by DLNR as a priority in order to develop solutions to operational problems that were encountered through congestion in the Lahaina Small Boat Harbor as well as the deficiencies in the facilities.

In terms of project need, it's very simple: The existing pier is unable to provide a safe and readily available loading and unloading docking facility for the interisland ferry. There are two ferry operations operating

out of Lahaina Small Boat Harbor. And the priority for the funds -- These are funds from the Federal Transit Authority, and these funds are used to increase interisland traffic -- interisland transportation, to facilitate and improve interisland transportation, and so the funds are targeted for this particular purpose. And, therefore, the focus on the improvements are to create a safe as well as operating efficient loading and unloading facility for the interisland ferries.

In terms of the project objectives, there are two. One is to improve existing operating conditions of the interisland ferry terminal; and second objective is to provide a safe and more convenient ferry facility. Again, these objectives are driven by the source funding for this particular project. As well through improvements of the existing ferry operations by the proposed solution of a new ferry pier, it would also help alleviate some of the congestion in the harbor, and it will also provide benefits to other boating communities and other boating users or harbor users in the Lahaina Small Boat Harbor. But the primary focus is for the ferry operations. And, again, I stress this to keep in mind that when we're looking at alternatives, we have to see and assess those alternatives in terms of the project need and the project objectives.

So based on that in terms of just background





to it, the Department of Land and Natural Resources had identified funding; had, I guess, been able to secure funding from the Federal Transit Authority for a number of improvements to harbors on Maui or in the State of Hawaii. And the County of Maui was a recipient of harbor improvements that will be proposed for Manele on Lanai, Kaunakakai on Molokai, Lahaina Small Boat Harbor, and Ma'alaea Small Boat Harbor.

This particular project is to look at improvements to the Lahaina Small Boat Harbor and the new ferry pier. And there was an earlier scoping meeting or earlier public information meeting, and in that -- in April of this year, and a much larger proposal was put forward to the community. And there was a lot of concern about that proposal. There were a number of issues about that, which we could get into later and I'll identify and just describe, but the result of that meeting was to really scale down the proposal quite a bit in order to try and work with the community and to try and, I guess, mitigate some of the concerns that were raised with the earlier proposals.

So tonight we're sort of publicly bringing forward revisions to the proposal that were originally put forward in April of 2004 with the new ferry proposal. And the new ferry proposal basically entails development of a new ferry pier which will be approximately 35-feet wide and

60-feet long. It will be connected to the existing pier by a 12-foot-wide walkway 60-feet long. And this is the scope of the project to -- in terms of the ferry pier: Would be able to dock two boats or ferries -- primarily ferries at this time on the south side and the north side. And by doing that, it would also free up some of the use on the existing pier.

In terms of this particular project, it is 135 feet south of the Hauola Stone. It's about 35 feet east of it. It's away from the tower and away from the sea wall. And so access to this -- access to the new pier will be provided by the existing pier and this walkway.

There's also consideration to look at a shade structure, a possible one-story open structure on the new ferry pier. And the Department of Land and Natural Resources is also looking at a possible one-story open structure on the existing pier for shade.

To give you a different perspective and view of the project, this is a plan view looking down on top of the -- on the top of the screen looking down on top of the structure. And this is the walkway and this is the roof structure and the perimeter of the new pier. This is the existing wall, sea wall, along here, so it's detached from the sea wall. This is water all around.

And if you look at the section of the ferry





pier, that is if you cut this -- cut across here, if you had a knife and just were able to cut across and slice down that view, you would see this particular section of the ferry pier. So this is the existing sea wall and water here. As I said, it's detached from the sea wall. This structure will be -- This is the new pier. This is the 60-foot length of the pier. There will be a sheet pile on all sides and then fill in the middle. Same construction as the existing pier.

This is the shade structure that is also being considered as an improvement with the project.

I'd like to just review some of the earlier proposals that were put forward. This one is the initial ferry pier concept. And the initial ferry pier concept, if you look at the overall site plan, was to connect the ferry pier to the existing sea wall and have a ramp from the sea wall on to the ferry pier. The ferry pier was much larger. It was 48-feet wide and 145-feet long. It had as a possible improvement a multipurpose pier which would extend from and be accessed by -- from the new ferry pier. And this would , a floating dock.

And as you can see, this would be the -- this is the existing ferry pier. And it will be 60 feet to the north of the existing ferry pier.

The section of this particular alternative is shown in section A. And, again, it's the same type of

construction. It's sheet pile with fill, concrete surface, and a ramp with guardrails on both sides.

And as this one was put forward, concern was raised with respect to the Hauola Stone. There's some significant cultural resources along this area as well, in proximity to the lighthouse, access over this area, and it was just, again, felt that this particular proposal would have fairly adverse impacts to these cultural resources.

This is just a little more detail of the multipurpose pier concept. And the reason for that is there are a lot of surfers who use this pier to get out to the surfing sites in front of the Lahaina Small Boat Harbor. So this multipurpose pier was developed to respond to their needs and to provide a facility for safe entry and exit to the water for the surfers. The pier -- the multipurpose pier from the new ferry pier would be built up on these piles and there would be a concrete walkway. And, again, this would be secured by piles in the harbor and a floating platform, floating deck for the multipurpose pier.

And this is another view of the multipurpose pier.

This third alternative, which received, again, a lot of comment, was -- it was a similar basic foundation in terms of the ferry pier as the second alternative that I showed you, just the previous alternative.





It had the multipurpose pier as well as the same dimensions; 45-feet wide, 140-feet long. This one is 140-feet long, I believe. And it had a two-story structure on top of it. It would be accessed again by the -- along the breakwater -- I'm sorry, the sea wall; access on to the ferry pier.

There would be a two-story structure. The lower floor would be an assembly area for the ferry termin passenger loading, unloading area, shelter. And the second floor would house a public comfort station. It would have a concessionary area and the administrative offices.

So those were the earlier proposals that were presented to the public in the April meetings.

I'd just like to outline the EIS process for you to give you a contextual sort of relationship as to where we are today and where we will be going in terms of the preparation of the Environmental Impact Statement and the steps that will be involved in finalizing the Environmental Impact Statement; and to assure you that during this process there will be a number of opportunities for more public comment, for more public meetings as we finalize the Environmental Impact Statement.

So there are approximately nine steps involved, and I would just briefly outline each one.

The Notice of Intent; as I mentioned, this -- there are State environmental laws and there are Federal

environmental laws. And because Federal funds are used for this particular project, funds from the Federal Transit Administration, we have to go through both the State laws, which are the environmental laws through Chapter 343 of the Hawaii Revised Statutes, and the Federal environmental impact laws developed -- or pursuant to the National Environmental Policy Act of 1969.

The Federal side of the environmental process is -- starts with early scoping. And I think the April meeting was considered an early scoping meeting. This is sort of the official kickoff and this is the Notice of Intent. This Notice of Intent was published in the "Federal Register" and it basically alerts the community and the agencies that a Federal Environmental Impact Statement will be prepared, and it's to give notice that this process is now underway. This was published in the "Federal Register" out of Washington, DC in November -- on November 23rd.

And the Notice of Intent was to notify the public that a Federal Environmental Impact Statement will be prepared and that a scoping meeting to review the project alternatives and to get community or public input and comments into the EIS process will be held today, December 8th. And so here we are, you know, through the Federal notice.

The Environmental Impact Statement





Preparation Notice, which is an EIS PN, you know, what is called the EIS PN for short, is through the State process. This is through Chapter 343 of the Hawaii Revised Statutes. And, again, this is at the State level notifying agencies and the public that an Environmental Impact Statement will be prepared for this particular project. This Environmental Impact Statement Preparation Notice was published in the State "Environmental Bulletin" today as well, December 8.

And there's a 30-day comment period for both the scoping comments as well as the EIS prep comments. And we run these -- I mean, this is intentional, this is our effort to kind of bring efficiency to this process by running these reviews concurrently, which means at the same time, rather than completing one process and going through the same process. We're running these on a dual track as we prepare the EIS. So we'll be preparing a State EIS which will meet Federal National Environmental Policy Act criteria as well.

There's a 30-day comment period, then there's a draft, we prepare the draft EIS. And during this period all the studies will be done, all the technical work will be done, and we'll be assembling and processing that technical information into an Environmental Impact Statement.

This draft EIS is then published, and there's a 45-day public comment period. And at this time there will be another public meeting and we will then review the details

of the project and really talk about the issues, talk about the mitigation, talk about the analysis of the particular document.

So after the 45-day comment period, the public review of the document and agency review of the document, we start preparing the final EIS. And this final EIS takes into consideration all the comments that were received during the public comment period, all the comments that were received and responses to all those; and then a determination whether mitigation has been met and whether a final EIS can be provided for the particular project.

At that point that final EIS is then distributed to the community or to the agencies, basically, at this time. It's to all the Federal agencies, State agencies that are listed. So it's in all the libraries so that the public can comment on it.

This gets -- The final EIS then gets distributed to those agencies. And there are some key Federal agencies that have to review this final document, and that's Department of the Interior US Fish and Wildlife Service, because of the marine impacts, and as well as the National Environmental Protection Agency. So those are the two key Federal agencies that will be reviewing it.

This then gets published, the Notice of Availability or at the Federal level it's called a Record of





Decision. And this gets published in the -- The Record of Decision gets published in the "Federal Register" in Washington. The availability of the final EIS determination gets published under the State laws in the Environmental Notice -- the "Environmental Bulletin," pardon me, and there's a 60 -- at the State level there's a 60-day challenge period to the EIS.

At the time after that period ends, then the EIS is accepted by the Governor of the State of Hawaii, and then at that time we start processing the State and County permits.

So that's kind of an outline of the process. So as you can see, we're at the very early stages of the process. And I say that in order to just, I think, give you some reassurance that there will be other opportunities for public review. There will be full disclosure and discussion of comments of the technical reports that are provided in the EIS and of our Environmental Impact Statement as well. So we will be in front of the community again to discuss the findings of the EIS and to discuss in detail the impacts, the technical studies, and the mitigation that has been proposed for the project.

The environmental issues to be evaluated -- And I'll just briefly run through some of the environmental parameters -- the environmental, social, and economic

parameters that we'll be reviewing in the EIS.

We'll be looking at the near shore marine environmental impacts. Edward K. Noda & Associates will be doing that portion of the work. Flora and fauna impacts; that is plant and wildlife impacts both on land and marine. Air quality and noise impacts. Scenic and open space impacts. Impacts to infrastructure; roadway, water, sewer and drainage. Impacts to socio-economic environment and public services. We do a consistency of the proposed improvements with State and County plans and policies. Impacts on surrounding land uses. Potential impacts to historic and cultural resources. Cumulative, that is secondary impacts resulting from the action and growth-induced impacts. And as well identification of measures to mitigate adverse impacts. So that's kind of what we will do during the preparation of the EIS process.

Again, then, just to remind you about the scoping objectives is to ensure that all significant issues related to this proposed action are identified and addressed. Comments should focus on proposing alternatives that may have less impacts while achieving similar transportation objectives. And identification of specific social, economic, and environmental issues to be evaluated in the Environmental Impact Statement.

Just to close, I would like to just give you





the County permits, the State permits, and the Federal permits that will be required for this proposed Ferry Pier Improvement Project.

At the County level the project will require a Special Management Area Use Permit. This is through the Maui Planning Commission. A Shoreline Setback Variance, because the proposed work will be within the shoreline setback area and the conservation area, which is on the State level. But a Shoreline Setback Variance again by the Maui Planning Commission. An Historic District Approval, and this is by the Cultural Resources Commission. There are two historic districts in Lahaina. This is in Historic District No. 1 and it's also within the Lahaina National Historic Landmark, so we will need the approval from the Cultural Resources Commission for the proposed action.

At the State level there's the Section 401 Water Quality Control, which is issued by the Department of Health. The Coastal Zone Management Consistency, which is approval through the Office of Planning. And there's a Conservation District Use Permit. Because the proposed improvements are in the conservation area that is on land -- submerged lands, then a Conservation District Use Permit will be required, and that's issued by the Department of Land and Natural Resources.

At the Federal level, a Department of Army

permit will be required because there will be fill in national waters. Section 106 Consultation will be required. This is for the consultation with Native Hawaiian organizations that may be impacted by the proposed action. And this will require consultation with those organizations and a memorandum of agreement with those organizations. Paul Clayhorn through the Pacific Legacy, Incorporated will be carrying out the Section 106 Consultation. And then a Federal requirement, this is through National Historic Properties, and this is Section 4(f) review, which is, again, specific to the Federal Transit Authority or Federal Transit Administration that their plans and policies will not impact public recreation, open space, or national historic properties. So we have to do a Section 4(f) review and get approval from the Federal Transit Authority or Administration for that.

So that's sort of the background of the project to date, the purpose of the scoping that we're having tonight.

And for this meeting we've asked the court reporter to attend, and she will be giving a verbatim, I guess, report to us about all the comments that we receive tonight. And as well, if you feel uncomfortable, you know, speaking what you want to say or what you have to say in front of a crowd, you could -- the court reporter will be





available to take your testimony on a one-to-one basis as well.

So with that, I think at this point I would just like to open it up for comment. And we have a microphone. And it would be appreciated if you want to speak, if you could give your name, where you live, and what your comment is, that would be appreciated.

So thank you very much for coming and attending this scoping meeting.

If you have questions as well.

MS. ROBINSON: I'm just wondering, is this --

MR. HIRANO: Give your name.

MS. ROBERTSON: Sorry. Peg Robertson, Association of West Maui Democrats. And I teach art at Kapalua Senior Center and Lahaina Senior Center as well.

I have taken a lot of legislators down here to the bathrooms for about the last five years, so I'm glad to see improvement. I just have a couple of questions. Is this gray area cement? Is that gray area cement?

MR. HIRANO: Yes.

MS. ROBERTSON: Well, when you have that much cement in Lahaina, it isn't good.

MR. RICE: That's not cement. That's the lawn.

MR. HIRANO: I'm sorry.

MS. ROBERTSON: That's the lawn. I didn't know because this is all the same color. So this is cement, that's cement, but this is different, that's grass?

MR. HIRANO: What's there now.

MS. ROBERTSON: Okay, good. Because it is the same color.

MR. HIRANO: You noticed that; we didn't.

MS. ROBERTSON: Okay. Now, the bathrooms over there, how many sinks do you have? I notice you have like 12 toilets and how many sinks? Anybody know?

MR. HIRANO: Five sinks. For women, 12 water closets and five sinks.

MS. ROBERTSON: Okay. I didn't -- I couldn't -- Okay.

I'm wondering about pump stations. I went through -- Oh, I think it's been eight years ago when I started talking to Cayetano about the pump stations. How many pump stations are there now, and how many are we going to have when this whole multimillion dollar, billion dollar whatever is, is put in? How many pump stations?

MR. HIRANO: There are no pump stations in this particular proposal. This is the pier and maybe electricity out to the pier, telephone service, but --

MS. ROBERTSON: Do we have a pump station there now? Somebody help me out.





MR. HIRANO: There is a pump station there now, existing.

MS. ROBERTSON: One pump station there now. Is that -- As far as environmentally, is that going to be enough?

MR. HIRANO: Nothing is changing as far as the numbers of boats.

MS. ROBERTSON: I know.

MR. HIRANO: May or may not.

MR. RICE: The pump stations, bathrooms, the existing pier now are not being touched. All that you are adding here is the concrete -- called a slab -- for the pier. The bathroom, Lahaina bathrooms is a different project down the street.

MS. ROBERTSON: Right. I understand.

MR. RICE: There's no -- Unfortunately, the people who are on the pier need to walk down to the new comfort station. There are no facilities on this pier.

MS. ROBERTSON: Well, I'm talking pumping stations for the dock.

MR. RICE: No, just the existing one, the original existing one.

MS. ROBERTSON: There's no thought of putting in any more pump stations? Just the one?

MR. RICE: Not under the scope of this plan.

MS. ROBERTSON: I just -- I don't know how many boats, isn't there some certain number that you have to consider that you have to have more than one pump station? Not at all? Okay, just a question.

I noticed that you have parking for the disabled at the bathrooms down there. Is it two or three, Mr. Wong?

MR. WONG: Two.

MS. ROBERTSON: Two parking. So we're taking out some regular parking and putting in disabled. I have a good scar here; I was disabled for a year. But if you're taking out two, are you going to put two more in maybe by the library or something to replace? We keep taking out parking, taking out parking. And you've got disabled across the street, too, you know, directly across. Is there going to be any more parking replacing those two that you're taking out?

MR. HIRANO: Not in this plan, but you could make a comment.

MS. ROBERTSON: What?

MR. HIRANO: You can make your comment.

MS. ROBERTSON: Okay. That's my comment. I think we used to have 28 parking spaces around Lahaina -- I don't know, some of you can help me. I think you know how many parking spaces they took out the first -- when they fixed Front Street and all that stuff. We lost, you know,





like 30 parking spaces. And that's a big problem in Lahaina.

Okay. Sinks, bathrooms, I guess -- I guess that's about all. This water situation here when it's high tide and all that other stuff is all being considered, where -- this area through here?

MR. HIRANO: What is the concern?

MS. ROBERTSON: I guess my concern is we have -- we had some pretty big waves last year, and the big waves were going over the harbor and stuff like that. And I was just -- I was concerned about if --

MR. HIRANO: Waves coming in.

MS. ROBERTSON: How is this study for how big a wave? I'm sure there is some study that you have done.

MR. HIRANO: There will be.

MS. ROBERTSON: There will be. Okay, thanks.

MR. HIRANO: Mr. Chenowith, come around this way.

MR. CHENOWITH: You bet. I'll only take a moment. Thank you very much. I'll turn around so I can fa you.

My name is Dave Chenowith. I live at 340 Front Street. I've been around a long time. I used to be harbormaster, so I know the area. I worked on our community plan. And, okay, so I've got a few -- couple comments.

A comfort station, I suggest you have about

an eight-inch gap underneath the roof all the way around for good ventilation. The floor should have a slope so you can hose it out. I used to clean it.

The improvements to the harbor, one of the most practical ones I can think of is to take the sign at the loading dock and change the 30 minutes to 15 minutes. It will cut down the stress almost in half.

The next suggestion I have is that commercial boats that are sharing the loading dock or whatever, whenever they -- instead of going to the loading dock, they go to their slips.

And the next suggestion I have is you have to consider that we're losing our view corridors that have not only a social impact and a quality of life impact about people in Lahaina, but look what's being drawn by -- painted by artists and what are tourists enjoying and what are the people that still live here that can still stand it want to see. They want to have some view corridors left. They want to still be able to see the mountain. Barely -- Not anymore. Along the Front Street and all along is walls now. Try to maintain our view corridors, whatever we do.

And I suggest that super-ferries and more than one cruise ship are just impossible for the area no matter what you do, because if you try to start building to service them, what you're trying to do here, you're going





to -- and I believe that you'll see the people in Kahului and Molokai, Lahaina have told in these meetings over and over they don't want all of this. Our Lahaina Community Plan limits the amount of people here in the district; the residents and the visitors.

And so that's all I want to say, is do some practical things like 15 minutes instead of 30 minutes, and don't do anything except make a really nice comfort station. Thank you.

MR. WARREN: Hello. My name is Tom Warren. I'm a Lahaina Harbor guy as well. And hi, everybody.

It seems this is going to happen. My concern is that it's predominantly for the cruise ships. Eric was trying to assure me that it wasn't, but I'm still not buying it. And I'm seeing the possibilities of right now they have the north face of the dock to use. With two more, potentially I see pandemonium.

The ferry boats on all four of the ferries, I use them, the local ferries, should be able to use that; but I just am wary of when the cruise ships pull in, how this is going to really alleviate any congestion. It's like if you build four lanes, you get four lanes of cars.

And just as a practical thing as well on the walkway between the new pier to the existing pier; say there is a cruise ship in and they're using the north face of the

loading dock and say Expeditions pulls in and is off-loading passengers, that's going to be the only exit for the passengers. That off-loads them right into the restricted zone. I don't see how that's practical.

Right now the only way they can get on board or I can go down and get my six gallons of gas is from the southern side. I think there should be more thoughts to provisions for exiting the ferry boats while cruise ships are in. Hopefully by the time this project is completed, the cruise ships won't be here at all.

And my other thought was -- again, talking to Eric -- is they said that the north face of the new ferry pier may not be dredged so as not to accommodate a boat. And I can't see if you're going to do a project of this scale to not make sure that it's dredged so we get both sides. If we're going to do it, do it.

Thank you.

MR. WALSH: I'm Chris with Trilogy Excursions.

I talked to a couple guys, but I just -- one thing that we have a situation with, of course, is the surfers going in and out, so I didn't know if you addressed -- I talked to somebody else and they addressed some specific areas or something that might work out for the surfers. But I know that that's something that I don't want





to run over one.

MR. HIRANO: There is a provision. There is consideration of putting a platform on this side for the surfers, a small platform.

MR. WALSH: Okay, but then you end up with the same thing that's happening right now. They're going out right here in the traffic area, going to go out right there in the traffic area. So definitely a little more consideration of some sort.

And hopefully, one of the other things they have is they're always trying to shower off and using our hoses, which we don't mind, but does add to it.

And then I did want to echo the part about the cruise ships coming in, because that is one problem that we do have. When the cruise ships are in, we can't get to that one pump-out station. So I would really hope you guys would reconsider putting a pump-out station on the ferry side over there. I'm not sure, I haven't talked to the ferry guys, I don't know if they pump out in other areas or have that situation. But that's a lot of people they're carrying back and forth to the different islands, so it really is something that's very much needed, a pump-out station there. Longer hose on the one existing would work, too, especially during the cruise ships and also when the ferry's in there when we're on the other side of the existing one.

Yeah, the same thing; rerouting the ferry guests. You know, this thing looks pretty silly, just going to send them right into where the zone is right now when we have cruise ships in there. So that one is confusing me very much.

Then, also, you didn't address and I've heard rumor they were thinking of actually replacing the "Carthaginian" so it would even be going farther out.

MR. HIRANO: Yes. I mean, that -- that's up for consideration.

MR. WALSH: That's a consideration.

MR. HIRANO: I don't know. It's not --

MR. WALSH: You don't have to do environmental impact on your part?

MR. HIRANO: On which part?

MR. WALSH: Well, if they put the something farther out here, if they put another "Carthaginian."

MR. HIRANO: No, no, that's not in consideration.

MR. WALSH: Okay. Thank you.

MS. NICKELSON: My name is Del Nickelson and I'm a slip holder down in the harbor. I also am a commercial captain out of Lahaina Harbor. And I guess I have more questions than anything at this point. We keep calling it a ferry pier and then we keep bringing in the cruise ship part.





So the cruise ships will be using the ferry pier when they're coming in, or will the cruise ships still be using the north side of the loading dock and the ferry pier will simply be for the two ferries that we have coming in and out?

MR. HIRANO: I'll answer that one as best I can. If I can't, I'll ask Eric. But I think for clarification, the purpose of this project is to provide a ferry pier and to allow the ferries to use both sides of the pier, or maybe one side. But when the ferries are not using the pier, I believe it will be a policy of the Department of Land and Natural Resources Boating Division that other users can use the pier as well.

MS. NICKELSON: So mainly cruise ships, or they'll still be going to the north side?

MR. HIRANO: I don't think the -- kind of the operational policies of that have been worked out yet, but it's -- it'll be primarily for the ferries, and then other users can use the pier. And that means all. Not just the cruise ships, not just the commercial boaters, but the pleasure crafts as well.

MS. NICKELSON: Okay. Then on that note, if I can make a suggestion, it seems like the most congestion we have down at the harbor is when the cruise ships come in. And as the pump-out station's on the north side, there's a fuel station on the north side, the security at the harbor

makes it really tough to get to the sole loading dock, particularly if you're a private boat owner, because you have commercial boats going in and out and they need to use it. So to me if we're going to -- This is from ferry funds from the Federal government, so this has nothing to do with cruise ships, just ferry funds; but there's no way we can combine the two together to make it available for the cruise ships as well?

MR. RICE: It's a multi-use pier, but, you're correct, it's ferry money. Priority will be for the ferry. Remember, that dock has no services on it. Most of the resident boats are going to want to use the existing dock where you have your fuel, your pump-outs, the parking where the people come, so that would be the preference. What it does is take some pressure off. You're adding at least one more face available to do that for everybody's use, and that just alleviates the pressure.

It's a little bit of -- It's a little safer not to have quite so many boats. The surfers will still do it. Surfers are surfers. I was one once, too. But at least it'll move them another 20, 30 feet away from the channel, and that should be a positive. Hopefully they'll go on around if we give them a little loading dock and what have you, a place to pull up on.

But essentially it is a multi-use thing, but





there is a preference for the ferries. The ferries want to run on a schedule and it makes it really easy because you can say there's a ferry due in now, everybody off. If there's nothing else happening, go in. The best thing we can do is keep the ferries regular. It's better for everybody.

MS. NICKELSON: Okay. And I had a question about the safety thing, because in the very beginning it s one of the reasons that we're addressing this whole thing is a safety issue. And I was just wondering what exactly safety -- I mean, I live at Lahaina Harbor, and as I walk around to my slip in the back, I'm falling through boards and falling off rails and things of that nature. And when you bring up safety, I'm just wondering, how did this become a priority over the other infrastructure that is probably far more unsafe than the major loading dock?

MR. RICE: Because this money is here, the other money isn't. But January 15th the legislature opens.

MS. NICKELSON: Okay.

MR. HIRANO: Thank you.

MS. LINDSEY: My name is Mary Helen Lindsey. I'm with the task force for the cruise ships, the Mayor's task force. And it has been -- We've gone out, we've been into Lahaina, the task force has, for the cruise ships. And almost all agreed, one cruise ship in at a time, not two. And, please, never three.

(Applause.)

MS. LINDSEY: Never, ever three.

Now, I have really -- not mixed emotions, but here, you know, I don't see anything on the paper that says -- You're going to Lanai, you're going to Kaunakakai; and you're not going to inform the people who are going to be using it. So I would like for you folks to do that as a courtesy to them, because they're the users.

MR. RICE: They're going to.

MS. LINDSEY: Okay. Both Kaunakakai and Manele, Lanai. So please put that on. Okay?

Now, secondly, the ferries all run on a schedule. You can see Molokai is outside, ready to come in, backing up, because they've had -- Before they didn't need to do that, but now they do. Hopefully this ferry appendage added will make them come in. And I use that very loosely.

Anyway, we want to take care of our Lanai and Molokai, mainly because plane fares are outrageously high. And there's going to be stopping on Lanai -- In fact, Aloha is not going to be going to Lanai. We've got a critical problem for those people. And, yes, they are very important for us because they're Maui County. They're not their own island in itself, it's under Maui County. Although this is DLNR that's doing it.

But we appreciate it and we have the -- We





have Linda Lingle's person right here that represents and will go back and give it to her. And Ralph -- George, rather. George is the one you need to talk to because he has the right lane right into the Mayor's -- the Governor's office.

And I assume because we've met with the people -- And I wear two hats, actually. Lahaina Restorat: Foundation, we've met the people on the bathroom. And it has been horrors, especially in the courthouse, the flooding. And we've had a meeting with DLNR and the State architects, and they told us all about what's going to be happening. And that seems to be the only bathrooms available. Once they have implemented I believe in 19 -- I mean, at '06, is that correct, you're going to be starting that bathrooms?

UNIDENTIFIED SPEAKER: Around there.

MS. LINDSEY: I saw it. I read about it. It's not going to come any -- I mean, it would be great if it could come sooner, because it's desperate when you have people need to go to the bathroom and they can't get there. And if we have -- like we just had two cruise ships just a few weeks ago, and it was chaotic over there.

So if the ferries are on time, does that make the tenders the first persons to get in to use these that were built for the ferries? Who's going to monitor them to say the ferries are going to be going in or coming out? So

who's going to say, do not use this? Will there be a sign, an enforcer? That's your duty, huh?

MR. HIRANO: The harbormaster.

MS. LINDSEY: Yeah, right there. So is that -- I didn't hear anything about that. Is there going to be a -- That's your duty?

MR. RICE: The cruise ships keep one of their officers on the dock to regulate the flow of their boats back and forth depending what the traffic is in the harbor. So, yeah, and that person works in conjunction with the harbormaster. The cruise ships maintain radios, walkie-talkies, so he can tell his people don't come, do come. The ferry's coming in, so keep the people on the boat for a half hour until they send the next one.

MS. LINDSEY: Okay. I hope -- I mean, written or in verse, it sounds good; but it's the actual activity that does work. Because if it does not work, then you're going to have a big, big problem, bigger than you're really going be able to handle, too.

So the next thing here that I didn't really see, the Army Corps of Engineers, is the sea wall that is where the ferry's going to be going loading and unloading, docking. You did the -- Did they do a study of the sea wall? How -- Is it going to be more pressure being put on the sea wall there? When I don't -- When I mean the sea wall, I mean





where the lighthouse is. You know, that's an ancient wall there. Has a study been done?

MR. HIRANO: The studies will be done. And that comment will go in to the engineers who will be reviewing that, looking at that. So that will be, as you said, a concern that was raised during this meeting, so we'll pass that along and have comment on that.

MS. LINDSEY: Okay. Thank you.

MR. MUNNS: Hi. My name is Josh, and I'm a boat captain and boat owner in Lahaina Harbor.

And it just seems to me that if this is for the ferries and money for the ferries, they should put the fuel in there for them. Because they're going to be using the north side to get fuel, but using this to get passengers. It seems to me if there's going to be a ferry pier, the ferries should do all their business there and not be coming to the other piers to use our facilities. If there's going to be a ferry pier, specifically funds for them, I think fuel will be a really good idea. It'd alleviate congestion for everybody else on our fuel pumps. That's about it.

MS. ROBERTSON: Sorry, I just thought of one more. Getting back to that drawing on the scale and everything, you had said that the new one is going to be 65-feet long by 35 feet; is that correct?

MR. RICE: It's mentioned on the -- on the

top there.

MR. HIRANO: 114 feet.

MS. ROBERTSON: Oh, so it's going to 114 feet, so it's going to be the same. And I see 60 feet between. Okay. Thank you.

MR. HIRANO: Thank you.

MR. JUNG: Okay. I'm Dave Jung, president of Sea Life of Hawaii. I run the Molokai ferry. I've been running it since 1986.

We have some special challenges with our particular route. Molokai is a depressed island, has limited transportation back and forth between the islands. Really, the only way the kids can come and participate in sports on Maui or for the other teams to go back the other way is on the ferry. The ferry is incredibly cheap compared to airfare these days. The next time you try to fly to Molokai, the prices have gone through the roof.

Because the channel is so rough, we have to run large boats. You can't get by with 50-foot catamarans. You have to bite the bullet, run with 100-footers. We didn't ask for this ferry terminal. We were supposed to be given priority use into the loading dock. We try not to abuse it. We try to get in and out as quickly as possible.

But times have changed. And I started running out of Lahaina in the early '70's. In the early





'70's you could sit at the loading dock all day long, do your maintenance, there was no problem. Times have changed. And we keep loading and loading and loading more and more vessels on that loading dock. It's gotten to the point today where the local fisherman doesn't even want to go there. The pleasure boat doesn't have a chance to get in. And we're just increasing the use on the loading dock.

The natural thing to do is to make our facilities better. Although this is funding under the name of ferry usage, it really does benefit the whole harbor. Whether or not we have this extra pier doesn't really have an impact on the number of cruise ships that show up here. If -- We're going to be crowded no matter what until the community comes up with some sort of limit on the cruise ships. If we had 20 loading docks, would we end up with 15 cruise ships? That's possible. But I think it's a big mistake to include improved facilities for the harbor with the number of cruise ships that are visiting.

We kind of have a parallel with Hana. Pec in Hana really don't want to see a four-lane highway to Hana, so they're willing to suffer with a small, winding road. I think in the harbor we don't want substandard harbors, we want to have decent facilities. If we're going to limit the number of cruise ships in our facility, in our community, I think we're going to have to deal with it on a different

level than having no harbor facilities. I think that would be a big mistake.

I think we have to look ahead as a community and control the number of visiting ships, not necessarily the number of piers or the number of pump-out stations. I'm all in support of improving the harbor facilities. I also wonder if some of the catamaran operators feel it's unsafe to load their catamarans on the back row slips like they used to do every day, that maybe we can use some of the ferry funding to upgrade other parts of the harbor facility. Because if you're asking people not to use the loading dock as often, it just makes sense you ought to maybe pay for a road on the back slip or good lighting or rebuild the piers or providing better electricity.

The bottom line is we've got a whole bunch of Federal money that can come in to benefit all of us. So I just hope all of us will get behind this project. And we'll just have to stay on top of how many cruise ships actually are going to show up, because the community -- like Dave Chenowith was saying, the community can only absorb so many visits. And that's kind of a separate topic. I hope we don't put the two together.

When you're out there in the Molokai channel or coming back and forth from Kaunakakai and we have to wait 15 minutes because we have cruise ship tenders running into





each other, it does cause a problem. I don't care how many piers we have, that's always going to be an issue. So let's have more piers and have it be an issue than less piers and have it be an issue. We're still going to have to address it. Thank you.

MR. WALKER: Hi, my name is Jimmy Walker. I've been living in Lahaina since 1949 -- '48, somewhere around there. My main concern --

How's this? Better? Okay.

My main concern is that wall. First of all, all the problems that the people from Lanai and us have to go through every time the boat is there and all this kind of stuff. There's no place for us to unload. We have to go and park at Prison Street parking lot and carry all of our stuff over because of the security.

But my main concern is the Hauola Rock and the wall. You're not going to touch the rock?

MR. HIRANO: No. It'll be on the existing pier.

MR. WALKER: Oh, okay. The oldies had a technique of setting stone and making a stone wall. If you want to see the difference between, just take a drive to the other side and look at all the new type of concrete that the ocean just eats away. So we cannot afford to have one of the last remaining places in our town disappear because of new

techniques that come in, say it's going to be better and it isn't.

The other, like the one I mentioned already, is the problems that the people from Lanai, they come in -- This is on the ferry, the Hiraga or whatever the ferry name is --

UNIDENTIFIED SPEAKER: Expeditions.

MR. WALKER: Expeditions, there you go. I, usually, like I say, we go back and forth, my family comes back and forth from Lanai. And how you figure this? We all there early, all our bags all get ready to be loaded up on the boat, and here comes this van, all the tourists that come out of there and they go on the boat first because they have tee times. And the whole theory to get these things and all the approvals was taking care of the local people, and that is not happening. That's my main concern. Thank you.

MR. KANA(?): I just want to make about three quick points. One is that if you saw this Environmental Impact Statement preparation, and right on the cover it says that it's prepared for the State of Hawaii Department of Land and Natural Resources, who, by the way, also review their own plan and put comment to it. So that needs to be -- You all that are here need to be aware of that the person that's doing it approves it, also.

The second thing is that the Section 106 part





of the Federal requirements and the monies that came in says that the real review body should be the Federal Transit Authority, which is the FTA, not DLNR. So that has to be made a point of. You need to know that. It's very important because DLNR should not be part of the process.

The third point is that I would like to be considered as one of the consultants for the 106 when that comes up. I want -- We would intervene as our organization.

And for the record, my name is Akona Kana (sp?) with Friends of Mokuala. Thank you. Sorry.

And, finally, I just want to say that we also -- at the last scoping meeting there was a big push toward not having the pier even added at Lahaina Harbor, which cannot take any more impact as-is, period, and that we look -- And there's a gentleman right there -- at an alternate place to put this one pier.

And if it's as said, your project objective needs to be revised because the way that you put it and what it said up here, it said this basically was for only ferrie Now, here, no, well, really, it's for everybody. But, no, no, but the scope was for ferries. So the overview, the project objective needs to be revised to really say what the objective is here.

And second is that you have not actually proposed, and it should be included in here, the alternative,

which was that it was brought up -- and I think it is a great idea because it would alleviate traffic, for one thing, in and out of the harbor area. It is an existing area that was a former pier area, anyway. It would keep all of the ferries and all the tenders coming from the ships dumping people down on that side of town instead. And with access to instead of just Front Street, they got the whole cannery, Lahaina Cannery, to go to like as in Kahului where they can go over to Maui Mall.

So these are my suggestions. And everyone else needs to pay attention to who's proposing and who's approving, because that is going to cause some possible lawsuits because of that. Aloha.

MR. KE'EAUMOKU KAPU: Aloha. Ke'eaumoku Kapu. I'm here representing Kuleana Ku'ikaki.

Just some suggestions that basically you need to definitely take into consideration based upon 7-1 Native Tenant Rights. And it always boils down to Hawaiian traditional and customary rights based upon what's happening in that area.

And somebody also mentioned about the surfers going on those areas and going into the water. They have a right. Yeah? They all have a right. My suggestion is get rid of the expansion. Don't want it. Because reading that little book that they put together, it says in 2010 we have a





population of 24,664 on the west side alone. Crazy. Right now we got what; 16, 14,000 people on this west side alone. So what is that going to cause? We're creating sprawl right before our eyes, and we don't even see it.

The only thing we're blinded by is the money that we're going to be bringing in. Then at the same time we're forgetting about -- Don't forget about us, now. We're still around. 7-1 Native Tenant Rights. The only thing I can say to the Department of Land and Natural Resources is they have a custodial duty to protect, which they have failed to protect Hawaiian traditional and customary rights. And we will be here. We'll be a part of this. We ain't going away.

So anything -- whatever your expectations are, kala mai ia'u, which means I'm very sorry, but sometimes we'll be left out of the picture. Always left out of the picture. And we always see degradation, suffering, yeah. The people has the poorest health, poorest education, yeah. And this so-called money that's supposed to come from the Harbors Division goes to the 5(f)(c), the land trusts. And 5(f)(c), the land trusts, those monies are supposed to be allocated for Hawaiian Homestead, education, and health. We don't see nothing. So we don't get nothing.

The only thing we have left is our Hawaiian traditional and customary rights, 7-1 Native Tenant Rights. We'll be a part of this. We ain't going away. It's not

happening. Mahalo.

MR. JOHNSTON: Hello. My name is Jim Johnston. I'm with Teralani Charters.

The big point that I would like to underline here is that whatever solutions come out of this, that we really work on the fuel delivery there. A lot of boats just need to come in, get fuel, get out. And a lot of times the fuel pumps just are not working. I know it's not particularly the State's business, but whatever solution we come up with, we should make sure there's adequate fuel delivery there.

If you go in to the south side to get fuel and the south and the middle pump are out, for example, you're on the south side and only the furthest one out is working, you're really hogging up space so other boats can't come in. It'd really help the flow a lot if the fuel pumps worked on a regular basis. And that's all I would like to say. Thank you.

MR. RUNYON: My name is Mark. I work for Trilogy Charters. One of the things that seems, whether or not this happens or not, there's always an issue with traffic control and flow in and out. If the expansion does happen, what is the possibility of having traffic control just like we do on the harbor days during at least an interim time to allow people to adjust for and, you know, take into





consideration other people's needs? What's the possibility from you, Hal, and your people as far as having some type of traffic control?

UNIDENTIFIED SPEAKER: Possible.

MR. RUNYON: Okay. Thank you.

MR. TISER(?): Aloha. Hello. My name is Albert Tiser (sp?). I was born in Kahului, raised in Lahai all my life except when I had to go to Nam. Every time I see a ship out there; stink, the water. It's terrible. Every time I see out there, they don't care. The ships don't care. The business in Lahaina, they make their business, but they don't care about the environment.

Let's talk about the environment. We are part of that environment. We can't enjoy the environment. I lived in Lahaina, I was ten years old, I can remember jumping in the water, it was green water. No more. Can't even eat the fish off the breakwater because they stink.

So how can you tell -- How can I tell my grandchildren that this is good for them? The kala is the power, Haole. This land, Lahaina, is so rich with cultural stuff -- you guys don't even realize that -- because this was the capital. This was the capital of Hawaii then. From Kapalua to Ukumehame, right, grave sites all over this place. You guys live here 50 years, that doesn't make you kanaka, I'm sorry. You could be Portuguese, Japanese, Filipino; you

guys have green card, you guys coming over. They're not taking care of Lahaina. They're not taking care of the local people.

My grandchildren, I don't dare let them swim anymore. 1987, my last time I swim the harbor, and all the way I had stink in my mouth, the piece of shit and shit shit. Today is worse. They get staph. Get the staph, cut the leg off. So how can you sit there telling me this environment is good for us? What about your grandchildren? How are you going to tell them that you going to give them this? My grandchildren, at least they can't say it's my fault that it's like this.

The environment, zero. Every time I see a cruise ship, all the shit they dump into the ocean. Just like Kahului. You can taste them. All you guys been here long time can taste the smell of the damn diesel shit. All these boats, they take people out to the other islands, they don't give a shit. I do for my grandchildren that will come here. Haole did this. This is heffa. This is not for us; it's for the money. We don't make money.

But the loss for my grandchildren is there. You guys pass this, you guys going to have to tell your grandchildren, your great grandchildren, because the water stinks. Heffa. You get sick, you get staph, all this crap. Even cut your leg off. Don't tell me all this is good for





us. Haole.

I'm sorry, I'm not here to yell at you guys, but Portuguese, Haole, Chinese, Japanese came here and it was beautiful. Water was sweet. Now, can you tell me you like the stink by the breakwater? Haole. The surfers take showers when they go out there when they go surf. And I know, I was a surfer. I was born 1949, I know. From Kapa' all the way to Ukumehame surf.

And the water stink and more stink every time a big cruise ship come in, but they don't care. All they care about making the revenues, giving Lahaina community revenues. But what about us that love the aina, love the water? We're not going to have that.

I'm sorry I yell. Not for you. It's my kapuna telling me to speak up. And my great grandchildren never come here. Mahalo.

MS. ROBERTSON: I know that the thing that's -- the thing that's bothered me for the last 20 years is safety-wise the electrical box that has no doors on it. It could easily be damaged. Someone could knock off all the electrical stuff in the harbor. Have you seen it? Well, I hope some of you go look at it. I mean, talk about terrorists and worried about security. All they have to do is go boom, boom, boom; and you guys will all be not able to function. So at least take a look at the electrical box.

It's at the end of the harbor down there. Everybody knows where it is. They'll tell you where it is.

And we keep saying, you said to me that we'll consider the surfers after some time, but the next time I hope when they come in you'll have someplace for those steps to go down and show us, you know, old-time surfers. And I think it's a shame our kids, that's one thing they love to do here, and I think that that should be put into the plans.

It's like the senior center. They were going to put hot water in all the rooms, and then I started working there and there's no hot water. They said, Well, we can't do it now. So what I would like to do is get with some surfers to see where they would like to get a ladder or stairs down. So the next time you come down here, try to talk to the surfers and they can speak, you know, whatever. Thank you.

MR. FREELAND: My name is Keoki Freeland from the Lahaina Restoration Foundation.

First of all, I would like to ask Mich a question. This project takes place in a national historic landmark and funded by the federal government; therefore comes under that Section 106. And from what I understand under 106, federal agencies are to take into account the effect of this project as it might have on historic property. Which federal agencies are supposed to review this?

MR. HIRANO: Federal Transit Administration.





And it's through the contact with the State Historic Preservation Officer.

MR. FREELAND: Okay. So we'll look forward to hearing from them.

I do have a couple items that we're concerned about. In the far left corner over there outside the pier is the "Carthaginian," and that's roughly where you're talking about building the new pier. Most of the time the surf comes in from right to left and the finger pier protects what's out there, the "Carthaginian" or the so-called new pier.

MR. HIRANO: If you could point to it.

MR. FREELAND: Okay. Roughly you're talking about putting the pier in this area. Normally the surf comes this way and the finger pier protects that site. But sometimes the surf, when it gets big, it can come from this direction. So the concern that I'm suggesting here is what are you going to do to protect that pier when the surf is coming in this direction?

The other concern that we talked about in stakeholder meeting and I want to mention it again is that when the surf is big, the reef from here all the way to Ma'alaea Wharf subsides from the waves coming over. The tide on the inside is higher than the outside and the only way the water can get out is through the channel. The water comes roaring out through here. So, again, if you're going to

dredge in here, what effect will that dredging have relative to that roaring water coming out when the surf is big? Is it going to make the dredging useless, or is it going to enable erosion? And heaven forbid if that were to happen. What I'm suggesting is to look into that so that we don't have a problem later on.

And, finally, the other suggestion or concern that we have is that everybody knows, you know, we have a real mess inside here. Okay. We're talking about cleaning up this mess here, but what about, another person has suggested it, taking care of some of the problems outside of here? You know, you're going to have a lot of people coming through here, we're talking about increasing the flow of traffic through here. What about taking care of the problems on land like maybe having a good parking area and a shuttle system or controlling the traffic? Thank you.

MR. GENOSA: My name is Kyle Genosa. I'm the Maui County Director of Transportation. I just wanted to address the traffic and parking problem a little bit at least. As you may know, last week we held a bunch of public meetings around the County in preparation for coming up with a transit plan for the island of Maui -- well, really for the whole County.

And one of the things that we're currently looking at is having a circulator system within Lahaina that





would basically come down Front Street and try to bring the cars off out of the harbor area. And we're looking at possibly getting some satellite parking. We're still looking for where we could put a lot, but basically to have people park outside of the town and have a circulator system like a shuttle system take people from that external parking area and circulate within the town. So that's currently what we're looking at.

And we've got some federal money to buy buses and -- but that's separate from this harbor project or from the ferry project in terms of the money sources. But that's what we're looking at to try to address the traffic problem currently, is to just have like a circulator system like Keoki was mentioning. Thank you.

MR. KNIGHT: Well, as most of you know, I'm Steve Knight with Expeditions. And what do you think; support, not support? We definitely are supporting something to alleviate our problems in Lahaina Harbor. This particular idea, other than the loading situation here, the unloading ramp, and I'm not real sure about that, but basically what we would like is anything that could help us with the problems that we're having in Lahaina Harbor for unloading our passengers from Lanai, especially back and forth.

At the present time there is no place for them to even unload their cars from Costco goods, stuff going

over to Lanai; luggage, golf clubs, everything like that. Cruise ship days, double cruise ship days, the security is so blocked. They've got all of their security cars parked out in front, all of the security cars parked. There were 14 cars the other day parked out right in front of the harbor in the security area. You can't even maneuver around there. You can't get in.

So if this situation, if the security barriers could be set up differently here where the access off of the ferry pier and over would -- could flow the traffic out or something like that, I think it would be wonderful. We're at a real situation now where we can't even get on the loading dock a lot of times. And as a Public Utility Commission operation, we're supposed to have preferential treatment on unloading and loading on the loading dock. If somebody at the dock loading or unloading their passengers or cleaning up or fueling or something like that could move off the loading dock so the ferry can come in. That's what's supposed to happen, but it's not being enforced. There's really no way to do that.

We've got three sides of a loading dock here that the cruise ships take up one side with the tenders, we've got a small area on the face, and then we've got the south side to utilize for the entire harbor on cruise ship days. And it's just almost impossible at times. You know,





sitting outside with 80, 90, 100 people on the ferry trying to stay on schedule, which we're mandated to do, and it just makes it impossible at times.

Somebody mentioned earlier to let the Lanai people know that this is in the making. They would welcome anything that could help us in this respect, which something like this would do. I don't know if this is the answer. I know this is a lot -- a big drop from the one of the initial options that we had with shops and harbor agent's office and all that on the top, which looks real nice, but this is really backing down. I think they're trying to -- I think they're trying to satisfy a lot of people and a lot of different opinions in this.

And whether this is the final answer that they will arrive at after the studies are made, this is just like the beginning steps trying to get something that at least we can go forward with. And with all the -- This is just the beginning of the study stage, so I'm sure there's going to be changes. I'm sure there's going to be -- It could have to do with the size of the pier. It could have to do with which areas are going to be dredged. It could have to do with the way people are unloaded off of the piers and into that area. And I'm sure it will have -- like the transportation, I'm sure it will have a lot to do with what's done up in this area for parking for traffic flow through;

all that kind of stuff.

Yes, Expeditions especially supports a ferry pier. It's because of the ferry pier that we're able to get this money -- or because of the ferry that we're able to get this money. The ferry pier is one element of this money. This money is available year after year after year. The majority of this money went to Alaska for their ferry systems up there, and they've been very good at being able to cross the T's and dot the I's and get this money and it's been going up there for years and years and years.

And right now the money that we just captured over for Manele Harbor is the first time ever in Hawaii that any Federal transportation money has ever been designated into Hawaii. And we got $6 million for ferry, for ferry improvements in Manele Harbor. Okay. That is going to give us a covered waiting area for the ferry passengers. Okay. What's that going to cost? You know, 100,000, 150. We spent -- on our own money we spent close to $200,000 to build the existing ferry pier that we had over there in our own money, okay.

Now we're going to have a covered waiting area, which will be great for the people, but what it will also improve is complete paving throughout the harbor, parking lot paved; electricity, which we've never had at Manele Harbor; lighting; telephones; sewer system; on and on





and on, all with this money for the ferry system.

So you can see what will happen if we can start capturing this money for Lahaina Harbor based on the ferry terminal. It will just mushroom, branch out, and maybe the back -- the back row will see some of the benefits. The ferry has to park its tender over in slip 86, so that's part of the ferry system, so all of that back there can be redo eventually, you know.

And this is year after year these monies are available. It's not a one-time shot. But there is a lot involved in capturing the money and there's time deadlines and things like that. It was really on a fast track for the Manele project. Everybody worked in complete agreement. The community meetings that we've had, Manele Harbor advisory meetings, on and on and on, everybody was in complete agreement. It was basically just do it, just do it, just do it. And we did. And they are projecting that groundbreaking over there will happen sometime early 2006, but it's in the complete planning stage now and it's a good project.

So I hope that we can do something like that here. I hope that because of the ferry operating out of Lahaina Harbor that we will get some kind of a ferry pier that will be exclusive use for the ferry. And if other operations can use it during the times that the ferries aren't on the dock, well, that's great, too. But I would

sure hate to see it be impacted by the cruise ships saying it's a golden opportunity to bring two more ships in here with all this room over here to use. And I just don't think that the FTA would let that happen with them giving all this money into the ferry terminal and the use of that.

So, anyway, that's all I've got to say. We can support it and hope we can get it down the road somehow. Thanks.

MR. HIRANO: Does anyone else have or want to say something about the project or have comments on the project?

Dave Chenowith, Jr.

MR. CHENOWITH: Hi. My name is David Chenowith, Jr. I do a lot of surfing. I'm over here from the mainland helping my dad right now. I used to surf -- and still do -- a lot in the '70's.

Where is that red firefly? Okay. Push that right there? Okay.

Right there the waves are big, big. That's where we usually pitched off in the '70's to paddle across over here, out over here. A lot of times we'd use the pier or the jetties out here and would paddle out here when it was big. What about the liability problem with this thing? The surfers are still going to be pitching out here and going across the channel here, and I was just kind of concerned





about that. Thank you.

UNIDENTIFIED SPEAKER: Well, one last word here. You know the old adage, use it or lose it. If we don't use this money, we're going to lose it. It would be a real shame. It's our harbor. The harbor users, let's get behind this and support it. If there's questions on how it's going to be used and how we administer it, then it's our responsibility to decide how we use it. Okay? That's a separate paddle, but let's just get this. Let's not let this money get away from us. It should benefit all of us. Thanks.

MR. HIRANO: I would like to just close the meeting now. And I would like to really thank every one of you who have come out and expressed your concerns, who have provided comments to us. It's not going to be an easy job for us to do the Environmental Impact Statement. There are certainly some heartfelt issues about this particular proposal. And we will be working with the community, we'll be working with the organizations and community groups and native organizations in order to work with them to get their concerns expressed and ways in which we could deal with those issues that have been raised this evening.

So I would like to thank you for the time you've spent and your interest in the project. So on behalf of the Department of Land and Natural Resources, I would like

to just say thank you and drive safely. Good night.

(The proceedings were adjourned at 7:45 pm)





C E R T I F I C A T E

STATE OF HAWAII )
) SS.
CITY AND COUNTY OF MAUI )

I, Sandra J. Gran, Certified Shorthand Reporter for the State of Hawaii, hereby certify that the proceedings were taken down by me in machine shorthand and was thereafter reduced to typewritten form under my supervision; that the foregoing represents to the best of my ability, a true and correct transcript of the proceedings had in the foregoing matter.

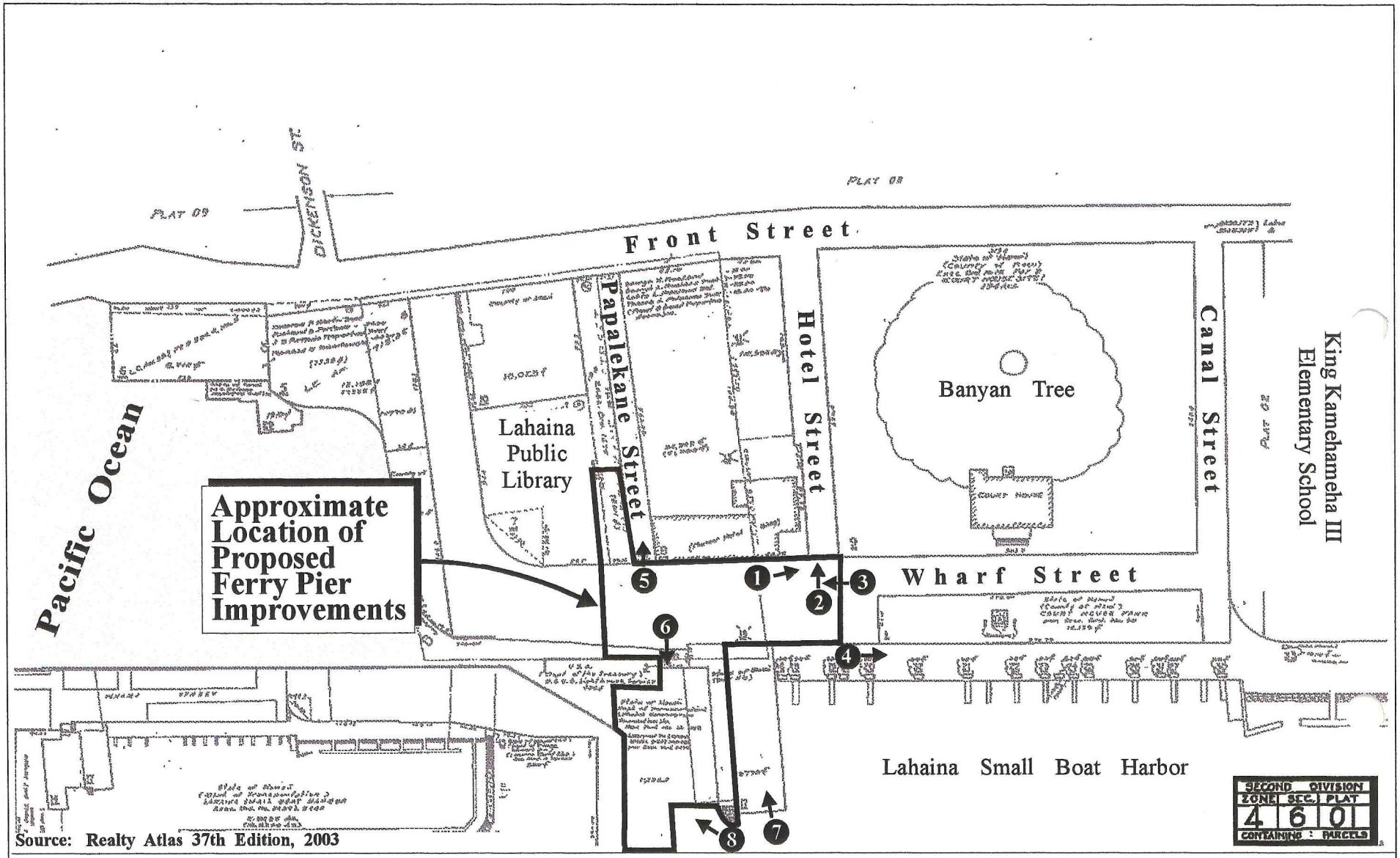
I further certify that I am not attorney for any of the parties hereto, nor in any way concerned with the cause.

DATED this 21st day of December, 2004, in Maui, Hawaii.

Sandra J. Gran
Hawaii CSR 424
Notary Public for Hawaii
My Commission Expires: 5/14/08

SANDRA J. GRAN
Notary Public
State of Hawaii

# 8. SITE PHOTOGRAPHS




Source: Realty Atlas 37th Edition, 2003

# Proposed Lahaina Small Boat Harbor
## Ferry Pier Improvements
### Photographic Reference Map

NOT TO SCALE

Prepared for: State of Hawaii, Dept. Of Land and Natural Resources

MUNEKIYO & HIRAGA, INC.

Mai/lhnpier/smassv/photoref

**PHOTO NO. 1 - Wharf Street, South View**

**PHOTO NO. 2 - Hotel Street, East View**

**PHOTO NO. 3 - Wharf Street, North View**

**PHOTO NO. 4 - Harbor Bulkhead, South View**

**PHOTO NO. 5 - Papalekane Street, East View**

**PHOTO NO. 6 - Lahaina Pier, West View**

**PHOTO NO. 7 - Lahaina Pier, East View**

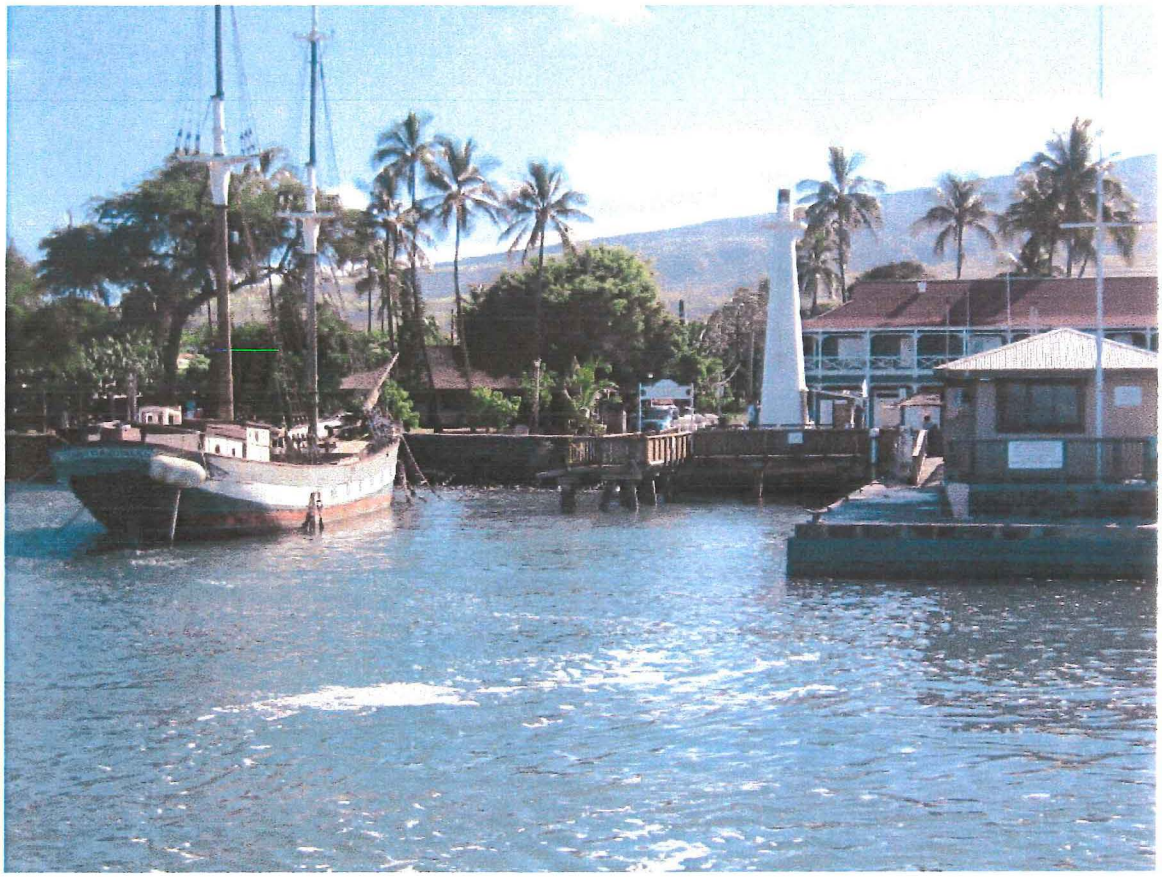
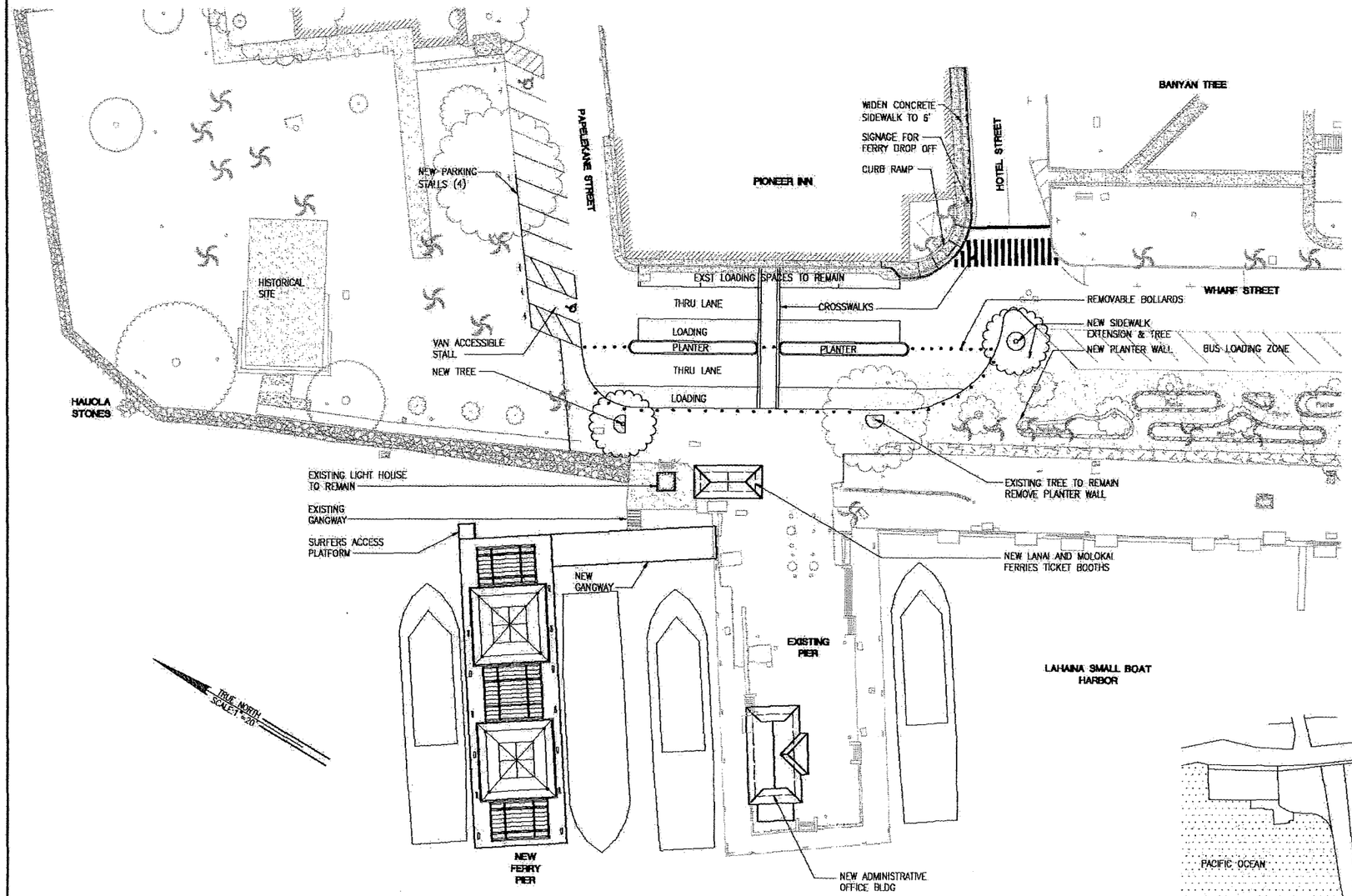


**PHOTO NO. 8 - Lahaina Pier, Northeast View**

# 9. PRELIMINARY SITE PLAN

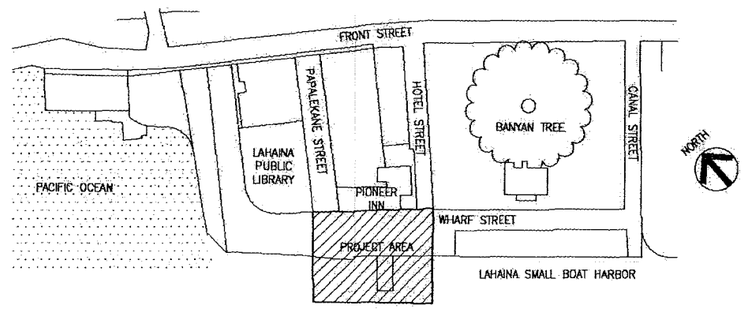



## SITE PLAN

SCALE: 1" = 20'-0"

20' 10' 0 20' 40'

1" = 20'




## LOCATION MAP

NOT TO SCALE

Mitsunaga & Associates, Inc.

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HONOLULU, HI 96814
PH. (808) 945-7882
FAX. (808) 946-2563

ARCHITECTURE
ENGINEERING
PLANNING
CONSTRUCTION MANAGEMENT

# LAHAINA SMALL BOAT HARBOR IMPROVEMENTS

Attached Sheet Pile and Pile Supported Ferry Pier
with Single Story Shade Structure

**LOCATION MAP**
**SITE PLAN**

Sheet No. 5

Date: JUNE 2006

# 10. CERTIFIED SHORELINE SURVEY

# 11. COLORED RENDERING
# (To be provided under separate cover)

**TO BE PROVIDED UNDER SEPARATE COVER**

# 12. NOTICE OF PUBLIC HEARING

# MAUI PLANNING COMMISSION

DATE: _____

TO: Owners/Lessees

Please be informed that the undersigned has applied to the Maui Planning Commission of the County of Maui for a Special Management Area Permit pursuant to the Special Management Area Rules of the Maui Planning Commission for the following parcel:

1. Tax Map Key: (2) 4-6-001:002, 007, 012, 014, and 017 Acreage: 11.9 acres
2. Street Address: Wharf Street, Lahaina, Hawai`i 96761 (Location Map Attached)
3. State Land Use Designation Urban Community Plan: Pk, Park and Public/Quasi-Public Zoning: Historic District 1
4. Proposed Development: The applicant proposes the following improvements at the Lahaina Small Boat Harbor: a new ferry pier (35 feet wide by 60 feet long) with an open sided shade structure to the north of the existing pier; an access ramp; improvements on Wharf Street and Hotel Street; six (6) parking stalls on Papalekane Street; replacement of the Harbor Master's office and ferry ticket booth.

**THIS SECTION TO BE COMPLETED BY THE PLANNING DEPARTMENT:**

Public Hearing Date: _____

Time: _____

Place: _____

_____

Attached please find a map identifying the location of the specific parcel(s) being considered in the request for a special management area permit.

The hearing is held under the authority of Chapters 205A and 91, Hawaii Revised Statutes (HRS), and the Maui Planning Commission Rules. The particular sections of the Statute and Rules involved are Sections 205A-26, 205A-27, 205A-28, and 205A-29, HRS and Chapter 201 and 202, Maui Planning Commission Rules.

Petitions to intervene shall be in conformity with §12-201-20, 12-201-40, and 12-201-43 of the Rules of Practice and Procedure for the Maui Planning Commission and shall be filed with the Commission and served upon the applicant no less than ten (10) business days before the first public hearing date, no later than 4:30 p.m. on the day of _____. Filing of all documents of the Commission is c/o the Maui Planning Department, 250 S. High Street, Wailuku, Maui, Hawaii 96793.

Any party may be represented by Counsel or other representative.

Testimony relative to this request may be submitted in writing to the Maui Planning Commission, c/o the Maui Planning Department, 250 S. High Street, Wailuku, Maui, Hawaii, 96793 or presented in person at the time of the public hearing.

Information relative to the application is available for review at the Planning Department, 250 S. High Street, Wailuku, Hawaii, 96793, Telephone (808) 270-7735; toll free from Molokai 1-800-272-0117, Extension 7735; and toll free from Lanai 1-800-272-0125, Extension 7735.

State of Hawai`i, Department of Land and Natural Resources
Name of Applicant

Signature

P.O. Box 373
Honolulu, Hawai`i 96809
Address

Phone: (808) 587-0230

Mich Hirano
Munekiyo & Hiraga, Inc.
Applicant's Agent, if applicable

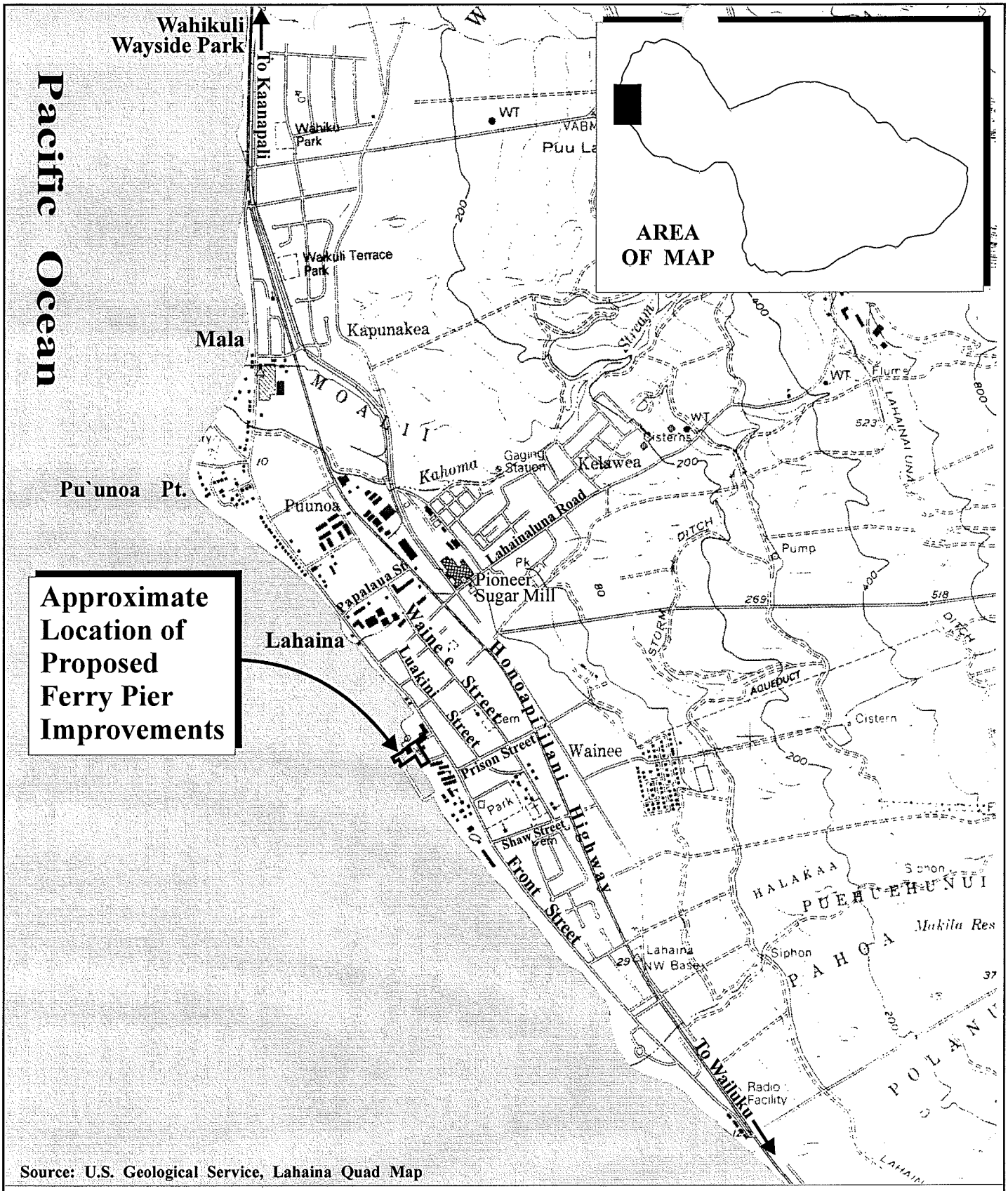
Signature

305 High Street, Suite 104
Wailuku, Hawai`i 96793
Address

Phone: (808) 244-2015

(Rev. 2/22/06)

MAI/LhnPier/SMAmajor




Source: U.S. Geological Service, Lahaina Quad Map

# Proposed Lahaina Small Boat Harbor Ferry Pier Improvements

## Regional Location Map

1000 Feet
0 500 2000

Prepared for: State of Hawaii, Dept. Of Land and Natural Resources

MUNEKIYO & HIRAGA, INC.

Mai/lhnpier/smassv/regloca

# MAUI PLANNING COMMISSION

DATE: _____

TO: Owners/Lessees

Please be informed that the undersigned has applied to the Maui Planning Commission of the County of Maui for a Shoreline Setback Variance pursuant to the Shoreline Area Rules of the Maui Planning Commission for the following parcel(s):

1. Tax Map Key: (2)4-6-001:002, 007, 012, 014, and 017 Acreage: 11.9 acres
2. Street Address: Wharf Street, Lahaina, Hawai`i 96761
   (Location Map Attached)
3. State Land Use Designation Urban Community Plan: Pk, Park and Public/Quasi-Public
   Zoning: Historic District 1
4. Proposed Development: The applicant proposes the following improvements at the Lahaina Small Boat Harbor: a new ferry pier (35 feet wide by 60 feet long) with an open sided shade structure to the north of the existing pier; an access ramp; improvements on Wharf Street and Hotel Street; six (6) parking stalls on Papalekane Street; replacement of the Harbor Master's office and ferry ticket booth.

**THIS SECTION TO BE COMPLETED BY THE PLANNING DEPARTMENT:**

Public Hearing Date: _____

Time: _____

Place: _____

_____

Attached please find a map identifying the location of the specific parcel(s) being considered in the request for a special management area permit.

The hearing is held under the authority of Chapters 205A, 91, and 92, Hawaii Revised Statutes (HRS), and the Maui Planning Commission Rules. The particular sections of the Statute and Rules involved are Sections 205A-43 and 205A-44, HRS and Chapters 201 and 5, Maui Planning Commission Rules.

Petitions to intervene shall be in conformity with §12-201-20, 12-201-40, And 12-201-43 of the Rules of Practice and Procedure for the Maui Planning Commission and shall be filed with the Commission and served upon the applicant no less than ten (10) business days before the first public hearing date, no later than 4:30 p.m. on the day of _____. Filing of all documents with the Commission shall be in c/o the Maui Planning Department, 250 S. High Street, Wailuku, Maui, Hawaii 96793.

Any party may be represented by Counsel or other representative.

Testimony relative to this request may be submitted in writing to the Maui Planning Commission, c/o the Maui Planning Department, 250 S. High Street, Wailuku, Maui, Hawaii, 96793 or presented in person at the time of the public hearing.

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State of Hawai`i, Department of Land and Natural Resources
Name of Applicant

Signature

P.O. Box 373
Honolulu, Hawai`i 96809
Address

Phone: (808) 587-0230

Mich Hirano
Munekiyo & Hiraga, Inc.
Applicant's Agent, if applicable

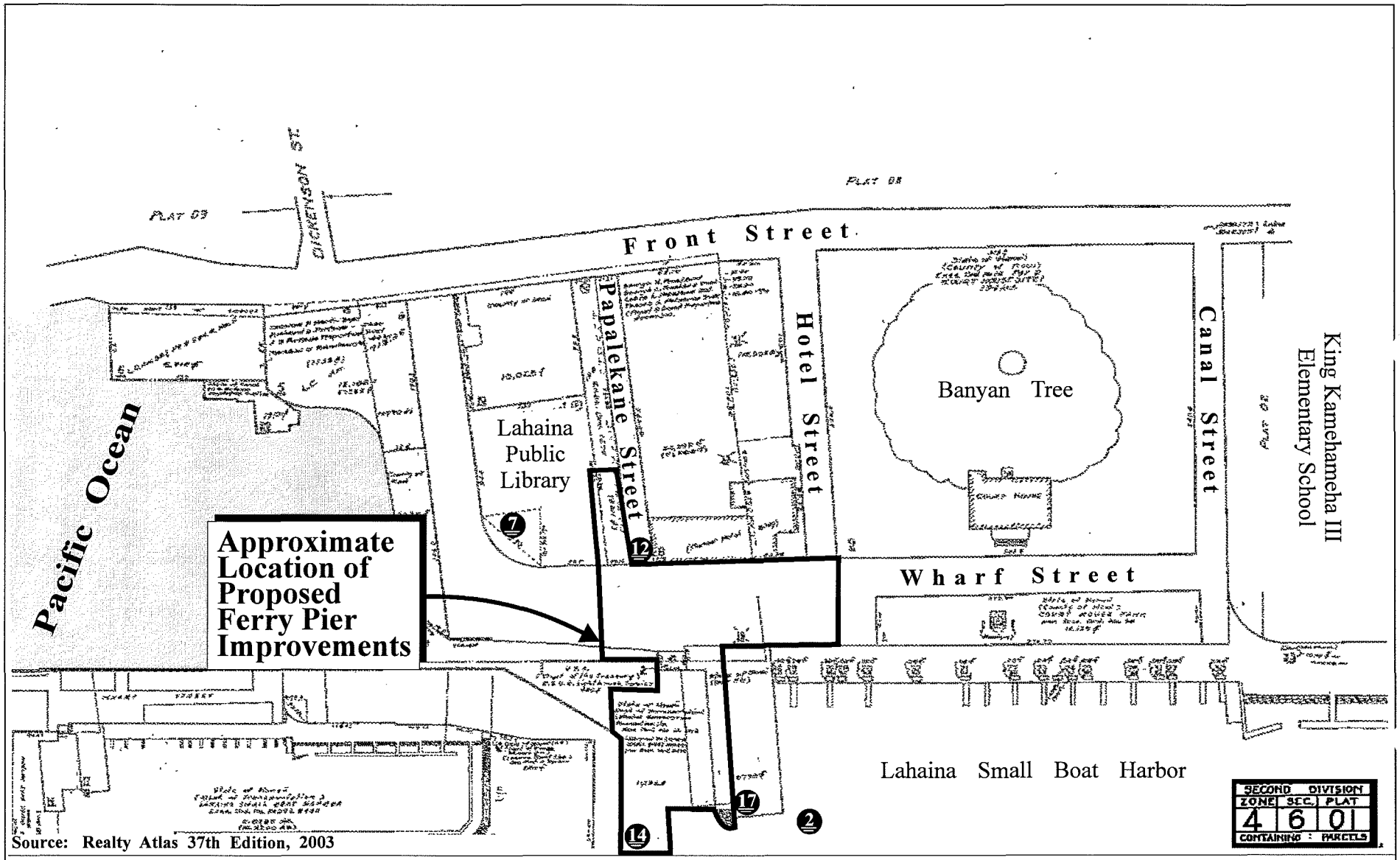
Signature

305 High Street, Suite 104
Wailuku, Hawai`i 96793
Address

Phone: (808) 244-2015

(Rev. 2/22/06)

MAI/LhnPier/SSVNOH




Source: Realty Atlas 37th Edition, 2003

# Proposed Lahaina Small Boat Harbor Ferry Pier Improvements

## Parcel Location Map

NOT TO SCALE

Prepared for: State of Hawaii, Dept. Of Land and Natural Resources

MUNEKIYO & HIRAGA, INC.

Mai/lhnpier/smassv/parcellocation