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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **BWS** | City & County of Honolulu Board of Water Supply |
| **DLNR** | State of Hawai'i Department of Land & Natural Resources |
| **DOE** | State of Hawai'i Department of Education |
| **DOH** | State of Hawai'i Department of Health |
| **DPP** | City & County of Honolulu Department of Planning & Permitting |
| **DURF** | Dwelling Unit Revolving Fund |
| **EA** | Environmental Assessment |
| **FAR** | Floor Area Ratio |
| **FEMA** | Federal Emergency Management Agency |
| **FIRM** | Flood Insurance Rate Map |
| **FONSI** | Finding of No Significant Impact |
| **HAR** | Hawai'i Administrative Rules |
| **HECO** | Hawai'ian Electric Company |
| **HHFDC** | Hawai'i Housing Finance & Development Corporation |
| **HPD** | Honolulu Police Department |
| **HRS** | Hawai'i Revised Statutes |
| **HUD** | US Department of Housing and Urban Development |
| **LdN or DNL** | Day-Night Average Sound Level |
| **LUO** | City & County of Honolulu Land Use Ordinance |
| **NRCS** | Natural Resource Conservation Service |
| **PUC** | Primary Urban Center |
| **SHPD** | State Historic Preservation Division |
| **SMA** | Special Management Area |
| **TMK** | Tax Map Key |

# OVERVIEW

THM Partners LLC, through affiliate KRC Partners LLC, is proposing to create a 176-unit residential condominium called "Holomua" on 21,339 square feet of land located at 1315 Kalakaua Avenue, Honolulu, identified by Tax Map Key (1) 2-4-6: 17 and 18. The goal of Holomua is to provide affordable and workforce housing in urban Honolulu. Figure 1 provides the Holomua site plan and Figure 2 provides a rendering of Holomua.

Recent residential condominium projects in Honolulu have focused on high-end/luxury units. Over the years attempts have been made to provide affordable housing on O'ahu through a variety of City, State and Federal programs. However, due to the high cost of land in urban Honolulu, many of these projects are located in the suburban communities of O'ahu. Of the projects located in town, many consist of rental programs and do not provide the opportunity for home ownership. Other affordable, for-sale residential opportunities located in central Honolulu are aged, poorly maintained and in less desirable locations. The result is a void of affordable units for the working people of Honolulu and also a void in "Gap-Group" or "Workforce" units.

Holomua fills this void by providing affordable and workforce housing in urban Honolulu, thus creating the opportunity for home ownership in close proximity to jobs and urban amenities. Located within in the urban core of Honolulu, Holomua is surrounded by numerous amenities including: grocery stores, shopping, public transportation, parks, schools, employment centers, childcare facilities, and activity centers. This close proximity to services is expected to reduce Holomua resident's reliance on automobiles for daily needs.

THM Partners LLC will be processing approvals for Holomua under Chapter 201H, Hawaii Revised Statutes (HRS), which allows for greater design flexibility and cost savings to facilitate the development of affordable housing. A minimum 51 percent of the units will be priced to be affordable to households earning 140 percent or less of the HUD median income for O'ahu.

In addition to meeting the content requirements for an environmental assessment (EA), under Chapter 343, HRS, and Chapter 11-200, Hawaii Administrative Rules (HAR), this EA also serves as the Chapter 201H, HRS application (201H application) agency/public comment document. Pertinent information relating to the 201H application has been included. The complete 201H application is on file with the Hawaii Housing and Finance Development Corporation (HHFDC).

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**Figure 1**
Site Plan
# Holomua

THM Partners LLC

ISLAND OF O'AHU

NORTH

NOT TO SCALE

PBR HAWAII & ASSOCIATES, INC.

**Figure 2**
Rendering
# Holomua

THM Partners LLC

ISLAND OF O'AHU

NORTH

NOT TO SCALE

PBR HAWAII & ASSOCIATES, INC.

Source: Rendering by Jimmy Tablante

# 1.0 INTRODUCTION

This environmental assessment (EA) is prepared in accordance with Chapter 343, Hawai'i Revised Statutes (HRS), for Holomua, a proposed affordable and workforce housing condominium building in Honolulu, O'ahu, Hawai'i. This chapter briefly reviews the background and nature of the proposed project, relevant statutory requirements, and the various sources consulted to develop the assessment.

## 1.1 PROJECT PROFILE

| | |
|---|---|
| Project Name: | Holomua |
| Location: | 1315 Kalakaua Avenue |
| Judicial District: | Honolulu |
| Tax Map Key: | (1) 2-4-06: 17 and 18 |
| Project Area: | 21,339 square feet |
| Existing Use: | Vacant land |
| Recorded Fee Owner: | KRC Partners LLC<br>615 Pi'ikoi Street, Suite 808<br>Honolulu, Hawai'i 96814 |
| Developer/Applicant: | THM Partners LLC<br>615 Pi'ikoi Street, Suite 808<br>Honolulu, Hawai'i 96814<br>Contact: Mr. Serge M. Krivatsy, MAI |
| Approving Authority : | Hawai'i Housing Finance & Development Corporation<br>677 Queen Street, Suite 300<br>Honolulu, Hawai'i 96813 |
| Agent/Preparer: | PBR HAWAI'I<br>1001 Bishop Street<br>ASB Tower, Suite 650<br>Honolulu, Hawai'i 96813<br>Contact: Tom Schnell, AICP |

| | |
|---|---|
| Zoning: | State Land Use: Urban<br>Development Plan: District Commercial<br>County Zoning: Community Business Mixed Use (BMX-3)<br>Special District: not in Special District<br>Special Management Area (SMA): not in SMA |
| **Anticipated Determination:** | Finding of No Significant Impact (FONSI) |
| **Agencies Consulted:** | See Chapter 8 |

## 1.2 COMPLIANCE WITH STATE OF HAWAI'I ENVIRONMENTAL LAWS

Section 343-5, Hawai'i Revised Statutes (HRS), establishes nine "triggers" that require the preparation of an environmental assessment or environmental impact statement. Use of State lands or funds is one of the "triggers" that require an environmental assessment. Holomua will use State funds through the HHFDC's DURF program. As such, this environmental assessment is prepared in compliance with Chapter 343, HRS, and in accordance with the provisions of Hawai'i Administrative Rules (HAR), Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules.

In addition, creation of Holomua may involve or impact State and/or County lands or funds relating to infrastructure improvements for public facilities, roadways, water, sewer, utility, drainage, or other facilities. While the specific nature of each improvement is not known at this time, this is environmental assessment is intended to address all current and future instances involving the use of State and/or County lands and funds relating to Holomua.

# 2.0 HOLOMUA DESCRIPTION

## 2.1 BACKGROUND INFORMATION

### 2.1.1 Location and Surrounding Area

The Holomua site, identified as TMK (1) 2-4-06: 17 and 18, is located on two vacant parcels of land fronting Kalakaua Avenue, bounded by Kulana Hale 1 Senior Rentals, a 16-story, 176 unit building. Commercial retail uses are located to the north; a 7-11 store with Aloha gas station to the south; Kalakaua Avenue to the west; and the Imperial Business Plaza to the east. Figure 3 provides an aerial photo of the site and surrounding area; Figure 4 provides a regional location map; Figure 5 provides a TMK map. Appendix A contains an ALTA/ACSM Land Title Survey of the property.

The Holomua site is on the block between Beretania Street and Young Street, on the east side of Kalakaua Avenue. It is in the Makiki Neighborhood Board No. 10 District, and within the Primary Urban Center of Honolulu.

Previously, a low-rise commercial building occupied the site. The building was demolished in 2006 to allow redevelopment of the property. A proposal for a 16-story high-rise elderly housing building (Kulana Hale II) had been pursued by other development interests. The Kulana Hale II development included a 201G (affordable housing) application that had been approved by the City and County of Honolulu (Resolution 97-431, CD1). However, development of Kulana Hale II did not move forward beyond the entitlement process. The Holomua site is currently vacant with a mixture of concrete, asphalt, dirt, and grass. A chain link fence surrounds the project site.

The surrounding area is developed with a mix of commercial, residential, and apartment uses. In the greater surrounding area are public uses, industrial uses, churches, and parks. Foodland is one block northwest of the Holomua site. Many restaurants and small businesses are conveniently located within a short walking distance from the site. Figure 6 provides site photographs.

### 2.1.2 Land Use Designations

The current land use designations of the Holomua site (TMK (1) 2-4-06: 17 and 18), are as follows:

- State Land Use: Urban (Figure 7)
- County Zoning: BMX-3 Community Business Mixed Use (Figure 8)
- Development Plan: District Commercial (Figure 9)

- Special District: none
- Special Management Area (SMA): not in SMA

## 2.2 DESCRIPTION OF HOLOMUA

### 2.2.1 Statement of Purpose and Need for Holomua

The Holomua condominium building addresses the need for affordable housing on O'ahu, particularly within Honolulu's primary urban center (PUC). Due to the focus on high-rise luxury condominium development in recent years, very few moderate-priced condominium buildings have been developed in the Honolulu PUC. New affordable housing has primarily been developed in suburban O'ahu, where residents are separated by considerable commutes from their workplace. In the urban center, affordable housing more often consists of rental housing. This has resulted in a shortage of for-sale affordable residential dwellings for working residents.

Strong demand for affordable workforce housing within the PUC is evidenced by the strong rental demand in the immediate area as well as relatively high prices for existing residential products. Holomua is intended to provide a needed housing type at an affordable price.

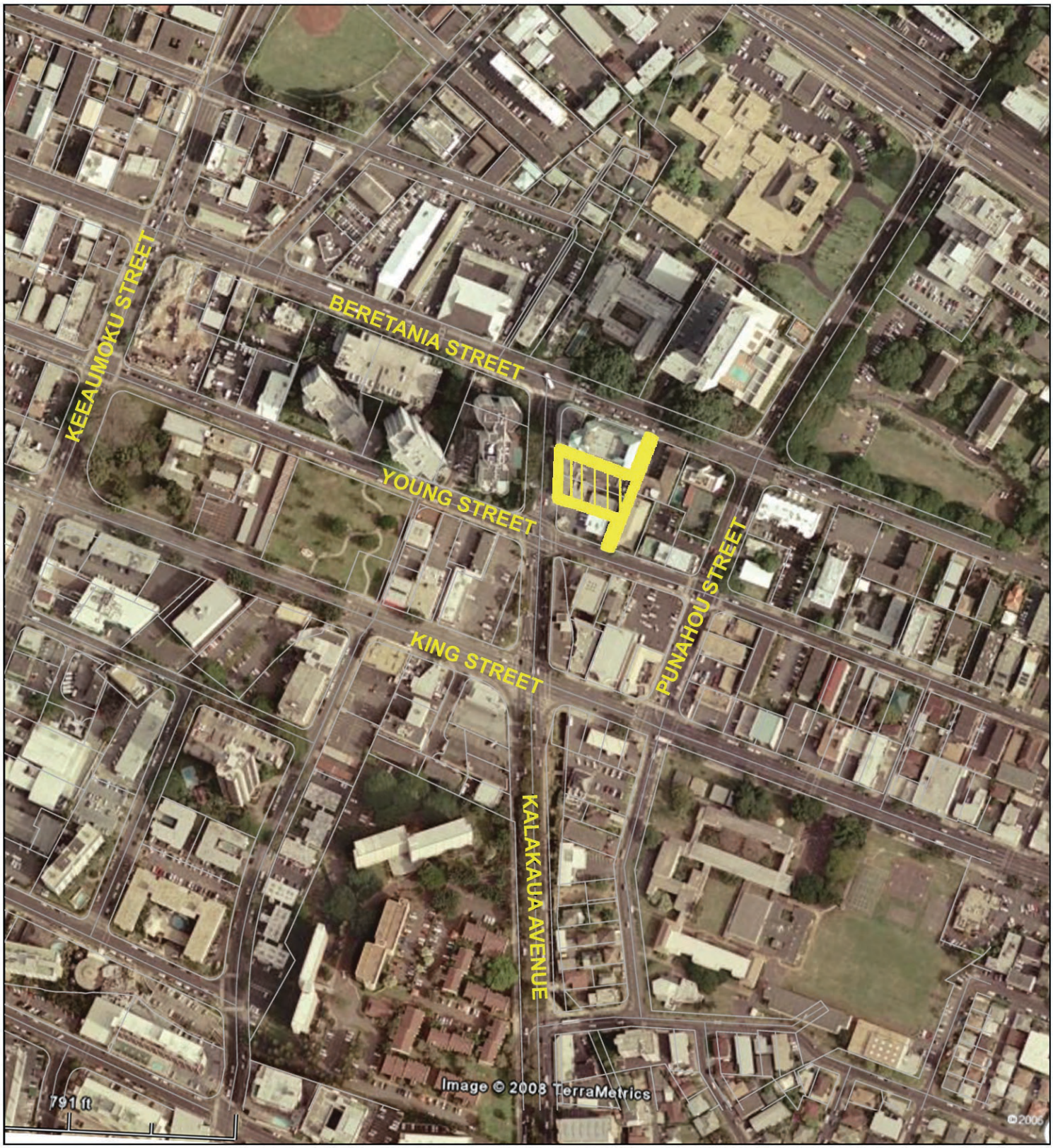
A market study prepared by Data@Work focuses on the historical, current, and projected high-rise condominium conditions and trends to help forecast the absorption for Holomua (see Appendix B).

The market study finds that Holomua will benefit from its strong site location, convenience to city services; and because it is providing new, reasonably priced housing where the housing stock is aged. Based on the analysis and conclusions of the market study, there is strong and sufficient demand within urban Honolulu to support Holomua.

### 2.2.2 Affordability

A minimum 51 percent of the Holomua units will be priced to be affordable to households earning 140 percent or less of the HUD median income for Honolulu. The remaining units will be priced as "Gap-Group" or "Workforce" housing.

THM Partners LLC will be processing approvals for Holomua under, Chapter 201H, HRS, which allows for greater design flexibility and cost savings to facilitate the development of affordable housing. Flexibility and cost savings are achieved by allowing exemptions from certain statutes, ordinances, charter provisions and rules




**LEGEND**

Project Location

**Figure 3**

Aerial Photograph

# Holomua

THM Partners LLC

ISLAND OF O'AHU

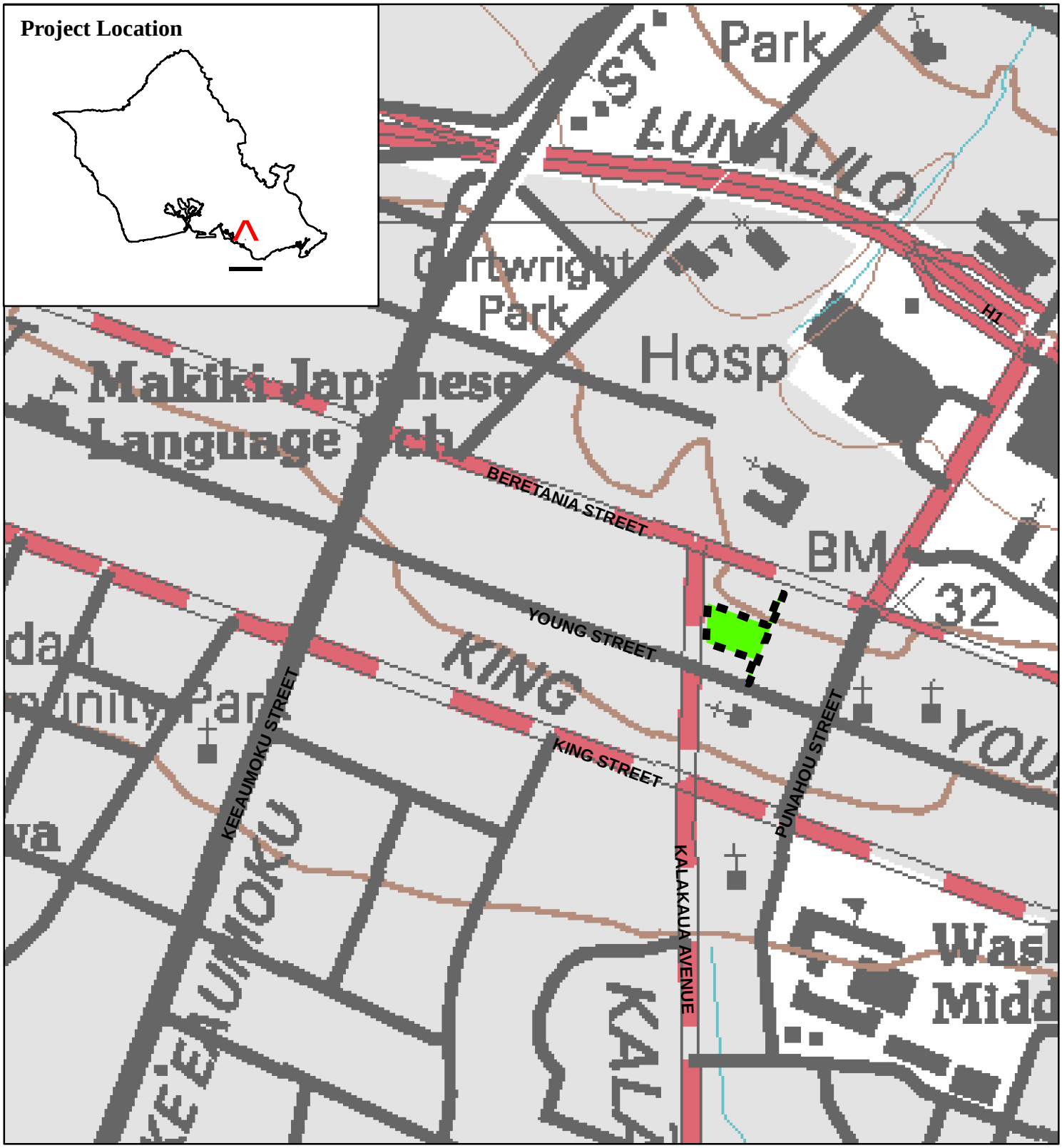
NORTH

NOT TO SCALE

PBR HAWAII & ASSOCIATES, INC.

Source: Google Earth Tele Atlas Copyright (2008)

Disclaimer: This map is to be used for general planning purposes only.




**LEGEND**

Project Location

**Figure 4**

Regional Location

# Holomua

THM Partners LLC

ISLAND OF O'AHU

NORTH

LINEAR SCALE (FEET)

0 200 400 800

PBR HAWAII & ASSOCIATES, INC.

Source: U.S. Geological Survey

Disclaimer: This map is to be used for general planning purposes only.

**LEGEND**

Project Location

**Figure 5**

Tax Map Key

# Holomua

THM Partners LLC

ISLAND OF O'AHU

NORTH

LINEAR SCALE (FEET)

0 50 100 200

PBR HAWAII & ASSOCIATES, INC.

Source: City & County of Honolulu Engineering Dept (1992)

Disclaimer: This map is to be used for general planning purposes only.

1. View looking East from the Northwest corner of Kalakaua Avenue/Young Street. Holomua Condominiums will be located to the left of the 7-11.

2. View of the project site. The previous building on the site was demolished in 2006.

3. Other high-rise buildings located in the vicinity. Kulana Hale 1 (left) is directly adjacent to the Holomua site. Banyan Tree Plaza (right) is located across Beretania Street.

4. View of the Holomua site from the Southeast corner of Kalakaua Avenue/Young Street. Kulana Hale 1 is in the background.

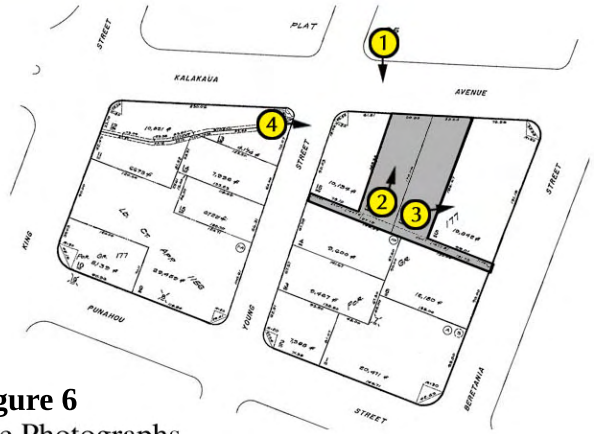



**Figure 6**
Site Photographs
# Holomua

THM Partners LLC
ISLAND OF O'AHU

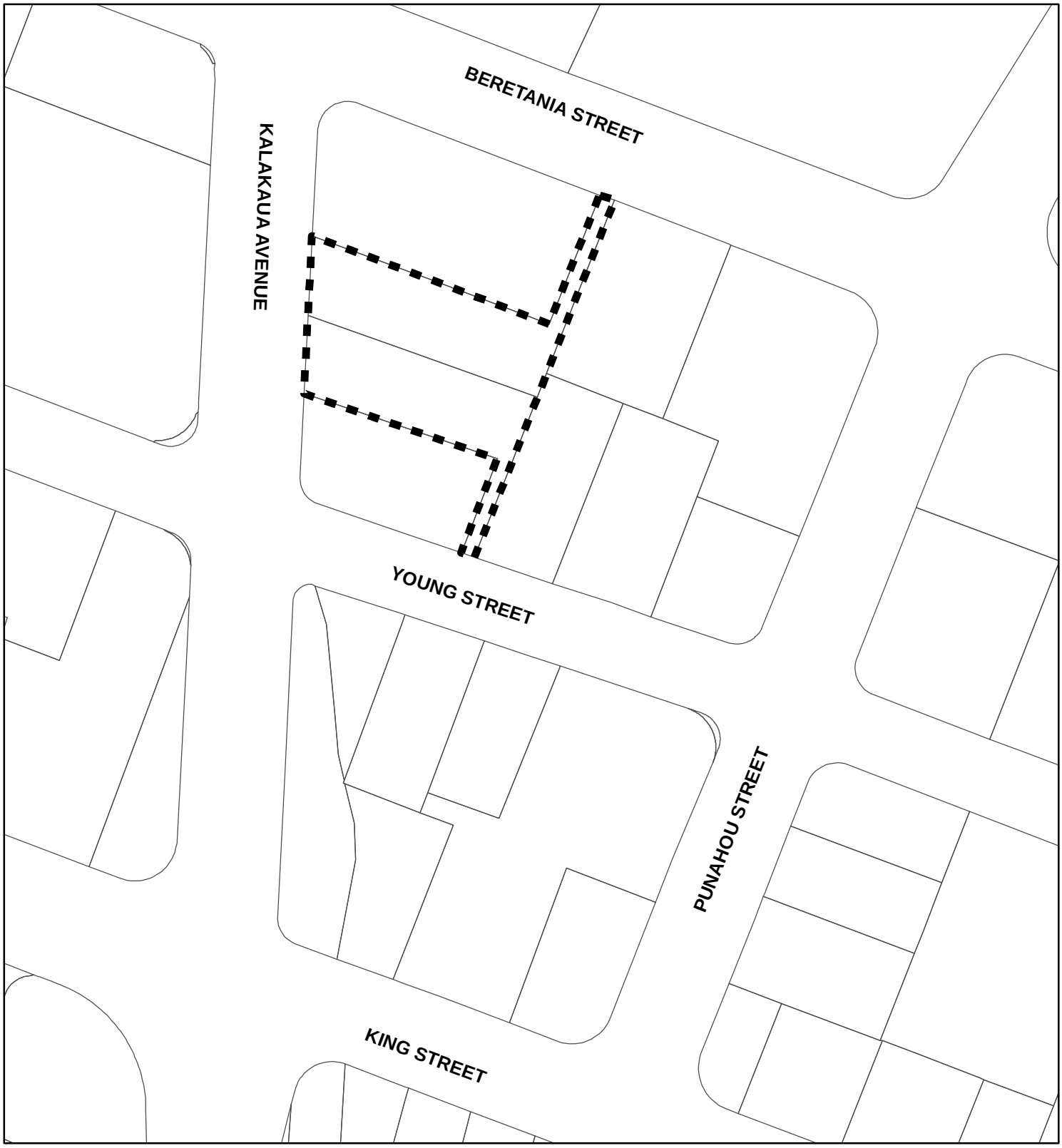
NORTH

NOT TO SCALE

PBR HAWAII & ASSOCIATES, INC.

Photos taken: 3-4-08

Source:
Disclaimer: This map is to be used for general planning purposes only.




**LEGEND**

- Project Location
- Agricultural
- Conservation
- Rural
- Urban

Source: State land Use Commission (2006)
Disclaimer: This map is to be used for general planning purposes only.

**Figure 7**

State Land Use Districts

# Holomua

THM Partners LLC

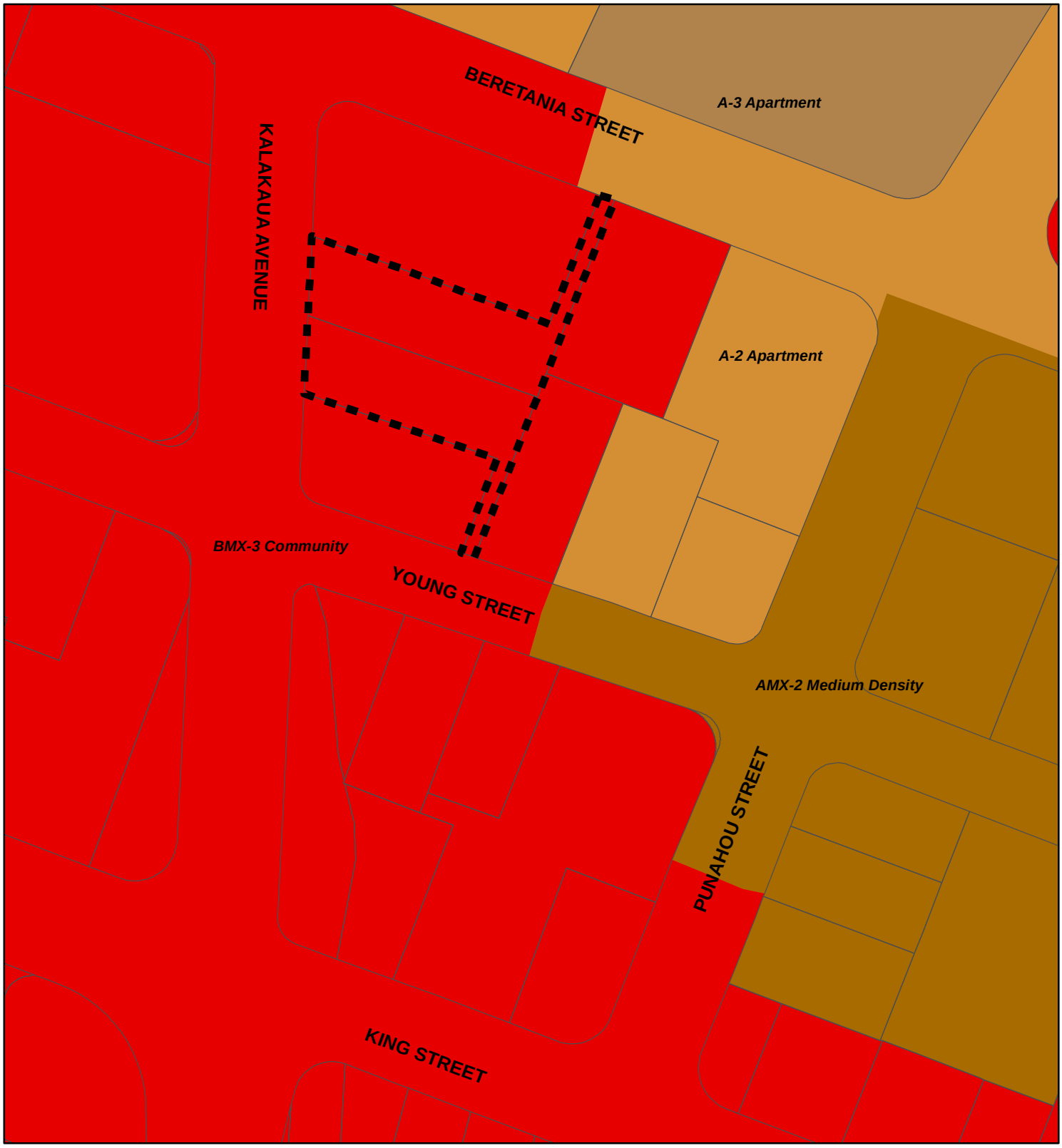
ISLAND OF O'AHU

NORTH

LINEAR SCALE (FEET)

0 50 100 200

PBR HAWAII & ASSOCIATES, INC.




**LEGEND**

- Project Location
- A-2: Apartment
- A-3: Apartment
- AMX-2: Medium Density
- BMX-3: Community

Source: HOLIS, City & County of Honolulu (2006)
Disclaimer: This map is to be used for general planning purposes only.

**Figure 8**

City & County of Honolulu Zoning

# Holomua

THM Partners LLC

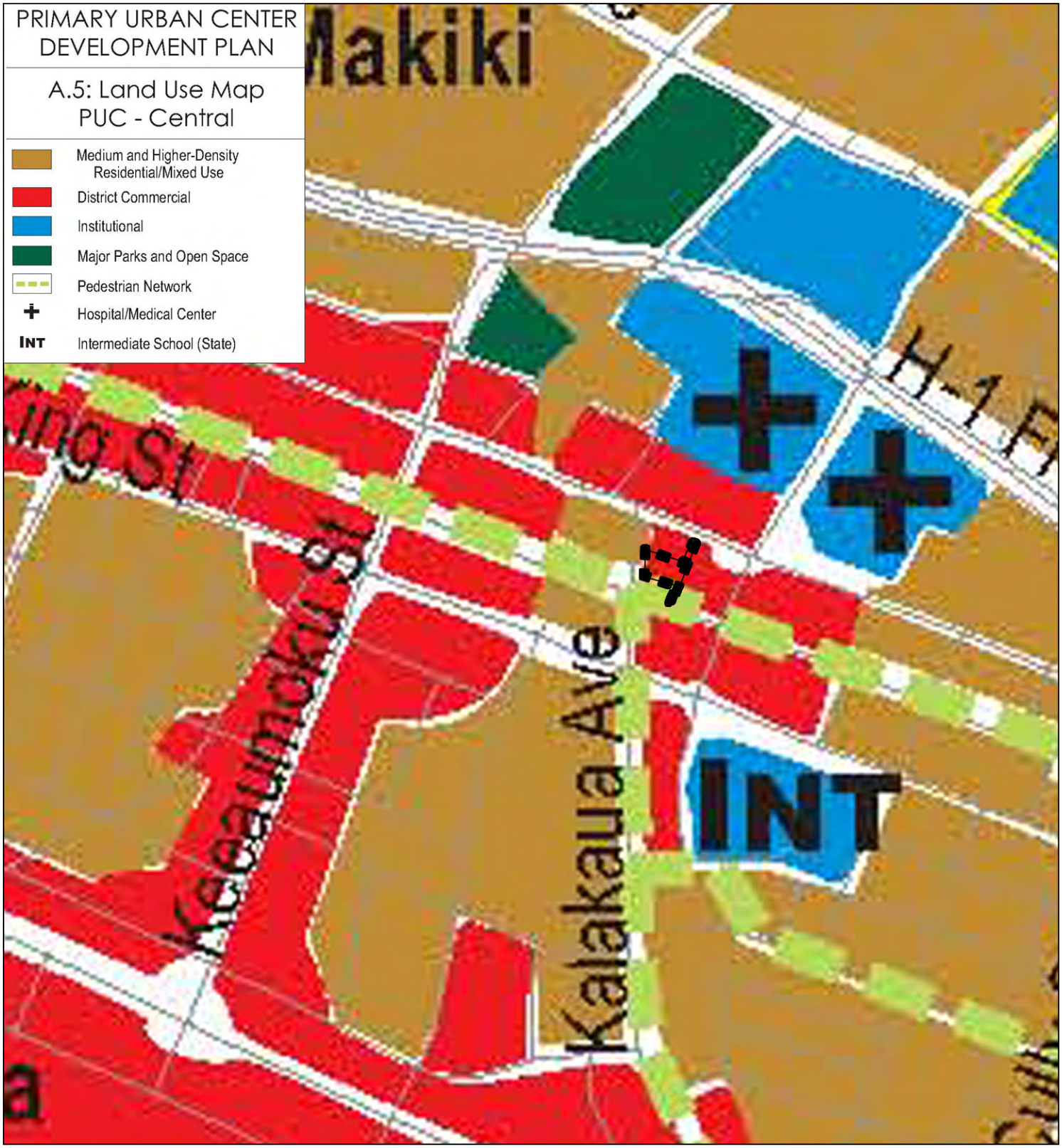
ISLAND OF OʻAHU

NORTH

LINEAR SCALE (FEET)

0 50 100 200

PBR HAWAII & ASSOCIATES, INC.




**LEGEND**

Project Location

**Figure 9**

Primary Urban Center Development Plan
Land Use & Public Facilities

# Holomua

THM Partners LLC

ISLAND OF O'AHU

NORTH

LINEAR SCALE (FEET)

0 300 600 1,200

PBR HAWAII & ASSOCIATES, INC.

Source: Department of Planning & Permitting (2004)
Disclaimer: This map is to be used for general planning purposes only.

relating to planning, zoning and construction, provided the project primarily provides affordable housing and does not contravene health and safety requirements.

THM Partners LLC has submitted a Chapter 201H, HRS application (201H application) to the State of Hawaii Hawai'i Housing Finance and Development Corporation (HHFDC). Through discussions and correspondence with the City and County of Honolulu Department of Planning and Permitting (see Appendix C) it was determined that HHDFC was the appropriate agency to process the 201H application. This is because Holomua unit pricing—while affordable to households earning 140 percent or less of the HUD median income for Honolulu—does not meet the City and County of Honolulu's eligibility requirements for the processing of a 201H application by the Department of Planning and Permitting. While HHDFC will be processing the 201H application, the City and County of Honolulu Council must approve and request for exemptions.

This EA serves as the 201H application agency/public comment document in addition to meeting content requirements for an environmental assessment (EA), under Chapter 343, HRS, and Chapter 11-200, Hawaii Administrative Rules (HAR). Pertinent information relating to the 201H application has been included throughout this EA and requested exemptions are discussed in more detail in Section 5.0. The complete 201H application is on file with the Hawai'i Housing Finance and Development Corporation (HHFDC).

Per the requirements of HHFDC and as specified in Section 201H-47, HRS, there will be a 10-year buyback clause for the affordable units; therefore, if the purchaser of an affordable unit sells the unit within 10 years, HHFDC has the option to buy back the unit to resell as affordable. The buyback clause would be subject to shared appreciation clauses as provided in Section 201H-47, HRS.

THM Partners LLC is also working with HHFDC to create Holomua through the HHFDC's Dwelling Unit Revolving Fund (DURF) program.

### 2.2.3 Building Details

As currently proposed, Holomua will be a 23-story building, up to 220 feet in height, which will include 176 one- and two-bedroom fee simple units aimed at the workforce market. A minimum 51 percent of the units will be priced to be affordable to households earning 140 percent or less of the HUD median income for Honolulu. The building floor area will be approximately 155,000 square feet with a building floor area ratio of 7.26. Table 1 provides a building summary.

Figure 1 provides the Holomua site plan. Figure 2 provides a rendering of Holomua. Appendix D contains the Holomua architectural drawings.

**Table 1. Building Summary**

| **Bedroom/Bath** | **# of Units** | **Size (sq. ft.)** | **No. of Floors** | 23 |
|---|---|---|---|---|
| 1/1 | 80 | 360-525± | **Building Height** | 220± feet |
| 2/1 | 32 | 695-700± | **Parking** | 242 stalls |
| 2/2 | 64 | 700-750± | **Loading** | 2 stalls |
| **Total units** | 176 | - | **Elevators** | 3 |

### 2.2.4 Access and Parking

Vehicular access to Holomua will be via a semi-circular driveway on Kalakaua Avenue. The driveway will allow for simultaneous in-bound and out-bound operations as well as a passenger loading/unloading area. A separate pedestrian walkway entrance to the lobby will also be directly off Kalakaua Avenue.

Current plans are for the parking structure to contain 242 parking spaces. However, THM Partners LLC is requesting the option to reduce the parking by 34 stalls (one floor), in the event that it is required to make the project financially feasible. ADA accessible stalls in compliance with City and County of Honolulu requirements will be provided.

Holomua is located on Kalakaua Avenue, which is frequented by TheBus routes 2, 13, and the B City Express. Beretania and King Streets, which are major east/west bus thoroughfares, are within walking distance. The urban location in proximity to stores, services, and transit routes provides opportunities for Holomua residents to reduce trips by cars, or possibly even eliminate the need for car.

## 2.3 DEVELOPMENT TIMETABLE

Construction of Holomua will begin when all approvals are received. The proposed construction timetable is as follows:

| | | |
|---|---|---|
| Design/Entitlement | January 2008 – December 2008 | 12 months |
| Construction<br>Start<br>End | <br>December 2008<br>June 2010 | <br><br>18 Months |

# 3.0 ASSESSMENT OF THE AFFECTED ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

This chapter describes the existing environmental conditions (physical, natural, and human) of the project area. Potential impacts that may result from the proposed Holomua development, and mitigation measures that may be implemented, are also identified.

## 3.1 TOPOGRAPHY

The topography of the Holomua site is flat and level, as the site was extensively modified to accommodate previous building at the site.

***Potential Impacts and Mitigation Measures***

The Holomua site has been previously modified, and the site currently consists of compacted gravel, areas of pavement and areas of low vegetation. Therefore, the proposed improvements will not require any major alterations to the land and no significant impacts to site topography are anticipated.

## 3.2 SOILS

*The United States Department of Agriculture Soil Conservation Service, Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawai'i* (1972), classifies the soils on the project site as MkA – Makiki clay loam, 0 to 2% slopes (Figure 10). This soil is almost entirely in urban use.

This soil is on smooth fans and terraces. In a representative profile the surface layer is dark brown clay loam about 20 inches thick. The subsoil, about 10 inches thick, is dark-brown clay loam that has subangular blocky structure. It contains cinders and rock fragments. The subsoil is underlain by similar material, about 24 inches thick, that is massive. Below this are volcanic cinders. The soil is strongly acid to medium acid.

Permeability is moderately rapid. Runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.7 inches per foot of soil. In places roots penetrate to a depth of 5 feet or more.

***Potential Impacts and Mitigation Measures***

The Holomua site does not contain soils of agricultural value and will not impact agricultural productivity (existing or potential). The site has been extensively modified

for urban development, and grading for the proposed improvements is not expected to be significant. All grading operations will be conducted in full compliance with dust, erosion control, and other requirements of the City Grading Ordinance, as well as the provisions of Section 11-60.1-33, Hawai'i Administrative Rules, on fugitive dust. In addition, best management practices will be included in construction plans to mitigate dust and/or silt emissions.

## 3.3 NATURAL HAZARDS

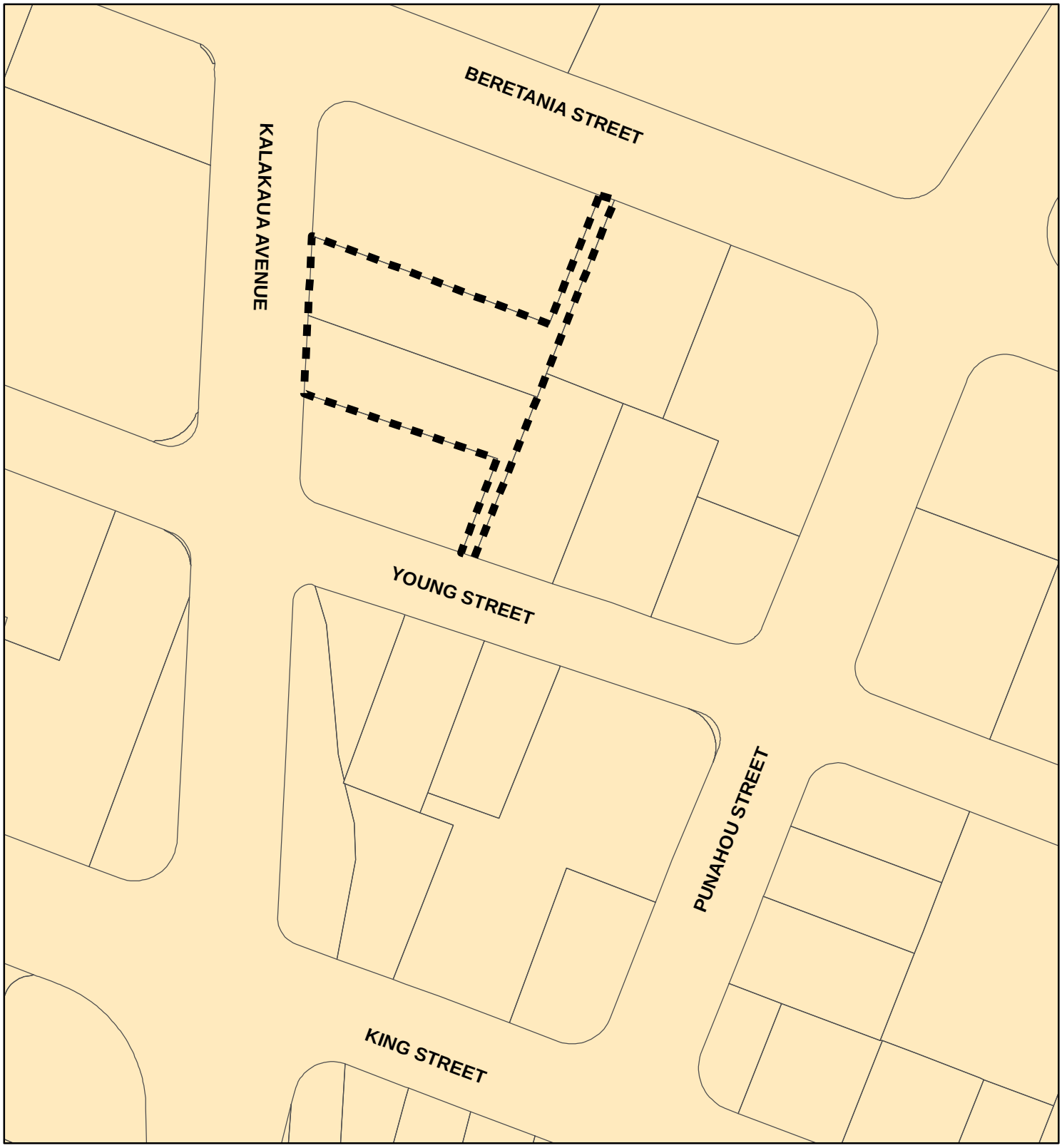
The Hawai'ian Islands are associated with volcanic eruption and tectonic movement. The State of Hawai'i has been affected twice in the recent past by devastating hurricanes, 'Iwa in 1982 and 'Iniki in 1992. While it is difficult to predict these natural occurrences, it is reasonable to assume that future events could be likely given the recent record. However, the Holomua site is no more vulnerable to the destructive winds and torrential rains associated with hurricanes and cyclones than the rest of the island or state. The Holomua site is located outside of the tsunami evacuation area and is designated Zone X (areas determined to be outside of the 500-year floodplain) by the Federal Flood Insurance Rate Map (Figure 11).

No portions of the site are located in a flood zone, as indicated on the Federal Flood Insurance Rate Map (FIRM) by the Federal Emergency Management Agency (110).

***Potential Impacts and Mitigation Measures***

Holomua will not exacerbate any hazard conditions, and all structures will be constructed in accordance with the City's Uniform Building Code to protect against the potential damage from destructive winds, torrential rainfall, or tropical hurricanes and cyclones. No structures will be built within a flood zone (since no portions of the site are within a flood zone) and no existing drainage patterns will be altered. The proposal does not include an increase in impervious area over previously developed conditions. Runoff will continue to flow into the municipal drainage system.

On-site construction work will temporarily expose any remaining soil and slightly increase the potential for soil erosion. However, project specifications will incorporate erosion control requirements to mitigate any construction impacts. After construction, impermeable surfaces (i.e., walkways and parking areas) and landscaping will mitigate the potential for soil erosion. Detailed erosion and sediment control measures will be specified in site plans.




**LEGEND**

Project Location

MkA: Makiki clay loam, 0-2% slopes

**Figure 10**

Soil Survey

# Holomua

THM Partners LLC

ISLAND OF O'AHU

NORTH

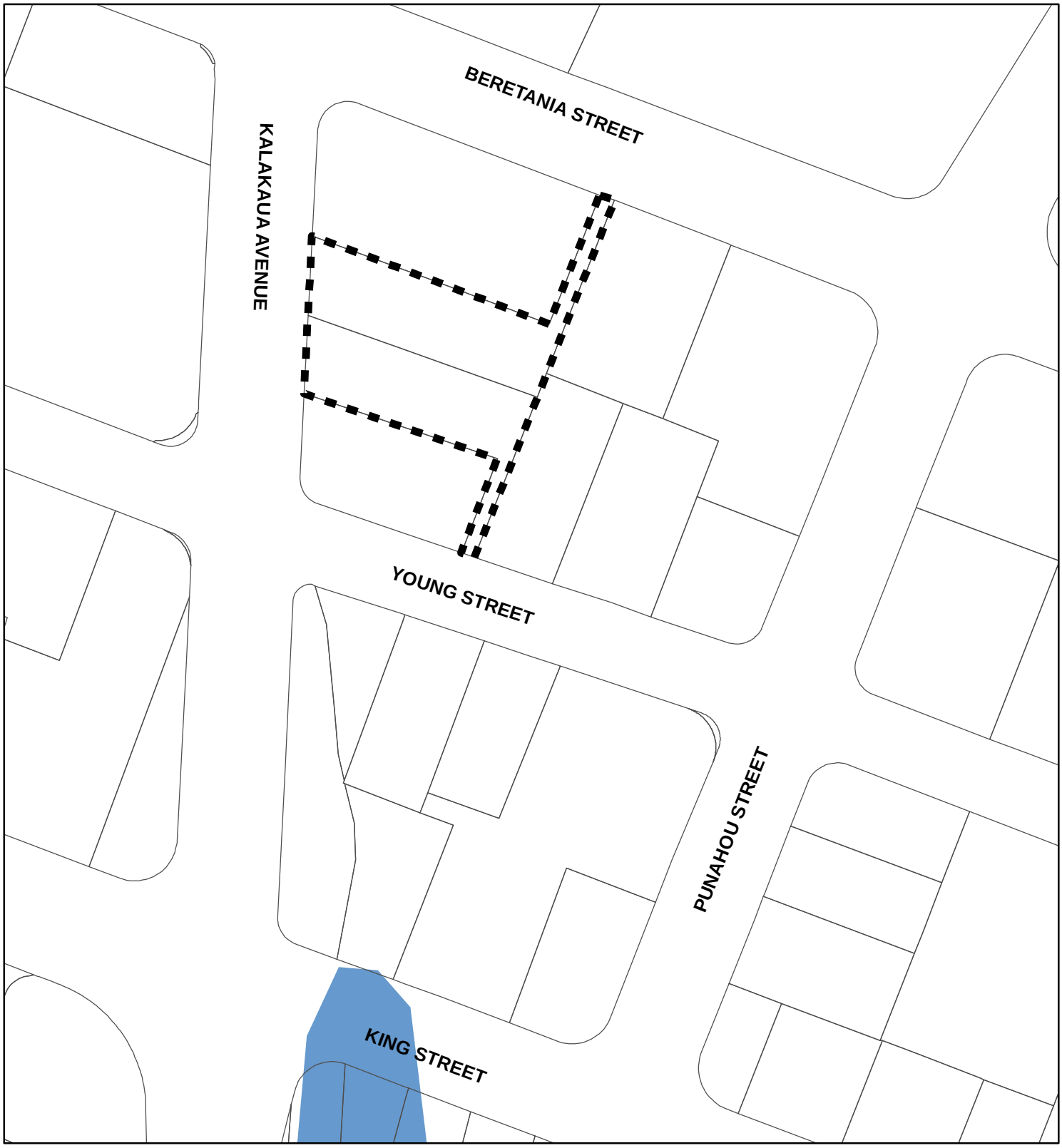
LINEAR SCALE (FEET)

0 50 100 200

PBR HAWAII & ASSOCIATES, INC.

Source: Natural Resources Conservation Service (2007)

Disclaimer: This map is to be used for general planning purposes only.




**LEGEND**

- Project Location
- Outside Floodplain/Minimal Flooding Area
- 500-Year Floodplain
- 100-Year Floodplain
- Floodway

Source: Federal Emergency Management Agency
Disclaimer: This map is to be used for general planning purposes only.

**Figure 11**

Flood Insurance Rate Map

# Holomua

THM Partners LLC

ISLAND OF O'AHU

NORTH

LINEAR SCALE (FEET)

0 50 100 200

PBR HAWAII & ASSOCIATES, INC.

## 3.4 FLORA AND FAUNA

The site is urbanized and is not known to contain any federally protected, threatened, or endangered species of plants or animals. The site previously had a commercial building on it, which was demolished in 2006.

***Potential Impacts and Mitigation Measures***

Because the site was previously developed and is not known to contain any federally protected, threatened, or endangered species of plants or animals, no impacts to flora and fauna are expected.

## 3.5 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Appendix E contains an archaeological assessment prepared by Scientific Consultant Services, Inc. The assessment provides a summary of settlement pattern for the Ahupuaʻa of Makiki based on historical, oral, and archaeological documentation. The assessment also provides results of archaeological testing which were conducted on site. Testing methods included both a pedestrian survey as well as mechanical excavation and analysis of nine stratigraphic trenches.

The archaeological assessment did not identify any archaeological sites, and generally served to support the historical settlement patterns discussed in the Assessment.

***Potential Impacts and Mitigation Measures***

Based on the results of the archaeological assessment, no impacts to archaeological resources are expected with creation of Holomua. Further, the archaeological assessment concludes that no further archaeological investigation is recommended.

THM Partners LLC will comply with all State and County laws and rules regarding the preservation of archaeological and historic sites. Should historic remains, such as artifacts, burials, concentrations of shell or charcoal be encountered during construction activities, work will cease in the immediate vicinity of the find and the State Historic Preservation Division will be contacted for appropriate mitigation, if necessary.

## 3.6 CULTURAL RESOURCES

The site is within the ahupuaʻa of Makiki, and more specifically, ʻili of Pāwa. The City and County of Honolulu has placed this site within the boundary of the Makiki neighborhood, although it is located immediately adjacent to the McCully/Mōʻiliʻili neighborhood district. As the site is located in an urbanized area of Honolulu, resource

materials investigating the cultural and archaeological significance of the area are plentiful. This assessment of cultural resources included a review of environmental assessments for near by developments, including those conducted on behalf of the City and County of Honolulu for the McCully-Mōʻiliʻili Beautification Master Plan which presents a broader context than site-specific environmental assessments typically prepared for individual development projects. Additionally, research collected for the archaeological assessment contributed to this cultural assessment by providing information relative to the historical settlement pattern. These investigations were supplemented by review of Sterling and Summers, Sites of Oʻahu as well as periodical research relating to history and culture of the Makiki and McCully/Mōʻiliʻili neighborhoods.

Historically, the areas bordering the Makiki Stream (in the vicinity of the Holomua site) were likely utilized for the cultivation of *taro* and like-crops from the early Historic times probably extending from Traditional times. Land Commission Awards research shows that subsequently land in the area was parceled and likely used for home sites. However, the archaeological assessment did not find any surface or subsurface archaeological evidence (artifacts such as basalt cores, adzes, flakes or features such as stone alignments, pavements, and walls) of former agricultural uses or habitation on the site. The archaeological assessment provides three possible explanations for this lack of archaeological evidence: 1) the site has been previously disturbed by past construction or demolition; 2) the acid condition of the soils could have degraded organic materials so that none could be found; or 3) no Traditional-style (pre- and circa-1778) cultural activities (*e.g.*, agriculture, fire making, food consumption) occurred on the site.

In recent historical times the Makiki and McCully/Mōʻiliʻili neighborhoods have the urbanized and population demographics changed from predominantly Hawaiʻian, to Chinese, to settlers of Japanese ancestry (Watanabe (1996).

Currently, the neighborhood is densely populated and multi-ethnic, retaining a strong Japanese presence through the Honolulu Japanese Chamber of Commerce and Japanese Cultural Center of Hawaiʻi (2454 S. Beretania Street) as well as many Japanese restaurants and retailers. In most recent history, the more culturally significant aspects of this neighborhood relate to business enterprises owned by those of Chinese, Japanese, and Korean descent. The neighborhood is home to the original Zippy's drive-in chain of restaurants, and recently, owners of an art gallery received a variance from the City and County of Honolulu to maintain a non-conforming neon sign that served a Chop Suey restaurant that was located at the intersection of King and McCully Streets for over 50 years.

Although the Holomua site is now vacant, debris, site soils and vegetation all reflect the site's history of development and recent building demolition. Subsurface testing conducted for the Archaeological Assessment indicate a top layer of imported matrices,

a layer of man-made debris (trash), a layer of additional non-local material. Vegetation consists of plant species that are adaptable to a harsh urban environment that receives little or no maintenance or watering. As such, the site is not utilized for cultivating or gathering of plants of cultural significance. Further, as the site is surrounded on three sides by buildings (high-rise housing and retail uses), and a fourth by Kalakaua Avenue, the site does not serve as an accessway to any neighboring cultural sites.

***Potential Impacts and Mitigation Measures***

The construction of housing at this urban site is not anticipated create negative impacts to cultural resources in the immediate vicinity or larger community. The site itself does not contain any cultural resources, nor does it impede access to any cultural resources. The addition of affordable housing on the site is consistent with the existing culture of the lower Makiki neighborhood as an urban mixed use neighborhood.

## 3.7 ROADWAYS AND TRAFFIC

The site is an irregularly configured mid-block lot with frontage on three public rights-of-way, Beretania Street (mauka), Young Street (makai) and Kalakaua Avenue (Ewa). Access to Holomua is proposed only from Kalakaua as the mauka and makai accesses are substandard in width for emergency services. Kalakaua is a four-lane street extending from S. Beretania Street into Waikiki and through Kapiʻolani Park. On-street parking is permitted in the mauka-bound direction along the project site frontage. Transit facilities (TheBus) include multiple routes and bus stops (routes 1,2,5,6, and 13) near the site. Pedestrian facilities include sidewalks on Kalakaua and neighboring streets as well as crosswalks at intersections. Young Street is a designated Bicycle Route.

A summary of existing transportation facilities, as well as an analysis of potential impacts has been prepared by transportation consultants, Fehr and Peers and is provided as Appendix F, Transportation Impact Analysis Report (TIAR). The TIA evaluates impacts of Holomua based on projected traffic estimates of existing conditions, plus anticipated (recently approved) development, and anticipated traffic associated with Holomua.

***Potential Impacts and Mitigation Measures***

<u>Intersection Operations</u>

The operations of eleven key intersections near the site were evaluated during the weekday morning (7:00 to 9:00 AM) and afternoon (4:00 to 6:00 PM) peak hours for the following three scenarios:

- **Scenario 1:** *Existing Conditions* (2008) – Existing volumes obtained from turning movement counts representing the peak one-hour vehicle flow.
- **Scenario 2:** *Opening Year (2010) without Project Conditions* – Existing peak-hour volumes multiplied by a growth factor plus traffic from approved but not yet constructed developments in the area. The traffic growth factor was developed based on historical growth in traffic counts for this area. This scenario is the basis from which Holomua impacts are determined.
- **Scenario 3:** *Opening Year (2010) with Project Conditions* – Opening Year (2010) without Holomua volumes plus the new traffic generated by Holomua.

Based on the impact criteria specified above, Holomua would not have a significant impact at any of the study intersections. While the Beretania Street/Keeaumoku Street intersection is projected to operate unacceptably, this condition is due to the addition of traffic from already approved projects plus growth. When Holomua traffic is added directly to existing volumes, the resulting operations at this location would continue to be acceptable. This illustrates that the unacceptable operating level at the Beretania Street/Keeaumoku intersection in the future is caused by the cumulative effect of future traffic, with or without the addition of Holomua.

Transit/Bicycle System Operations

The Holomua site is within 650 feet of bus stops on three transit corridors. Given the proximity to transit, it is anticipated that residents may use the bus to commute and travel to other regional destinations rather than using personal cars for all trips. The number of anticipated transit riders could be accommodated by the existing system capacity and no significant impacts are anticipated.

Creation of Holomua will not conflict with any existing or proposed bicycle or pedestrian facility and will not significantly increase demand or hazards for these modes of travel. Cyclists will have direct access to the Young Street bike route, which is more conducive to bicycle travel than either King or Beretania Streets. Thus, no significant impacts are anticipated.

On-Site Circulation

Access to the site will be provided by two driveways on Kalakaua Avenue, both of which will be restricted to right-in/right-out only operation. On-site circulation will be provided via an internal drive aisle providing access to parking inside the building. The width of aisles and length of parking stalls will provide adequate circulation. As such, site access and onsite circulation is considered adequate, and no changes are recommended.

On-site circulation will include facilities for access by persons with disabilities; Holomua will include an accessible entry at the drop-off/pick up area, ADA accessible stalls within the parking structure and accessible parking spaces nearest the main entry.

Comments from the City and County of Honolulu Department of Facility Maintenance indicate that no future road work is planned along the Holomua frontage or in the immediate vicinity. Therefore, construction conflicts are not anticipated.

## 3.8 NOISE

The site is currently exposed to moderate and sometimes high ambient noise levels. Appendix G contains a Noise Assessment Report. It finds that vehicular traffic on Kalakaua Avenue is the dominant noise source. Typical neighborhood noise including people talking, playing music, and occasional aircraft flybys generate additional ambient noise. Activities at the neighboring gas station can also generate noise.

Environmental noise is generally described as Day-Night Average Sound Level (Ldn or DNL), which is a noise descriptor currently used by federal agencies (such as FHA/HUD). This descriptor is a 24-hour average of measured sound levels with an additional 10-decibel (dB) "penalty" on noise levels occurring during the nighttime hours of 10:00 PM to 7:00 AM. In general, noise levels of 55 Ldn or less occur in rural areas, or in areas which are removed from high volume roadways. In urbanized areas, locations shielded from high volume streets generally range from 55 to 65 Ldn.

***Potential Impacts and Mitigation Measures***

Short-term noise impacts from construction activities are expected during the construction period. Construction noise will be short-term and limited to daylight hours. Proper mitigation measures will be implemented to minimize noise impacts, and all work will comply with the State Department of Health (DOH) noise limits.

Construction activities will generate noise from related equipment. This construction-related noise will have an impact on nearby residents although construction will occur during daylight hours when most adult residents are at work and children are at school. However, this noise impact will be temporary and last only until project completion (approximately 18 months).

All construction activities will be monitored to ensure compliance with the DOH Administrative Rules, Chapter 11-46, "Community Noise Control."

After construction, long-term noise impacts will be from traffic and associated noise conditions. The results from the long-term noise measurements conducted for the noise assessment (Appendix G) at the Holomua site show a calculated day-night level, $L_{dn}$, of

65 dBA. Therefore, the exterior noise levels at the façade of the proposed building facing Kalakaua are expected to meet the current EPA design goal as well as the HUD noise criteria for "Acceptable" housing sites. Noise mitigation measures included in the building's design include fully enclosing two sides, and partially enclosing a third side, of the structured parking.

## 3.9 AIR QUALITY

Air quality in the vicinity of the project site is primarily affected by vehicular emissions generated along surrounding streets. Among the various air pollutants for which State and National standards have been established, carbon monoxide level is the primary concern in areas near heavy traffic flow. The federal standard for carbon monoxide is a maximum of 40 micrograms per cubic meter for 1-hour sample and 10 micrograms per cubic meter for an 8-hour sample. State of Hawaii regulations, which are more stringent, limit carbon monoxide to 10 micrograms per cubic meter for 1-hour samples and 5 micrograms per cubic meter for 8-hour samples. According to the State Department of Health Clean Air Branch, the Waikiki Air Monitoring Station on Kalakaua Avenue reported that carbon monoxide levels have not exceeded State or Federal standards in the past five years.

***Potential Impacts and Mitigation Measures***

It is anticipated that no State or Federal air quality standards will be violated during or after the creation of Holomua. The anticipated issues related to air quality are related to construction; however, construction activities such as site clearing and grading, will be temporary. In addition, all construction activities will comply with the provisions of Chapter 11-60.1, HAR, Section 11-60.1-33, Fugitive Dust.

An effective dust control plan will be implemented as necessary. Measures to control dust during various phases of construction include:

- Providing an adequate water source at the site prior to start-up construction activities.
- Irrigating the construction site during periods of drought or high winds.
- Controlling dust debris being hauled away from the project site.
- Providing adequate dust control measures during weekends, after hours, and before daily start-up of construction activities.
- Installing silt screening in the areas of disturbance.

In the long term, Holomua is not anticipated to generate significant enough volumes of traffic to degrade air quality in the area.

## 3.10 MAN-MADE HAZARDS

A Phase I Environmental Site Assessment (ESA) was conducted in October, 2007 by Environmental Science International. The study concluded that there were no environmental liens or use limitations for the property. Two abandoned pipes were found protruding from the ground. Additional studies were conducted and it was found that the pipes extended two feet into the ground where they terminated. The pipelines were found to be isolated and connected to nothing and no subsurface soil contamination was observed. The abandoned pipes were excavated from the property and soil was backfilled into the excavated trenches.

***Potential Impacts and Mitigation Measures***

The Phase I Environmental Site Assessment (ESA) did not report any soil contamination requiring future use limitations on the site; however, if hazardous materials are found, they will be handled according to the Department of Health regulations.

## 3.11 VISUAL RESOURCES

The Holomua site is located in the Primary Urban Center and the BMX-3 Community Business Mixed Use District. None of the major mauka-makai streets in the surrounding neighborhood offer views of the ocean, and the existing tall buildings in the area obstruct mauka views along Kalakaua Avenue toward the Koʻolau Mountain Range. The Holomua site is surrounded by roadways and tall buildings (see site photographs in Figure 6).

***Potential Impacts and Mitigation Measures***

The proposed structure will have a finished height of up to 220 feet, which is over the 150-foot height limit of this BMX-3 Community Business Mixed Use District. THM Partners LLC plans to ask for an exemption, through the 201H process, from the height restriction.

The scale of building is similar of that previously approved at this site by the City and County of Honolulu (Resolution 97-341, CD1) for Kulana Hale II, a 16-story, 162 unit affordable elderly housing development. Holomua will be an infill development, surrounded by a mixture of commercial, residential, and mid to high-rise apartments. There are a number of other high-rise buildings in close proximity to Holomua some of which exceed 200 feet in height. Further, Holomua has a relatively small overall building footprint of only 9,100± square feet, above the structured parking floors.

## 3.12 SOCIO-ECONOMIC CHARACTERISTICS

### 3.12.1 Community Profile

The Makiki/Lower Punchbowl/Tantalus neighborhood (defined by the City as Neighborhood Board No. 10 District) extends from the east side of the Pauoa Valley, across the H-1 Freeway at Punahou Street, makai to King Street, and from King Street to Ward Avenue mauka to the H-I Freeway, Pele Avenue to the east rim of Punchbowl Crater and onward mauka to encompass Tantalus. The Holomua site is located within the Subdistrict 2 which contains Kīnaʻu, Lower Makiki and Kewalo, characterized by a mix of uses including multi-family mid-rise and high-rise housing, retail and institutional/educational facilities.

The Makiki neighborhood is a primarily residential community, with economic facilities mostly limited to neighborhood stores, small offices, restaurants, and other facilities serving community residents and University students, faculty, and staff. The lower Makiki area, makai of the H-1 Freeway, contains a greater proportion of the neighborhood's commercial uses with housing consisting primarily of mid-rise and high-rise structures.

The City DPP compiled *Community Profiles: General Demographic Characteristics of Neighborhoods (1990-2000)* based on 1990 and 2000 U.S. Census files. In 2000, the population of Oʻahu was 876,156; the population for the Makiki Neighborhood Area was 30,145.

In comparison to Oʻahu as a whole (see Table 2), the Makiki Neighborhood Area population is generally older; has a racial mix with proportionately more Asians than other races; has a lower proportion of family households; has proportionately lower homeownership rates and greater vacancy rates.

***Potential Impacts and Mitigation Measures***

Holomua will have a socio-economic benefit by addressing affordable housing demand in Honolulu. In particular, Holomua will increase the opportunity for homeownership in a neighborhood with relatively low homeownership rates. According to the market analysis prepared for Holomua (see Appendix B), a deficit in housing supply is projected relative to demand. Therefore, the provision of housing, and particularly affordable housing, is a benefit to the Makiki Neighborhood and larger Oʻahu housing market. The market analysis further projects that there are some 33,000 households on Oʻahu that could qualify for the affordable units at Holomua.

Holomua will supply 176 new multi-family residential units. This represents a one percent increase to the existing inventory of 16,368 units (2000 Census data). A minimum 51 percent of the units will be priced to be affordable to households earning 140 percent or less of the HUD median income for O'ahu.

Holomua is compatible with the existing character of this mixed use neighborhood and surrounding multi-family developments.

**Table 2. Demographic Characteristics: 2000**

| | Makiki Neighborhood #10 | | O'ahu | |
|---|---|---|---|---|
| **Subject** | **Number** | **Percent** | **Number** | **Percent** |
| **TOTAL POPULATION** | 30,145 | 100.0 | 876,156 | 100.0 |
| SEX AND AGE | | | | |
| Female | 15,760 | 52.3 | 435,638 | 49.7 |
| Male | 14,385 | 47.7 | 440,518 | 50.3 |
| Under 5 years | 1,260 | 4.2 | 56,849 | 6.5 |
| 5-17 years | 3,205 | 10.6 | 175,175 | 20.0 |
| 18-64 years | 20,354 | 67.5 | 526,395 | 60.1 |
| 65 years and over | 5,326 | 17.7 | 117,737 | 13.4 |
| Median age (years) | 41 | | 35.7 | - |
| RACE | | | | |
| White | 6,563 | 21.8 | 186,484 | 21.3 |
| Black or African American | 340 | 1.1 | 20,619 | 2.4 |
| American Indian and Alaska Native | 60 | .2 | 2,178 | 0.2 |
| Asian | 16,321 | 54.1 | 403,371 | 46.0 |
| Native Hawai'ian and other Pacific Islander | 1,862 | 6.2 | 77,680 | 8.9 |
| Other/two or more races | 4,702 | 15.6 | 185,824 | 21.2 |
| HOUSEHOLD BY TYPE | | | | |
| Total Households | 14,998 | 100.0 | 286,450 | 100.0 |
| Family households (families) | 6,895 | 46.0 | 205,672 | 71.8 |
| • With own children under 18 years | 2,671 | 17.1 | 91,022 | 31.8 |
| Married-couple family | 4,793 | 32.0 | 156,195 | 54.5 |
| • With own children under 18 years | 1,644 | 11.0 | 70,442 | 24.6 |
| Female householder, no husband present | 1,520 | 10.1 | 35,138 | 12.3 |
| • With own children under 18 years | 712 | 4.7 | 15,235 | 5.3 |
| Non-families | 8,103 | 54.0 | 80,778 | 28.2 |
| • Living with non-relatives | 1,599 | 10.7 | 18,815 | 6.6 |
| • Living alone; 65 years and over | 1,879 | 12.5 | 20,021 | 7.0 |
| Average household size | 1.97 | - | 2.95 | - |
| HOUSING OCCUPANCY AND TENURE | | | | |
| Total Housing Units | 16,368 | 100.0 | 315,988 | 100 |
| Occupied units | 14,998 | 91.6 | 286,450 | 90.7 |
| • By owner | 5,856 | 35.8 | 156,290 | 49.5 |
| • By renter | 9,142 | 55.9 | 130,160 | 41.2 |
| Vacant units | 1,370 | 8.4 | 29,538 | 9.3 |
| Available housing vacancy rate (%) | 5.7 | - | 4.9 | - |
| Homeownership rate (%) | 39.0 | - | 54.6 | - |

### 3.12.2 Economy

The Makiki Neighborhood, particularly makai of the H-1 Freeway is characterized by a mix of uses including high-rise housing, neighborhood stores, small offices, restaurants and other facilities serving community residents and University students, faculty and staff.

According to the 2000 Census data, median household income for Makiki Neighborhood Area was $37,818, which is significantly lower than the median household income of $52,280 for O'ahu.

***Potential Impacts and Mitigation Measures***

Holomua will provide needed affordable housing in an urban neighborhood, where median housing income is significantly below the island-wide median.

Holomua will provide short-term construction jobs and is expected to stimulate economic activity in the surrounding neighborhood as Holomua residents patronize nearby stores, restaurants, and other neighborhood businesses. Holomua will also provide direct long-term, employment for a resident manager and landscape and maintenance personnel.

Tax revenues will be generated by the short-term construction work and also modest revenues by the long-term employment and secondary service industry jobs that support the increase in population. Holomua will also increase property tax revenues relative to the current vacant condition of the site.

## 3.13 INFRASTRUCTURE

Engineering Dynamic Corporation has evaluated availability of public infrastructure and a Site Infrastructure Assessment is attached as Appendix H .

### 3.13.1 Water

The Board of Water Supply (BWS) owns and maintains the water system that services the area. Records at BWS, Engineering Maintenance Unit, indicate there are existing 8-inch water mains located along the westerly side of Kalakaua Avenue and the southerly side of Young Street.

*Potential Impacts and Mitigation Measures*

Average daily water demand for Holomua is estimated to be 52,800 GPD. Initial contacts with BWS Customer Care Division indicate adequate capacity to serve Holomua.

Approval from BWS to connect to the water system will be requested during the building permit process. Holomua will be subject to Cross-Connection Control and Backflow Prevention requirements prior to approval of the building permit.

To conserve water within Holomua, THM Partners, LLC will implement water conservation strategies to reduce consumption, conserve resources, and minimize water demands. The goal is to reduce the total water requirements through a combination of water saving equipment and strategies. Water efficiency measures may include:

- Low-flow fixtures and devices, including low-flow toilets
- Climate-adapted native and other appropriate plants for landscaping as practical.
- Encouraging individual homeowners to maintain fixtures to prevent leaks

### 3.13.2 Wastewater

The area is currently serviced by the existing wastewater system owned and maintained by the City. Comments from City and County of Honolulu Department of Design and Construction indicate that a sewer connection application is required with the Department of Planning and Permitting, Wastewater Branch, to determine adequacy of existing sewer lines. The sewer connection application was filed and was approved on April 3, 2008 by the Wastewater Division.

*Potential Impacts and Mitigation Measures*

Sewer connection for 176 units has been approved on April 3, 2008 by the City and County of Honolulu Department of Planning and Permitting, Waste Water Branch. The applicant will continue to work with the City Wastewater Branch, Inspection Section and/or State Department of health to maintain proper operation of the system and to mitigate potential interruptions of existing wastewater service that may occur.

### 3.13.3 Drainage

Stormwater surface runoff from the Holomua site is generally directed toward the Kalakaua Avenue gutter where it continues through the public system, ultimately to the Ala Wai canal.

*Potential Impacts and Mitigation Measures*

The site formerly contained a commercial structure, with all exterior areas paved in A/C pavement, rendering it completely impervious. Construction of Holomua will not create any additional impervious surface area than under prior development conditions. A small landscape area at the front of the building will allow for some infiltration of storm water.

### 3.13.4 Solid Waste

On O'ahu, most residential and general commercial trash is disposed of at H-POWER (Honolulu Program of Waste Energy Recovery), the City's waste-to-energy plant located at Campbell Industrial Park. The facility processes over 600,000 tons of solid waste annually, reducing the volume of solid waste going into landfills by 90 percent. H-POWER also generates about seven percent of O'ahu's electricity. The electricity generated is bought under a purchase power agreement with HECO. Ash and non-processibles are transported and buried at the Waimānalo Gulch Landfill.

The Waimānalo Gulch Landfill is located on the western side of O'ahu. The land is owned by the City and the landfill is operated by Waste Management, Inc. The landfill accepts ash and residue from the H-POWER waste-to-energy facility, industrial wastes, and non-combustible construction and demolition debris.

*Potential Impacts and Mitigation Measures*

A solid waste management plan will be prepared in accordance with guidelines provided by the City Department of Facility Maintenance. All waste generated by Holomua will be disposed of in a manner and at appropriate sites designated by the City.

Holomua will comply with applicable requirements of the State DOH and the City Department of Facility Maintenance. Holomua will also comply with the program goals and objectives of the Integrated Solid Waste Management Act, Chapter 342G, HRS, and the City's approved integrated solid waste management plans.

Waste generated by site preparation will primarily consist of vegetation, rocks, and debris from clearing, grubbing, and grading. Soil and rocks displaced from grading and clearing will be used as fill within the site as needed. Construction waste will consist of waste lumber, concrete, and other building materials.

During construction, a job-site waste management and recycling program will be implemented to maintain a clean construction site, maximize material recycling, and

minimize disposal truck traffic impacts. This recycling program will incorporate the "Three Rs" of effective construction waste management:

- Reduce: by preventing waste before it happens through efficient design.
- Reuse: by using materials removed during demolition (such as rocks and concrete) on site.
- Recycling: by separating recyclable materials from non-recyclable materials and supplying these recyclable materials to a recycler for use as new products.

Construction materials that cannot be recycled will be disposed of in the Waimānalo Gulch Landfill.

After construction Holomua will contain a centralized trash chute for solid waste disposal from each floor. Provisions for recycling, such as collection systems and space for bins for recyclables, will be incorporated into the ground floor trash room. A private refuse company will be contracted to haul away solid waste that cannot be recycled.

### 3.13.5 Electrical & Communications

Hawai'ian Electric Company (HECO) has existing power lines serving this area. Existing overhead electrical lines and power poles are located within the vicinity of the project area frontage along Kalakaua Avenue.

An existing telecom box is located within the sidewalk also fronting Kalakaua Avenue.

***Potential Impacts and Mitigation Measures***

To reduce energy consumption, THM Partners, LLC will consider implementing elements of the United States Environmental Protection Agency (EPA) EPA) ENERGY STAR Program in the design of Holomua. Energy conservation measures may include:

- Energy efficient lighting and appliances
- High efficiency compact fluorescent lighting
- Effective insulation
- High performance, energy efficient windows
- Tight construction
- Efficient cooling equipment, and.
- Maximum use of day lighting.
- Exceeding Model Energy Code requirements.

THM Partners LLC will coordinate with HECO and franchise utilities regarding electrical and communications infrastructure to support Holomua.

## 3.14 PUBLIC SERVICES

### 3.14.1 Schools

The Holomua site is located in the State Department of Education (DOE)'s Honolulu District, and is served by Queen Ka'ahumanu Elementary School, Washington Middle School, and McKinley High School.

Queen Ka'ahumanu Elementary School is located at 1141 Kīna'u Street, approximately 0.7 miles northwest of the Holomua site.

Washington Intermediate School is located at 1633 S. King Street, approximately 1,000 feet southeast from the Holomua site.

McKinley High School is located at 1039 S. King Street, approximately 0.8 miles west of the project site.

Current school enrollment and capacity for the three schools are listed below in Table 3.

**Table 3. Public School Capacity and Enrollment**

| School | Capacity 2006-2007 | Enrollment 2007-2008 | Projected Enrollment 2010-2011 |
|---|---|---|---|
| Queen Ka'ahumanu Elementary School | 670 | 566 | 551 |
| Washington Intermediate School | 1,158 | 1,032 | 844 |
| McKinley High School | 2,152 | 1,857 | 1,757 |

Source: Department of Education, 2008.

***Potential Impacts and Mitigation Measures***

According to the DOE school multipliers[1] for new housing developments, it is estimated that Holomua will have 19 elementary, 7 middle, and 12 high school students. As shown in Table 2 above, the public schools will have the capacity to accommodate Holomua's estimated student population growth.

In 2007, the State Legislature passed a law establishing school impact fees (See HRS Section 302A-1601 et. seq). Under this new law, it is possible that Holomua may be

[1] Elementary: 176 MF homes x 0.109 = 19.184 students
Middle: 176 MF homes x 0.040 = 7.04 students
High: 176 MF homes x 0.069 = 12.144 students

subject to an impact fee. As part of the 201H process, THM Partners LLC is requesting an exemption to any school impact fees.

### 3.14.2 Police

Police protection is provided by the Honolulu Police Department (HPD). HPD headquarters (Alapai Headquarters) is located at 801 South Beretania Street.

*Potential Impacts and Mitigation Measures*

In their pre-consultation letter the Honolulu Police Department stated "This project should have no significant impact on the facilities or operations of the Honolulu Police Department." However, due to its residential use, there may be an occasional demand for police services at Holomua. Holomua will have its own onsite security system. The Police Department will be notified when the construction phase begins so they may anticipate an increase in calls for service to the area because of traffic complications. As such, mitigation measures will be implemented to minimize construction-related traffic.

### 3.14.3 Fire

The Pawaʻa Fire Station (Station 2) on Makaloa Street provides primary response to this area in case of an emergency.

*Potential Impacts and Mitigation Measures*

There may be an occasional demand for firefighting services. To mitigate potential structural fires, Holomua will be equipped with modern fire control devices, and access for fire apparatus, water supply, and building construction will be in conformance with existing codes and standards. Fire apparatus access will be provided in compliance with UFC Section 902.2.1. Adequate water supply exists (see Section 3.12.1). On-site fire protection will include fire hydrants or fire department connections (FDC) located within the parking area and an automatic fire sprinkler system within the building. Civil engineering drawings will be submitted to the Fire Department for review.

### 3.14.4 Medical Facilities

Several healthcare facilities in Honolulu provide primary patient care to adults and children. The nearest hospital that provides 24-hour emergency service is Straub Clinic & Hospital at 888 South King Street. The hospital is approximately five minutes from the McCully Fire Station by ambulance. Also near the project site, the Kapiʻolani Medical Center for Women & Children at 1319 Punahou Street has a 24-hour pediatric emergency room.

*Potential Impacts and Mitigation Measures*

Holomua is not expected to significantly increase the need for emergency service, and is not expected to have a long-term adverse impact on emergency medical providers or their ability to service the community. There may be an unavoidable and occasional need for emergency health care services by residents of Holomua.

### 3.14.5 Recreational Facilities

There are numerous recreational facilities in Honolulu. The well-known Waikiki beach parks, Kapiʻolani Park, Kewalo Basin, Kakaako Waterfront Park, Ala Wai Boat Harbor, Mount Tantalus, and Diamond Head State Park are located within a three-mile radius of the project site.

The following public recreational facilities are located within convenient walking distance (less than one mile) from the Holomua site.

- Ala Moana Regional Park, 1201 Ala Moana Boulevard
- Ala Wai Community Park, 2015 Kapiʻolani Boulevard
- Ala Wai Promenade, 1828 Kalakaua Avenue
- Cartwright Neighborhood Park, 1314 Makiki Street
- Makiki District Park,1527 Keeaumoku Street
- McCully District Park, 831 Pumehana Street
- Moʻiliʻili Neighborhood Park, 1115 Isenberg Street
- Old Stadium Park, 2237 King Street
- Sheridan Community Park, 833 Piʻikoi Street
- Stevenson Recreation Center, 1202 Prospect Street
- Thomas Square, 1102 Victoria Street

*Potential Impacts and Mitigation Measures*

THM Partners LLC plans to ask for an exemption to park dedication requirements (Chapter 22, Article 7, Revised Ordinances of Honolulu) through the 201H process. Comments from City and County of Honolulu Parks and Recreation suggest incorporation of on-site recreational facilities into the project design. As Holomua is an affordable housing project, the on-site amenities proposed are to be limited, to both hold the purchase price down as well as limit maintenance fees for residents.

# 4.0 LAND USE CONFORMANCE

## 4.1 STATE OF HAWAI'I

### 4.1.1 State Land Use Law (Chapter 205, Hawai'i Revised Statutes)

The Holomua site is located within the State Urban District, and Holomua is consistent with the uses allowed in this district.

## 4.2 CITY AND COUNTY OF HONOLULU

### 4.2.1 General Plan

The General Plan for the City establishes long-range objectives and policies for the general welfare of the public and, together with the City Charter, provides a direction and framework to guide the programs and activities of the City.

The General Plan directs most of the growth in residential population and jobs to the Primary Urban Center (PUC) and Ewa to achieve the City's overall strategy to maintain a compact urban core. The proposed project will support this strategy by providing additional residential units within the PUC.

The proposed project is in accordance with the following General Plan policies:

*I. POPULATION*
*Objective C:* *To establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony.*
*Policy 1:* *Facilitate the full development of the primary urban center.*

**Discussion:** Holomua is located within the Primary Urban Center (PUC). Housing that is affordable to the workforce and centrally located is important to ease the burden on transportation systems, and contributes to a vibrant, 24-hour city.

*IV. HOUSING*
*Objective A:* *To provide decent housing for all the people of Oahu at prices they can afford.*
*Policy 3:* *Encourage innovative residential development, which will result in lower costs, added convenience and privacy, and the more efficient use of streets and utilities.*
*Policy 5:* *Make full use of State and Federal programs that provide financial assistance for low- and moderate-income homebuyers.*

*Objective C:* *To provide the people of Oahu with a choice of living environments which are reasonably close to employment, recreation, and commercial centers and which are adequately served by public utilities.*
*Policy 3:* *Encourage residential development near employment centers.*
*Policy 4:* *Encourage residential development in areas where existing roads, utilities, and other community facilities are not being used to capacity.*

**Discussion:** Holomua will provide a minimum 90 residential units (51 percent) at affordable prices to residents based on 140 percent or less of the HUD median income (see Section 2.2.2).

Holomua will increase the inventory of residential condominiums in the PUC, near employment, recreation, and commercial centers. Holomua will be integrated with the existing roadway and utility system in the immediate vicinity, and will not require the development of new roadways or offsite infrastructure.

*VII. PHYSICAL DEVELOPMENT AND URBAN DESIGN*
*Objective A:* *To coordinate changes in the physical environment of Oahu to ensure that all new developments are timely, well- designed, and appropriate for the areas in which they will be located.*
*Policy 2:* *Coordinate the location and timing of new development with the availability of adequate water supply, sewage treatment, drainage, transportation, and public safety facilities.*
*Policy 5:* *Provide for more compact development and intensive use of urban lands where compatible with the physical and social character of existing communities.*
*Policy 6:* *Encourage the clustering of developments to reduce the cost of providing utilities and other public services.*
*Policy 9:* *Exclude from residential areas, uses which are major sources of noise and air pollution.*

*Objective B:* *To develop Honolulu (Waialae-Kahala to Halawa), Aiea, and Pearl City as the Island's primary urban center.*
*Policy 3:* *Encourage the establishment of mixed-use districts with appropriate design and development controls to insure an attractive living environment and compatibility with surrounding land uses.*
*Policy 4:* *Provide downtown Honolulu and other major business centers with a well-balanced mixture of uses.*
*Policy 5:* *Encourage the development of attractive residential communities in downtown and other business centers.*

*Objective E:* *To create and maintain attractive, meaningful, and stimulating environments throughout Oahu.*
*Policy 4:* *Require the consideration of urban-design principles in all development projects.*

*Policy 5:* *Require new developments in stable, established communities and rural areas to be compatible with the existing communities and areas.*

*Policy 6:* *Provide special design standards and controls that will allow more compact development and intensive use of lands in the primary urban center.*

**Discussion:** Holomua is consistent with policies to promote development in the PUC. Holomua will be compatible with the neighboring mid- and high-rise residential developments. By design, Holomua is also consistent with the policy to provide for more compact development and intensive use of urban lands. Holomua will contribute residents to an already vibrant, mixed-use neighborhood through the addition of affordable and attractive housing.

### 4.2.2 Primary Urban Center Development Plan

The City Department of Planning and Permitting (DPP) has established Development/Sustainable Communities Plans for eight geographic regions that include all areas of O'ahu. These community-oriented plans are intended to help guide public policy, investment, and decision-making through the 2025 planning horizon. Holomua is located within the Primary Urban Center (PUC).

The PUC Development Plan Land Use Map designates the Holomua site as District Commercial (Figure 9) and describes this land use as the following (Section 3.2.2.4 Shopping and Retail Business Districts, page 3-26):

> ***District Commercial.*** *District Commercial includes a wide variety of commercial uses located in the core areas of the Primary urban Center. These districts typically have larger facilities and serve larger populations than community/neighborhood commercial districts. They may include major office buildings, shopping centers, and older commercial streets that serve a district-wide, regional or island wide population. Mixed uses, medium to higher density residential uses where appropriate, and higher densities are encouraged in these areas. Downtown should have the tallest buildings on Oahu. In other areas, maximum building heights should be established on the basis of viewplane studies to preserve views of natural landmarks.*

**Discussion:** Holomua, a high-density residential facility, is consistent with this designation.

Holomua is in accordance with the following PUC Development Plan policies (page 3-36):

*3.3 In-Town Housing Choices*
*3.3.2 Policies*

*The following policies are intended to promote housing choices in livable in-town neighborhoods that are planned for higher-density residential and mixed uses.*

- *Provide incentives and cost savings for affordable housing. Provide exemptions from zoning and building codes for housing projects that meet established standards of affordability, on a case-by-case basis.*
- *Provide for high-density housing options in mixed-use developments around transit stations. This type of "transit-oriented development" facilitates transit use and allows for increased densities without generating increased vehicular congestion.*

**Discussion:** Holomua will provide a minimum of 90 residential units (51 percent) at affordable prices to residents based on 140 percent or less of the HUD median income (see Section 2.2.2).

Holomua is located near major bus stops at the intersections of Kalakaua Avenue/Beretania Street and Kalakaua Avenue/King Street. Holomua's proximity to local services and easy access throughout the city via transit is consistent with housing choice policies set forth by the City.

### 4.2.3 City & County Land Use Ordinance

All lands within the City & County are zoned into specific districts. According to the Department of Planning and Permitting, the project site is zoned Community Business Mixed Use (BMX-3). According to Sec. 21-3.120 of the Land Use Ordinance (LUO):

> *The purpose of the business mixed use districts is to recognize that certain areas of the city have historically been mixtures of commercial and residential uses, occurring vertically and horizontally and to encourage the continuance and strengthening of this pattern. It is the intent to provide residences in very close proximity to employment and retail opportunities, provide innovative and stimulating living environments, and reduce overall neighborhood energy consumption.*

**Discussion:** Holomua is consistent with the purpose of this zoning designation. Because Holomua is also proposed under the provisions of 201H, exemptions will be sought to the LUO. These exemptions will be requested so as to make the project financially viable, keep unit prices affordable, and limit maintenance fees for the eventual residents. Proposed exemptions discussed in Chapter 5.

## 4.3 APPROVALS AND PERMITS

**Table 4. Approvals and Permits Summary**

| Permit/Approval | Responsible Agency |
|---|---|
| Chapter 201H, HRS | State HHFDC/<br>City and County of Honolulu Council |
| Chapter 343, HRS | State HHFDC |
| Americans with Disability Act (ADA) Accessibility Requirements | Disability and Communication Access Board |
| Conditional Use for Joint Development | Department of Planning and Permitting |
| Building Permit for building, electrical, plumbing, sidewalk/driveway, and demolition work (variance for Building Permit when work is done in setback areas) | Department of Planning and Permitting |
| Grubbing, Grading, and Stockpiling Permit | Department of Planning and Permitting |
| Sewer Connection Permits | Department of Planning and Permitting |
| Water Connection | Board of Water Supply |
| Water Quality | State Department of Health |

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# 5.0 201H APPLICATION AND EXEMPTIONS

## 5.1 INTRODUCTION

Hawaii Revised Statutes (HRS) Section 201H-38, "Housing development; exemption from statutes, ordinances, charter provisions, and rules" allows for eligible 201H projects to seek exemptions from all statues, ordinances, and rules of any governmental agency relating to planning, zoning, and construction standards that do not negatively affect the health and safety of the general public in exchange for providing affordable housing.

Holomua will be a 176-unit for sale condominium building centrally located in urban Honolulu. At least 51 percent of the units will meet the affordability requirements of the 201H program in that they will be priced to be affordable to households earning 140 percent or less of the HUD median income for Honolulu. The exemptions requested below are required to maintain the financial feasibility of Holomua. The primary goal is to maximize the number of units on the site reducing the overall development cost on a per unit basis. This in turn achieves THM Partners LLC 's and the State of Hawaii's joint goal of maximizing the number of affordable homes delivered to the public in an attractive and efficient building situated in a prime urban location located in close proximity to major employment centers and public transportation opportunities.

Below is a detailed description of the exemptions being requested for Holomua. A summary of requested exemptions is also included following the detailed description.

## 5.2 REQUESTED EXEMPTIONS

**Zoning**

Exemption from Revised Ordinances of Honolulu, Land Use Ordinance Section 21-3.120-2(b) [Table 21-3.4], Business Mixed Use Districts and Development Standards

- An exemption from Land Use Ordinance Sec. 21-3.120-2(b) [Table 21-3.4] is sought to allow Holomua to exceed the current allowable maximum height of 150 feet. Holomua consists of a single structure which may be as high as 220 feet. This additional height should not significantly impact the immediate neighborhood. There are a number of other high-rise buildings in close proximity to Holomua, some of which exceed 200 feet in height. Further, Holomua has a relatively small overall building footprint of only 9,100± square feet.
- An exemption from Land Use Ordinance Sec. 21-3.120-2(b) [Table 21-3.4] is sought to allow Holomua to exceed the maximum allowable density (FAR) of 2.5 (maximum 3.5 with bonuses) which allows a maximum building floor area of 53,348 square feet (74,687 square feet with bonuses). Holomua will have a building floor area of up to 155,000

square feet which equals a density (FAR) of 7.26. This density is necessary to achieve required economies of scale to maintain the financial feasibility of the affordable nature of Holomua.

- An exemption from Land Use Ordinance Sec. 21-3.120-2(b) [Table 21-3.4] is sought to allow the parking levels of Holomua to encroach into the required 10-foot side yard setback by about 10 feet along the north side and between 0 to 5 feet along the southerly side of the property. The residential tower located on top of the parking structure will not encroach into the side yard setback areas.
- An exemption from Land Use Ordinance Sec. 21-3.120-2(b) [Table 21-3.4] is sought to allow the parking levels of Holomua to encroach into the required 10-foot rear yard setback by about 10 feet for a distance of 27 feet and another 5 feet for a distance of about 37 feet. The residential tower located on top of the parking structure will not encroach into the rear yard setback area.
- An exemption from Land Use Ordinance Sec. 21-3.120-2(b) [Table 21-3.4] is sought to allow a loading space of Holomua to encroach into the required 10-foot side yard setback by about 10 feet along the north side of the property.

<u>Exemption from Revised Ordinances of Honolulu, Land Use Ordinance Section 21-3.120-2(5) (A), Street Setbacks</u>

- An exemption from Land Use Ordinance Sec. 21-3.120-2(5)(A) is sought to allow a 60 foot high and 30 foot wide section at the top of Holomua to encroach into the street setback area.

<u>Exemption from Revised Ordinances of Honolulu, Land Use Ordinance Section 21-6.20 [Table 21-6.1], Off-street Parking Requirements</u>

- An exemption from Land Use Ordinance Sec. 21-6.20 [Table 21-6.1] is sought to allow for less than the minimum required off-street parking spaces. The requirement is to provide 224 resident and 18 guest parking stalls for a total of 242 stalls[1]. While the current design provides for 242 parking stalls, more than sufficient to meet the minimum parking requirement, THM Partners LLC requests the option to include a lesser number of 201 resident parking spaces (1.14 stalls/unit) and 10 guest parking stalls for a total of 211 parking stalls if required to make Holomua financially viable. Considering the Holomua's close proximity to bus lines and major employment centers many residents and guests are anticipated to use public transportation, reducing the demand for parking stalls within Holomua.

[1] Parking calculations from ROH, LUO Sec. 21-6.20 [Table 21-6.1] based on floor area of dwelling unit: 1 required parking stall per unit of 600 square feet or less; 1.5 required stalls per unit between 601 and 799 square feet; 1 guest parking stall per 10 units. Therefore, 80 units (600 sf or less) x 1 required stall/unit = 80 stalls; 96 units (601 to 799 sf) x 1.5 required stalls/unit = 144 stalls; 80 + 144 stalls equals 224 required resident stalls. 176 units x 1 guest parking per 10 units equals 18 required guest parking stalls.

Exemption from Revised Ordinances of Honolulu Chapter 22, Article 7, Park Dedication Requirements

- An exemption from the Park Dedication requirements as set forth in Chapter 22, Article 7, Revised Ordinances of Honolulu is sought. The requirement is to provide approximately 15,500 square feet for Holomua[1]. The Holomua site is limited in size and, therefore, has limited land available for park dedication. While there will be landscaped open space at select locations around the building, such space is not sufficient to meet the City's Park Dedication requirements.

Exemption from Primary Urban Center Development Plan Guidelines

- Scenic Views - An exemption from the Primary Urban Center (PUC) Development Plan policies and guidelines as they relate to scenic views (PUC 3.1.1.2; Map A.1; Policy 3.1.2; and Guideline 3.1.3.3) is requested. At an overall height of nearly 220 feet, Holomua may not meet the overall guidelines of the PUC Development Plan. However, it should be noted that there are a number of other high-rise buildings in close proximity to Holomua some of which exceed 200 feet in height. Further, Holomua has a relatively small overall building footprint of only 9,100± square feet. Therefore, it is not anticipated that Holomua will have a significant impact on scenic views outlined in the Development Plan.
- Plazas - An exemption from the Primary Urban Center (PUC) Development Plan policies and guidelines as they relate to plazas (PUC Policy 3.1.2; and Guideline 3.1.3.7) is requested. At 21,339 square feet, the Holomua site is relatively small and does not afford the flexibility a larger site would provide in meeting this goal of creating public open space on the property while providing the maximum number of allowable affordable units.
- Maximum Building Heights – An exemption from the Primary Urban Center (PUC) Development Plan policies and guidelines as they relate to maximum building heights (PUC Policy 3.2.2.3) is requested.
- Pedestrian Amenities – An exemption from the Primary Urban Center (PUC) Development Plan policies and guidelines as they relate to additional pedestrian amenities (PUC Policy 3.2.2.3) is requested.

**Building Permit And Plan Review Fees**

- An exemption from Sections 18-6.1 and 18-6.2, Revised Ordinances of Honolulu is requested, to allow exemption from plan review and building permit fees, estimated at $2,500 (maximum) and $140,000±, respectively.

[1] The Park Dedication requirement is based on 10% of the maximum floor area (155,000 square feet) which equals 15,500 square feet or 176 units x 110 square feet per unit which equals 19,360 square feet, whichever is less.

**Public Works/Infrastructure Fees**

- An exemption from Revised Ordinances of Honolulu (ROH), Sec. 14-6.1 and 14-6.4 is sought to exempt Holomua from payment of Board of Water Supply connection and Wastewater sewer connection fees estimated to approximate $270,000± and $605,000±, respectively. Such fees add significantly to the cost of the Holomua. Exemption from these fees allows delivery of the units at a lower price.
- An exemption from ROH, Sec. 14-3.2 is sought to exempt Holomua from sewer installation charges.
- An exemption from ROH, Sec. 14-14.4 is sought to exempt Holomua from grading and grubbing permit fees.
- An exemption from ROH, Sec. 14-12.12 is sought to exempt Holomua from private storm drain connection license fee.
- An exemption from ROH, Sec. 14-10.3 is sought to exempt Holomua from residential wastewater system facility charge.

**School Impact Fee**

- An exemption is sought from any school impact fees required under HRS Section 302A-1601 et. seq. Holomua is not expected to significantly increase the overall population and the number of school-aged children in the area.

## 5.3 SUMMARY OF REQUESTED EXEMPTIONS

A summary of requested exemptions is presented below.

| SUMMARY OF REQUESTED EXEMPTIONS | | | |
|---|---|---|---|
| ***Land Use Ordinance*** | | | |
| Item | Pertinent Section | Allowable/Required | Proposed |
| Building Height | Sec. 21-3.120-2(b) [Table 21-3.4] | 150 ft. | 220± ft. |
| Building Floor Area Ratio/Density | Sec. 21-3.120-2(b) [Table 21-3.4] | 2.5-3.5 (53,348-74,687 sf) | 7.26 (155,000± sf) |
| Setbacks: | | | |
| Side Yard | Sec. 21-3.120-2(b) [Table 21-3.4] | 10 ft. | 10-ft encroachment of parking garage on North side; 0-ft to 5-ft. encroachment of parking garage on South side; 10-ft encroachment of loading space on North side |
| Rear Yard | Sec. 21-3.120-2(b) [Table 21-3.4] | 10 ft. | 10'x27' encroachment and 5'x37' encroachment of parking garage |
| Street Setback (Height) | Sec. 21-3.120-2(5)(A) | 2 to 1 max from centerline of street | 60-ft high x 30-ft wide encroachment at top of building |
| Parking Stalls:<br>Units<br>Guest<br>Total | Sec. 21-6.20 [Table 21-6.1] | <br>224<br>18<br>242 | <br>242/201 (201 if needed financially)<br>10<br>211 |
| ***Park Dedication Requirement*** | | | |

| | | | |
|---|---|---|---|
| Park Dedication | Chapter 22, Article 7 Revised Ordinances of Honolulu | 110sf/unit or 10% Permitted Floor Area = 15,500 sf | None |
| ***Primary Urban Center Development Plan*** | | | |
| Scenic Views | PUC 3.1.1.2; Map A-1; Policy 3.1.2; Guideline 3.1.3.3 | Exemption is requested as Holomua may not meet guidelines for preservation of scenic views. | |
| Plazas | PUC Policy 3.1.2; Guideline 3.1.3.7 | Exemption is requested as the Holomua site is relatively small and may not meet Development Plan's goals for plazas or public open space. | |
| Maximum Building Heights | PUC Policy 3.2.2.3 | Exemption is requested as Holomua may not meet guidelines for maximum building heights. | |
| Pedestrian Amenities | PUC Policy 3.2.2.3 | Exemption is requested as Holomua may not meet guidelines for pedestrian amenities. | |

### *5.4* PERMIT/INFRASTRUCTURE FEES & SCHOOL IMPACT FEE

In addition to the exemptions above, the applicant will also be requesting the following:

1. Exemption is requested of Plan Review and Building Permit fees, estimated at $2,500 and $140,000, respectively (Sections 18-6.1 and 18-6.2, ROH).
2. Exemption is requested from facilities fees charged by Board of Water Supply and Wastewater Branch, estimated at $270,000± and $605,000±, respectively, to hook-up to county water and sewer (Sections 14-6.1 and 14-6.4, ROH).
3. Exemption is requested from sewer installation charges (ROH, Sec. 14-3.2), grading and grubbing permit fees (ROH, Sec. 14-4.4), private storm drain connection license fee (ROH, Sec. 14-12.12) and residential wastewater system facility charge (ROH Sec. 14-10.3).
4. Exemption is requested from school impact fees required under HRS Section 302A-1601 et. seq.

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# 6.0 ALTERNATIVES

## 6.1 NO ACTION ALTERNATIVE

The no action alternative would keep the site in its present condition. Given the presence of the vacant dirt lot, this alternative is not considered to be desirable for purposes of health and safety as well as aesthetics. The vacant nature of the lot generally attracts loitering and other undesirable activities. The adjacent commercial building wall has been vandalized with graffiti, and the dirt lot is unsightly and dusty.

## 6.2 ALTERNATIVE SITE DEVELOPMENT CONCEPTS

The Holomua site is limited by the small lot size and allowable uses and development standards pursuant to the City's Land Use Ordinance. Alternative concepts include:

- **Low-rise Multi-family Residential Development –** The cost of redevelopment, when coupled with the tax burden the property bears, cannot be justified by a land use that is significantly less than its highest and best use. In addition, a low-rise multi-family residential building would be inconsistent with the surrounding mid-rise condominiums.

- **Taller Building Form** – A tall, compact residential tower atop a podium parking structure is a typical design solution for high-rise buildings. A taller building form than the one proposed could provide more residential units, but at a much higher cost, especially for additional levels in the parking structure, which would require proportionately greater circulation space.

## 6.3 RETAIL USE ALTERNATIVE

This alternative would limit development on the site to retail/commercial land uses that would compliment the existing retail activities in the area. As with the low-density, low-rise alternative discussed in 5.2, an important consideration is the inability to generate sufficient revenue to justify the land purchase price and development cost.

To maximize revenue from retail, the property would need to be developed to its highest allowable density. Assuming that the property is developed to the allowable Floor Area Ratio (FAR) of 2.5 (~53,347 square feet of retail space), the parking standard of one stall for every 800 square feet of retail space would result in 66 parking stalls being required for off-street parking. These stalls would have to be located onsite in a multi-story parking garage, which would have to be built above retail. The

construction cost for structured parking is such that lease rates for retail tenants would be well above market lease rates, making the project unfeasible.

# 7.0 ANTICIPATED DETERMINATION, FINDINGS, AND SUPPORTING REASONS FOR DETERMINATION

## 7.1 SIGNIFICANCE CRITERIA

According to the State Department of Health, Hawai'i Administrative Rules (HAR) (Section 11-200-12, Significance Criteria), an applicant or agency must determine whether an action may have a significant impact on the environment, including all phases of the project, its expected consequences both primary and secondary, its cumulative impact with other projects and its short- and long-term effects. The HAR establish a "significance criteria" to determine whether significant environmental impacts will occur as a result of a proposed action. An action shall be determined to have a significant impact on the environment if it meets any one of the following criteria:

*(1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resources;*

The Holomua site, along with the surrounding area, has been extensively modified from its natural state for urban development. Based on site inspections and the results of an archaeological assessment, there are no known historic properties on or near the Holomua site. Similarly, no loss or destruction of any cultural resources or natural resources such as threatened or endangered plant or animal species are expected.

This environmental assessment evaluated existing cultural and environmental conditions and determined that no known natural or cultural resources will be lost or destroyed as a result of the proposed action.

*(2) Curtails the range of beneficial uses of the environment;*

Holomua is consistent with State and City land use designations. Holomua involves the redevelopment of an urban use site with a use consistent with the General Plan, PUC Development Plan, and Land Use Ordinance. The "highest" and "best" use of the project site would be multi-family housing.

*(3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS; and any revisions thereof and amendments thereto, court decisions, or executive orders;*

Holomua is consistent with the environmental policies, goals, and guidelines established in Chapter 344, HRS.

*(4) Substantially affects the economic welfare, social welfare, or cultural practices of the community or state;*

Holomua will also positively benefit the social welfare by providing needed affordable housing in an urban neighborhood, where median housing income is significantly below the island-wide median.

Construction of Holomua will benefit the community and State by creating temporary jobs and increasing sales within the construction industry. Tax revenues will be generated by the short-term construction work and also modest revenues by the long-term employment and secondary service industry jobs that support the increase in population. Holomua will also increase property tax revenues relative to the current vacant condition of the site.

*(5) Substantially affects public health;*

Construction of Holomua may pose temporary impacts to noise and air quality levels (i.e., fugitive dust from grading work, noise and exhaust emissions from construction equipment and vehicles). However, these potential impacts will be short-term and are not expected to significantly affect public health. All construction activities will comply with applicable regulations and appropriate mitigation measures will be implemented as necessary.

*(6) Involves substantial secondary impacts, such as population changes or effects on public facilities;*

Holomua will have a secondary impact of creating residences for 176 new households in the Makiki Neighborhood Area. This represents a one percent increase to the existing inventory of 16,368 units (2000 census data) . Public facilities have adequate capacity to serve the development.

*(7) Involves a substantial degradation of environmental quality;*

Construction activities are anticipated to result in short-term impacts to noise, air quality, and traffic in the immediate vicinity. With the incorporation of mitigation measures during the construction period, the Holomua will not result in long-term degradation to environmental quality.

*(8) Is individually limited but cumulatively has considerable effect on the environment, or involves a commitment for larger actions;*

No cumulative effects are anticipated, inasmuch as Holomua involves the development of residential uses within an urban area that are consistent with land use plans and designations.

*(9) Substantially affects a rare, threatened or endangered species or its habitat;*

The Holomua site and surrounding area consists of urban uses, structures, and the landscaped environment does not provide habitat for any rare, threatened, or endangered species.

*(10) Detrimentally affects air or water quality or ambient noise levels;*

Construction activities for creation of Holomua could temporarily impact noise, air and water quality levels (i.e., fugitive dust from grading work, noise and exhaust emissions from construction equipment and vehicles). However, these potential impacts will be short-term and are not expected to be detrimental. All construction activities will comply with applicable regulations and appropriate mitigation measures will be implemented as necessary.

*(11) Affects or is likely to suffer damage by being located in an environmentally sensitive area, such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters.*

Holomua is not located within an environmentally-sensitive area and is not expected to impact any environmentally-sensitive areas such as a critical habitat for an endangered species. The Holomua site is designated by the FIRM as Zone X, which are areas determined to be outside of the 500-year floodplain (Figure 11). The site is located away from the shoreline and is outside of the tsunami evacuation and beach area. The site is flat and does not appear to be located on geologically hazardous land. The site is not located adjacent to an estuary or freshwater or coastal waters.

*(12) Substantially affects scenic vistas and view planes identified in county or state plans or studies;*

Holomua will not affect any designated view planes in this area as identified on State or County plans.

Holomua will fall in the profile of the existing high rises and be built to the character of the neighborhood. Holomua will be an infill development, surrounded by a mixture of commercial, residential, and mid to high-rise housing.

*(13) Requires substantial energy consumption.*

Construction of Holomua is not expected to require substantially more energy than other projects of similar size and scale. Where possible, Holomua's developer will be looking to incorporate energy-saving technologies.

## 7.2 ANTICIPATED DETERMINATION

On the basis of impacts and mitigation measures examined in this document and analyzed under the above criteria, it is anticipated that Holomua will not have a significant effect on the local, County, or Statewide physical or human environments. Pursuant to Chapter 343, Hawai'i Revised Statutes, the Approving Agency, which in this case is the Hawai'i Housing Finance & Development Corporation (HHFDC), is anticipated to issue a Finding of No Significant Impact (FONSI).

# 8.0 CONSULTATION

THM Partners LLC have initiated public and agency comment to Holomua through letters and meetings requesting input prior to development of this EA.

## 8.1 AGENCY PRECONSULTATION

The following public agencies were sent pre-consultation letters for the preparation of this EA:

State of Hawai'i

- Department of Education ✓
- Department of Land & Natural Resources – State Historic Preservation Division
- Hawai'i Housing Finance & Development Corporation
- Department of Health – Office of Environmental Quality Control

City & County of Honolulu

- Board of Water Supply ✓
- Department of Community Services✓
- Department of Design & Construction ✓
- Department of Environmental Services
- Department of Facility Maintenance✓
- Department of Parks & Recreation ✓
- Department of Transportation Services✓
- Department of Planning and Permitting (DPP) ✓
- DPP - Land Use Approval Branch
- DPP - Traffic Review Branch
- DPP - Zoning Plan Review Branch
- DPP -Civil Engineering Branch
- DPP-Subdivision Branch
- DPP-Wastewater Branch
- Fire Department ✓
- Police Department ✓

Private Organizations and Individuals

- Hawai'ian Electric Company, Inc. ✓
- Councilmember Ann Kobayashi

Those agencies with a (✓) provided comments, which have been incorporated into this EA. Letters and responses are provided in Appendix I.

## 8.2 ADDITIONAL CONSULTATION

In addition to the pre-consultation letters THM Partners LLC has also initiated public involvement through meetings, which as of May 2008 have included:

**Councilwoman Ann Kobayashi** - The principals of THM Partners LLC met with Councilwoman Ann Kobayashi on Friday, March 14, 2008. At the meeting THM presented the Holomua and included a summary of the exemptions sought in order to make the Holomua successful. Ms. Kobayashi asked a number of general questions regarding the Holomua and unit pricing. Due to its central location, she felt the residents would benefit from nearby public transportation. She expressed initial support for the Holomua, however, stated she would need to get feedback from her constituents about the Holomua before providing her formal public support.

**Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10** - The principals of THM Partners LLC presented Holomua to the Makiki/Lower Punchbowl/Tantalus Neighborhood Board on April 17, 2008. Questions were asked regarding if THM Partners LLC was considering energy-saving devices such as photovoltaics or solar water heating (response was these items are being explored, however, are not likely to be feasible due to limited roof top space for panels as well as cost concerns considering affordable nature of Holomua); timing of environmental assessment (response – July 2008); if Holomua will be fee simple (response – yes); if there will be any restrictions on affordable units (response – yes, 10-year buyback, shared appreciation, etc); and if there will be any commercial use on the ground floor (response – no). One attendee expressed concern about traffic. However, this concern was more about the self storage project currently under construction at the corner of Kalakaua and King which has been blocking off one lane of traffic on a daily basis for quite some time. Overall the presentation went smoothly with no major issues or concerns raised by the Board or the attendees. No action by the Board was taken.

# 9.0 REFERENCES

Baker, H.L. et al. (1965) *Detailed Land Classification, Island of Hawai'i*. L.S. Land Study Bureau, University of Hawai'i.

Consillio, Kristin (2006) "New Generation Seeks Place for Tradition." *Honolulu Star-Bulletin,* June 10, 2006.

D.L. Adams Associates, Ltd. (2008). *Environmental Noise Assessment Report: May, 2008,* Kailua, Hawai'i: Prepared for THM Partners LLC.

Fehr & Peers (2008) *Holomua Transportation Impact Analysis.* Honolulu, Hawai'i. Prepared for KRC Partners, LLC.

Juvik, Sonia P. & Juvik, James O. (1998) *Atlas of Hawai'i: Third Edition*. Honolulu: University of Hawai'i Press.

Kam, Nadine (2005) "Mo'ili'ili." *Honolulu Star-Bulletin.* February 19, 2005.

Kusao and Kurahashi, Inc. (2003) *Final Environmental Assessment Kinau Vista Affordable Elderly Residential Apartment Development.* Prepared for Hawai'i Housing Development Corporation.

Kusao and Kurahashi, Inc. (2005) *Final Environmental Assessment Piikoi Vista Affordable Elderly Rental Apartment Development.* Prepared for Hawai'i Housing Development Corporation.

PBR Hawai'i (2002) *Final Environmental Assessment McCully/Mō'ili'ili Beautification Master Plan.* Prepared for City and County of Honolulu, Department of Design and Construction.

Pukui, Mary Kawena, Samuel H. Elbert, and Ester T. Mo'okini (1974) *Place Names of Hawai'i, revised and expanded edition.* Honolulu: University of Hawai'i Press.

Sawada, Kristin (2003) *"New Assisted Living Facility Targets Seniors"*. Pacific Business News. Honolulu. September 12, 2003.

Scientific Consultant Services, Inc. (2008) *An Archaeological Assessment Report of 0.4800-Acres of Land In Makiki, Ili of Pawa'a, Makiki Ahupua'a, Honolulu District, Island of Oahu, Hawai'i [TMK (1) 2-4-006: 017 and 018].* Prepared for THM Partners, LLC.

Star-Bulletin (2002) "Higas Still Run Zippy's as a Family Business." *Honolulu Star-Bulletin.* 29, September, 2002.

State of Hawai'i Department of Business, Economic Development & Tourism, Research and Economic Analysis Division, Hawai'i State Data Center. (2001). *2000 Census Tract Names and 1990 and 2000 Resident Population for the State of Hawai'i*. Honolulu, Hawai'i.

State of Hawai'i, Department of Business, Economic Development, and Tourism (2004). *Population and Economic Projections for the State of Hawai'i to 2030*.

State of Hawai'i Department of Education. (2006). *Official Enrollment Count 2007-2008 School Year*. Provided by DOE via fax on February 25, 2008.

United States Census Bureau (2000). Census Report. Website: http://www.census.gov.

United States Department of Agriculture, Soil Conservation Service: Foote, Donald E., Hill, Elmer L., Nakamura, Sakuichi, and Stephens, Floyd. (1972). *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawai'i*. Hawai'i: USDA SCS, in cooperation with the University of Hawai'i Agricultural Experiment Station. Available online at http://www.ctahr.Hawai'i.edu/soilsurvey/5is/oahu.htm. Accessed on February 27, 2008.

Watanabe, June (1996) "Places in the Heart for Everyone." *Honolulu Star-Bulletin,* 24 October 24, 1996.

Watanabe, June (2003) "McCully's 122-acre Land Grant was Subdivided Around 1901." *Honolulu Star-Bulletin,* February 9, 2003.

Wu, Nina (2008). "McCully Chop Sui Sign Shines Again." *Honolulu Star-Bulletin,* April 5, 2008.

Wu, Nina (2006) "Landmark McCully Eatery from 1940's Will Close." *Honolulu Star-Bulletin.* July 11, 2006.

# Appendix A

## ALTA / ACSM Land Title Survey

File No.

# SURVEYOR'S REPORT

*(To be filled out and signed with all surveys)*

To: **TITLE GUARANTY OF HAWAII**

THIS IS TO CERTIFY, that on September 27, 20 07, I made an accurate survey of the premises standing in the name of Geneva Commons, LLC situated at Honolulu (City) Honolulu (County) Hawaii (State)

briefly described as: Parcels First and Second Tax Key: (1)-2-4-06: 17 & 18

and shown on the accompanying survey entitled: ALTA/ACSM Land Title Survey

I made a careful inspection of said premises and of the buildings located thereon at the time making such survey, *and again on* September 25, 20 07, and at the time of such latter inspection I found same to be in possession of said premises as owner (tenant) or (owner)

I further certify as to the existence or non-existence of the following at the time of my last inspection:

1. Rights of way, old highways, or abandoned roads, lanes or driveways, drains, sewer, water, gas or oil pipe lines across said premises: See map.

2. Springs, streams, rivers, ponds, or lakes located, bordering on or running through said premises: None

3. Cemeteries or family burying grounds located on said premises. (Show location on plat): No surface evidence was found to indicate any cemeteries or family burying grounds.

4. Telephone, telegraph or electric power poles, wires or lines overhanging or crossing said premises and serving other property or properties: See map.

5. Joint driveways or walkways; party walls or rights of support; porches, steps or roofs used in common or joint garages: None

6. Encroachments, or overhanging projections. (If the buildings, projections or cornices thereof, or signs affixed thereto, fences or other indications of occupancy encroach upon or overhang adjoining properties, or the like encroach upon or overhang surveyed premises, specify all such): See map.

7. Physical evidence of boundary lines on all sides. (Be specific): Sidewalk along the westerly side; building along the northerly side; building and pavement along the southerly side; building along the easterly side.

8. Is the property improved? No
   (a) Building is: Brick ( ); Clapboard ( ); other ( ) Specify
   (b) Building is One story ( ); two story ( ); split-level ( ), other ( ) Specify

9. Indications of building construction, alterations or repairs within recent months: No
   (a) If new improvements under construction, how far have they progressed?

10. Changes in street lines either completed or officially proposed: None to my knowledge.
    (a) Are there indications of recent street or sidewalk construction or repairs? No

11. Are the abutting streets or roads maintained by public authorities? Yes

12. If the surveyed premises are subject to restrictive covenants, do the improvements, use and occupancy comply with such? (If the premises are subject to restrictive covenants, have the examining attorney furnish you verbatim copy of them) N/A

DAYNE M. TAUZER LICENSED PROFESSIONAL LAND SURVEYOR No. 6297 HAWAII, U.S.A.

Dayne M. Tauzer
Civil Engineer or Surveyor

**NOTE:** In all cases where there are encroachments, support easements, party walls, etc., they should also be denoted upon the map of your survey. Also, be certain map compliés with Instructions on reverse side. Particular attention is directed to Paragraph 3 of these instructions.

## Survey Instructions and Certificate

A survey to be acceptable to **TITLE GUARANTY OF HAWAII, INC.**, must be prepared in U. S. Standard of measurements and if within corporate limits of any town, village or city, must be a "transit" survey and not a "compass" survey. Preference will always be given to surveys showing bearings referred to true north but all surveys which show bearings must designate the meridian referred to whether true, magnetic or arbitrary and if true meridian is not used approximate deflection must be noted on the plat.

**Boundaries**

1. Every survey, whether of farm or city property, must indicate the physical character of the boundary lines, that is, whether fence, wall, water-course, highway, etc., and if no physical evidence of boundaries exists, such fact must be noted. Any material variations from the record lines by fences, walls or structures, whether on the property surveyed or adjoining, must be shown, with the extent of such variations. If any of the boundaries or lines of record coincide with lot or property lines on any filed map, or are adopted from previous surveys, whether by the same surveyors or otherwise, such facts should be shown on plat. The surveyor is required to check the descriptions of adjoining owners, when furnished to him, and show the extent of any variations between the boundaries as stated therein and those of the property surveyed.

**Rights of Way, Cemeteries, etc.**

2. The surveyor must indicate any water courses, drains, sewers, utility easements, joint driveways, roads, paths or trails crossing the property, the closing of which might affect the rights of adjoining owners, whether legal or assumed. He must also show any existing cemetery or burying grounds on surveyed property.

**Streets and Alleys**

3. Names of streets and alleys must be shown with the **distance** from the nearest corner to **beginning point** of property surveyed. Width of street and sidewalk in front or at side of premises should be shown with width of alley in rear or side of premises.

**Party Walls**

4. The nature, character, location and width of all walls on or near boundary lines should be shown. Show all projections beyond face of wall and indicate the portion of wall on the property and the portion on adjoining property, and whether subject to beam rights. The thickness of walls throughout entire length should be shown. If building on premises has no independent wall but uses any wall of adjoining premises, this condition should be shown and explained. The same requirements apply where conditions are reversed.

**Adjoining Owners and Lot Numbers**

5. Indicate on survey the names of adjoining owners on all sides of the premises which information may be obtained from occupants. Lot numbers and name of subdivision of the property in question and of adjoining lots must be shown.

**Encroachments**

6. Encroachments of buildings and of structural appurtenances, such as fire escapes, bay windows, etc., by or on adjoining property, or on abutting streets, must be indicated with the extent of such encroachments.

**Buildings and Lot Lines**

7. All buildings on property must be shown with dimensions and relation to lot and building lines. If conditions in chain of title or zoning ordinances require building to be set back specified distances from street or property line survey must show **measured distances** from said building to said line. In acreage surveys buildings may be plotted to scaled positions.

**Area**

8. Show acreage of the property except in cases of small lots.

**Contiguity**

9. If survey comprises several parcels, shown interior lines and facts sufficient to insure contiguity. The Company may require that it be furnished with a consolidated description. Caution should be used to see that there are no strips or gores.

**Courses and Distances**

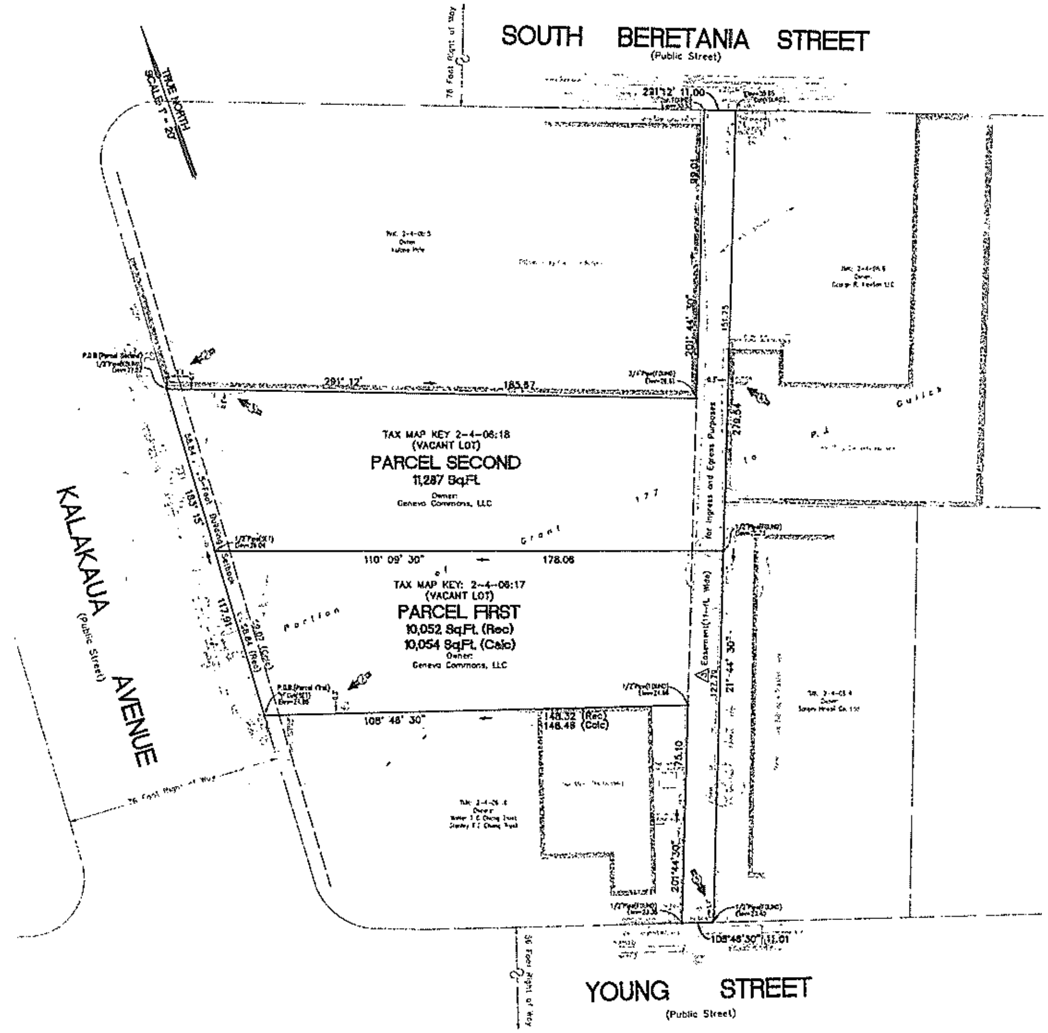
10. Courses and distances should be properly denoted, showing stakes or other monumentations appearing on the premises. Map should show arrow pointing north and give scale of distances.

**Certificates**

11. All maps must show City or Town and State where premises located with such other notations as will accurately identify property surveyed. The certificate thereon must be dated as of date survey was made, signed by surveyor, and be to the effect that the survey was actually made on the ground as per record description and is correct; that there are no encroachments either way across property lines except as shown.

The certificate should be addressed, to-wit: "To all parties interested in title to premises surveyed."

*In addition to the certified map of the survey, a report must be filled out by the surveyor on the following attached form entitled "SURVEYOR'S REPORT".*




## LEGAL DESCRIPTION

PARCEL FIRST:

That certain parcel of land (being portion[s] of the land[s] described in and covered by Royal Patent Grant Number 177 to P.J. Gulick) situate, lying and being on the east side of Kalakaua Avenue between Beretania and Young Street, City and County of Honolulu, State of Hawaii, and being more particularly described as follows:

Beginning at a pipe on the east side of Kalakaua Avenue, said point of beginning located by true azimuth traverse from a Government Survey Street Monument set near the north corner of Beretania and Punahou Streets as follows:

| | | | | | |
|---|---|---|---|---|---|
| (a) | 111° | 12' | | 494.45 | feet; |
| (b) | 3° | 15' | | 280.60 | feet to the above described initial point, and thence running by azimuths measured clockwise from true South: |
| 1. | 183° | 15' | | 58.84 | feet along the east side of Kalakaua Avenue to a pipe; |
| 2. | 290° | 09' | 30" | 178.06 | feet along the remainder of Grant 177 to P.J. Gulick to a pipe; |
| 3. | 21° | 44' | 30" | 122.79 | feet along same to a pipe; |
| 4. | 108° | 46' | 30" | 11.01 | feet along the northeast side of Young Street to a pipe; |
| 5. | 201° | 44' | 30" | 75.10 | feet along the remainder of Grant 177 to P.J. Gulick to a pipe; |
| 6. | 109° | 45' | 30" | 148.32 | feet along same to the point of beginning and containing an area of 10,052 square feet, more or less. |

TOGETHER WITH an easement for ingress and egress to and from Beretania Street, eleven (11) feet wide, as set forth in Partition Deed dated October 28, 1944, recorded in the Bureau of Conveyances, State of Hawaii, in Book 1884, Page 387, said easement being more particularly described therein.

PARCEL SECOND:

That certain parcel of land (being portion[s] of the land[s] described in and covered by Royal Patent Grant Number 177 to P.J. Gulick) situate, lying and being on the east side of Kalakaua Avenue between Beretania and Young Street, City and County of Honolulu, State of Hawaii, and being more particularly described as follows:

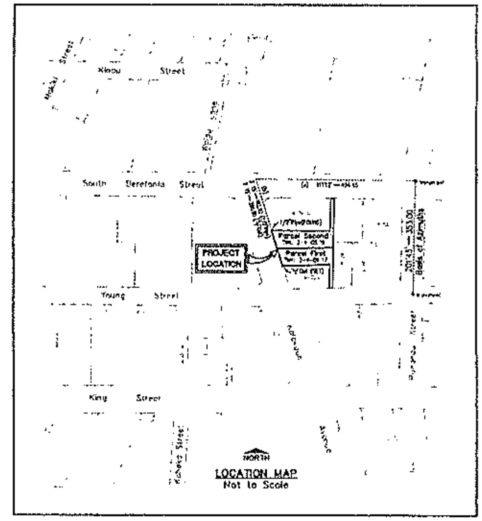
Beginning at a pipe on the northwest corner of this piece of land and on the east side of Kalakaua Avenue, said point of beginning located by true azimuth traverse from a Government Survey Street Monument set near the north corner of Beretania and Punahou Streets as follows:

| | | | | | |
|---|---|---|---|---|---|
| (a) | 111° | 12' | | 494.45 | feet; |
| (b) | 3° | 15' | | 152.92 | feet to the above described initial point, and thence running by azimuths measured clockwise from true South: |
| 1. | 291° | 12' | | 183.67 | feet along the remainder of Grant 177 to P.J. Gulick; |
| 2. | 201° | 44' | 30" | 99.01 | feet along the remainder of Grant 177 to P.J. Gulick; |
| 3. | 291° | 12' | | 11.00 | feet along the southwest side of Beretania Street to a concrete post marked "+"; |
| 4. | 21° | 44' | 30" | 151.75 | feet along the remainder of Grant 177 to P.J. Gulick; |
| 5. | 110° | 09' | 30" | 178.06 | feet along the remainder of Grant 177 to P.J. Gulick; |
| 6. | 183° | 15' | | 58.81 | feet along the east side of Kalakaua Avenue to the point of beginning and containing an area of 11,287 square feet, more or less. |

TOGETHER WITH an easement for ingress and egress to and from Beretania Street, eleven (11) feet wide, as set forth in Partition Deed dated October 28, 1944, recorded in the Bureau of Conveyances, State of Hawaii, in Book 1884, Page 387, said easement being more particularly described therein.

Being the land conveyed by the following (As to Parcels First and Second):

WARRANTY DEED Grantor:Rooney Group, LLC, a Hawaii limited liability company Grantee:GENEVA COMMONS, LLC, a California limited liability company Dated:December 27, 2005
Recorded:Document No. 2005-267034




LOCATION MAP
Not to Scale

## EXCEPTIONS – SCHEDULE B

| | | |
|---|---|---|
| 1 | TAX MAP KEY:<br>(1) 2-4-006-017-0000 (AS TO PARCEL FIRST)<br>(1) 2-4-006-018-0000 (AS TO PARCEL SECOND)<br><br>Property Address:<br>PARCEL FIRST:1319 Kalakaua Avenue Honolulu, Hawaii 96826<br>PARCEL SECOND:1567 S. Beretania Street Honolulu, Hawaii 96826 | NOT SHOWN |
| 2 | Title to all mineral and metallic mines reserved to the State of Hawaii. | NOT SHOWN |
| 3 | Easement of right-of-way reserved for ingress and egress to and from Young Street, eleven (11) feet wide, as set forth in Partition Deed:<br>Dated:October 28, 1944 Recorded:Book 1884, Page 387 | SHOWN |
| 4 | Any recorded, unrecorded or unfiled subleases or rental agreements and any liens, charges or exceptions against any sublessees or tenants named therein. | NOT SHOWN |
| 5 | FIRST MORTGAGE AND SECURITY AGREEMENT Mortgagor:Geneva Commons, LLC, a California limited liability company Mortgagee:SCOTT W. SETTLE, as Trustee of that certain unrecorded Settle Family Trust dated September 2, 2003, as to an undivided fifty percent (50%) interest; and THOMAS E. GRUENWALD, an individual, as to an undivided fifty percent (50%) interest, Tenants in Common Effective As Of:July 21, 2006 Recorded:Document No.2006-150229 Principal Amount:$750,000.00<br><br>NOTE:Geneva Commons, LLC is not registered with the Department of Commerce and Consumer Affairs to do business in the State of Hawaii | NOT SHOWN |

## LOCATION SUMMARY

- (1) Tow away sign extends onto Parcel First by 0.3 feet.
- (2) Concrete footing extends onto TMK:2-4-06:5 by 0.1 feet for approximately 9 feet
- (3) AC unit extends onto Parcel Second by 0.8 feet.
- (4) Electrical conduit extends onto Parcel Second by 0.3 feet.
- (5) Ht box extends onto Parcel First by 1.7 feet.

## REFERENCES

R-1 Island Title Corporation Commitment Order Number 096-322641 dated as of September 4, 2007

R-2 Parcel Map 6-4-1-70A "PUNAHOU STREET WIDENING" dated June 3, 1960, filed with the Department of Public Works, City & County of Honolulu

## LEGEND

| | |
|---|---|
| a/c | Asphaltic Concrete |
| d/w | Driveway |
| fh | Fire Hydrant |
| ht box | Hawaiian Telcom Box |
| he box | Hawaiian Electric Box |
| mtco | Mutual Telephone Company |
| pm | Parking Meter |
| swr co | Sewer Cleanout |
| slb | Street Light Box |
| smh | Sewer Manhole |
| wv | Water Valve |
| w/w | Walkway |
| wm | Water Meter |
| wmh | Water Manhole |

## SYMBOLS

Boundary Of Survey
Easement
Overhead Utility Line
Concrete Pavement
Building Line
Tile Wall
Tree
Hedge
Concrete Driveway
Plotted Exception
P.O.B. Point of Beginning

## NOTES

1. This survey was prepared using Island Title Corporation's Commitment Order Number 096-322641 dated as of September 4, 2007.
2. Adjacent property owners obtained from the Real Property Mapping Branch.
3. All property corners are marked as shown.
4. All streets shown are public streets.
5. The parcels are located within ZONE X (areas determined to be outside the 0.2% annual chance floodplain) as shown on FEMA Flood Insurance Rate Map Number 15003C0365F, Map revised September 30, 2004.
6. The parcels are zoned as BMX-3 Community Business Mixed Use District per the Honolulu Land Information System website. Front yard setback = 10 feet. Side and rear setback = 0 feet. Maximum height = 150 feet.
7. There are no parking stalls on Subject Properties (vacant lots)
8. There is no observable evidence of recent earth moving work or building construction.
9. There is no observable evidence of site use as a solid waste dump, sump or sanitary landfill.
10. Elevations shown are referred to mean sea level.

## BASIS OF AZIMUTHS

The basis of azimuths is the azimuth between survey street monuments located along Punahou Street between Young Street and South Beretania Street, being 201°45' 353.00 as shown on Parcel Map 6-4-1-70A "PUNAHOU STREET WIDENING" dated June 3, 1960, filed with the Department of Public Works, City & County of Honolulu (see location map).

# ALTA/ACSM LAND TITLE SURVEY

## TAX MAP KEYS 2-4-06: 17 AND 18
## PORTION OF GRANT 177 TO P.J. GULICK

AT PAWAA, HONOLULU, OAHU, HAWAII

OWNER: GENEVA COMMONS, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY

## SURVEYOR'S CERTIFICATE

To BHM Partners LLC, Geneva Commons, LLC and Island Title Corporation:

This is to certify that this map or plat and the survey on which it is based were made in accordance with the "Minimum Standard Detail Requirements for ALTA/ACSM Land Title Surveys," jointly established and adopted by ALTA and NSPS in 2005, and includes Items 1, 2, 3, 4, 5, 6, 10, 11(a), 13, 14, 16 and 18 of Table A thereof. Pursuant to the Accuracy Standards as adopted by ALTA and NSPS and in effect on the date of this certification, undersigned further certifies that in my professional opinion, as a land surveyor registered in the State of Hawaii, the Relative Positional Accuracy of this survey does not exceed that which is specified therein.

9/28/07
Date

Wayne M. Teruya
Licensed Professional Land Surveyor
Certificate No. 6297

WAYNE M. TERUYA LICENSED PROFESSIONAL LAND SURVEYOR No. 6297 HAWAII, U.S.A.

SEPTEMBER 27, 2007
DATE: ~~NOVEMBER 24, 2003~~
FIELD BOOK NO. 2160/48

T.M.K.: 2-4-05; 17 & 18

24" X 36" = 6.0 sq. ft.

# Appendix B
# Market Study

# KALAKAUA AFFORDABLE HOUSING MARKET

***For Holomua***

***KRC Partners***


***Data@Work***

A RESIDENTIAL REAL ESTATE MARKET RESEARCH CONSULTANCY

1029 Iiwi Street, Honolulu, Hawaii
(808) 291-4407
• rcassiday@mac.com •

http://www.rcassiday.com

# I. INTRODUCTION & IDENTIFICATION OF STUDY AND RESEARCHER

The Data@Work, a market research firm that specializes in analyzing residential real estate markets for developers, has been asked to perform a study analyzing the market for affordable housing condominiums in Honolulu. This study focuses on the historical, current, and projected rental market conditions and trends to help forecast the absorption for the proposed project (tentatively named Holomua).

The study entailed collecting, comparing and analyzing information that has a bearing on the numerous aspects of market demand for the proposed project, including but not limited to publicly available real property, economic and commercial data. Income and demographic information was obtained from the State of Hawaii, City and County of Honolulu, Bureau of the Census, Applied Geographic Systems and National Decision Systems.

The data and statements herein are based on independent research by Data@Work and are in no way contingent upon outside findings or recommendations. By way of background, Data@Work focuses exclusively on residential market research in the state of Hawaii. It services the developer, lending and landowning community with regular reports on the housing markets. In addition, it conducts numerous feasibility studies, including Hokua Tower, The Windsor and Ko'olani, three of the largest condominium high-rise projects on the market today. It also has done fourteen studies on the affordable housing market, rental and for-sale – ten on Oahu, and one on Maui, one on the Big Island and two on Kauai -- since 1999 for five different developers.

# II. PROJECT DESCRIPTION, TARGET MARKET AND STUDY

## Project Location & Description

The proposed project is located on Kalakaua Avenue in the area of Lower Makiki, Honolulu, on the island of Oahu, in the state of Hawaii. It is situated at one end of Kalakaua Avenue, which is the major thoroughfare of the major resort in the state, Waikiki. It is also within close proximity to Ala Moana Shopping Center, the state's largest retail center. As such, it is very close to two of the major sources of employment in Honolulu.

In the immediate neighborhood, there is a good-sized public park, and one of the oldest and largest churches, Central Union, in the state (with extensive grounds). It is next to every major bus line in the city, and has a major supermarket within a block.

The property is 21,339 square feet in size. It is an infill site, planned for redevelopment with a 176-unit residential condominium project, whose units will be aimed at the workforce market. Thus, a minimum of 50% of the units will be priced at or below 140% median income for the area.

**PROPOSED PROJECT**

| Target Market | Bedrooms | Count | Ave sf |
|---|---|---|---|
| Affordable Units | 1 Bed | 43 | 458 |
| | 2 Bed | 48 | 719 |
| Affordable Units | | 91 | 596 |
| Market | 1 Bed | 37 | 515 |
| | 2 Bed | 48 | 719 |
| Market Total | | 85 | 630 |
| Grand Total | | 176 | 612 |

The project's strongest selling points:

- Strong location, extremely desirable to most Honolulu residents (as well as a number of offshore ones, including the neighbor islands and the continental US);
- Providing new construction in an area where most of the housing stock is aged;
- Reasonable prices;
- Strong views of the mountains and surrounding city on 3 out of the 4 sides;
- Walking distance to large park and major church;
- Walking distance to services and shopping, as well as easy transit to bus stop on King and South Beretania Street.

## *Target Market Definition*

The project is targeted on buyers who can qualify to purchase these units, under the affordable housing policy of the state of Hawaii (which combines residency, plus family size, age and income guidelines). In general, they will be making within 140% of the Area Median Income, and consist of households having 1 person to 4 persons, preferably.

Target Market: In order to qualify, the home purchaser candidates will have to demonstrate that that their annual incomes fall within the limits established by the affordable housing policy guidelines, which for this program has at it's limits 140% of Area Median Income (AMI).

The overall guideline is described in the table below:

**HONOLULU AFFORDABLE INCOME GUIDELINES, 2008**

| AMI | *2 Persons* | *3 Persons* |
|---|---|---|
| 80% | $60,800 | $68,400 |
| 100% | $61,840 | $69,570 |
| 110% | $68,020 | $76,530 |
| 120% | $74,210 | $83,480 |
| 130% | $80,390 | $90,440 |
| 140% | $86,580 | $97,400 |

Using these income guidelines, we developed the following limits that these households could pay for a house, using the following HUD assumptions:

- A Five Percent down payment
- A 30 year term mortgage
- A Six percent interest rate, and
- A Housing Expense (mortgage only) of 28%

Using these guidelines, we roughly estimated 'how much house you could buy' for households containing 2 to 3 people, earning 140% of AMI. Then, we arranged this according to household sizes (people counts). This is described in the table below:

**TENTATIVE PRICING, GIVEN 140% AMI 2008**

| People in Household | Maximum Bedroom Size To Purchase | 140% of AMI | Maximum Price Payable, 140% |
|---|---|---|---|
| 2 | One Bed | $86,580 | $422,246 |
| 3 | Two Bed | $97,400 | $475,015 |

It is worth noting that the maximum prices these households could afford are higher than the average prices for similar units in the market last year. The table below describes the average

prices for fee-simple condominium one and two bedroom units in the general area (TMK Zone 1-2, from Downtown to Kapahulu) of the proposed project and in the relevant price ranges, of $250,000 to $500,000.

**GENERAL PRICING CHARACTURISTICS OF THE OAHU CONDOMINIUM MARKET**

| Bed Counts | 2007 Sales | Ave Int sq ft | Ave 2007 Prices |
|---|---|---|---|
| 1 | 596 | 601 | $344,754 |
| 2 | 340 | 966 | $519,950 |

In order to get a general understanding of the positioning of these units in the market, we have worked up a potential price program for both the affordable and the market units in the development. The table below describes our guidelines and pricing parameters:

**GENERAL PRICING PROGRAM FOR DEVELOPMENT**

| Target Market | Bedroom Type | Count | Ave sf | Min $ | Ave $ | Max $ |
|---|---|---|---|---|---|---|
| Affordable Units | 1 | 43 | 458 | $243,700 | $313,293 | $353,900 |
| | 2 | 48 | 719 | $399,000 | $399,000 | $399,000 |
| Affordable Units | | 91 | 596 | $243,700 | $358,501 | $399,000 |
| Market | 1 | 37 | 515 | $355,100 | $362,584 | $374,800 |
| | 2 | 48 | 719 | $473,000 | $508,850 | $544,300 |
| Market Total | | 85 | 630 | $355,100 | $445,181 | $544,300 |
| Grand Total | | 176 | 612 | $243,700 | $400,364 | $544,300 |

As seen, this pricing program fits well within both the pricing limits for the affordable units, as well as the general pricing parameters existing in the target market segment for the market units.

This then provides support for our belief that the marketplace will react favorably to both the affordable and market units, when they come to market. To be sure, this belief is based on our observation of strong and deep potential demand, as well as no further degradation of market sentiment, but we point to the following benefits that drive demand (besides the most important, favorable pricing relative to the market):

- The most desirable infill location for a new project in terms of having immediate access to major employment centers, major transportation conduits and public transportation, shopping and recreational opportunities and vital good and services;
- Impressive and unobstructed views of the surrounding area, particularly the mountains, the sunrise and Diamond Head, and Waikiki (3 out of the 4 sides of the building, and above the 16$^{th}$ floor on the 4$^{th}$ side of the building, looking out at the sunset).

## *Competitive Market Area Definition*

In the narrowest sense, the competitive market area consists of the sales of condominium apartments in and around general area of Central Honolulu, and more specifically Waikiki and Moilili. This would be areas included in TMK Zone 1-2.

In a broader sense, one well supported by buyer demographics in competing projects, the competitive market includes the entire island, , given that the location is very near to the centers of employment, shopping and recreation of Honolulu.

## *Quantifying Market Demand*

Given the needs and desires typical of homebuyers whose incomes are at or below 140% of AMI, we will quantify the potential demand for these units as follows:

- All households within a reasonable proximity of the proposed project (which we believe is island-wide, given that the proposed pricing will target an affordable market segment, but which we restrict to the immediate area, defined as TMK Zone 1-2) that can qualify under the income guidelines of HUD and still be able to qualify for a market rate mortgage.

In accessing the size and strength of the target market, we will look to the following:

- The overall real estate market for Oahu; plus
- All condominium sales, new and resales, in the relevant price ranges for Oahu, Honolulu and the relevant area.

## *Study Contents*

1. *The study will begin by analyzing the economic cycle relevant to housing demand, and to those macro and micro economic considerations that have a bearing on the project's feasibility.*

2. *Thereafter, it will describe the current residential real estate market on Oahu. It will do so first in general, looking at the overall market trends.*

3. *Next, it will look at the specific target market, focusing in on the sources of demand, as well as the sources of competitive supply.*

4. *Finally, it will quantify demand and make a projection as to how soon these units will be completely absorbed.*

# III. ECONOMIC TRENDS AND HOUSING DEMAND

## Overview

Simply put, real estate values move closely in synch with an area's economic growth, and economic growth is determined in the short run by economic trends in the area, plus those trends in the area's major trading partners. In the longer run, economic growth is also determined by population changes (both migration and demographic) and lifestyle preferences.

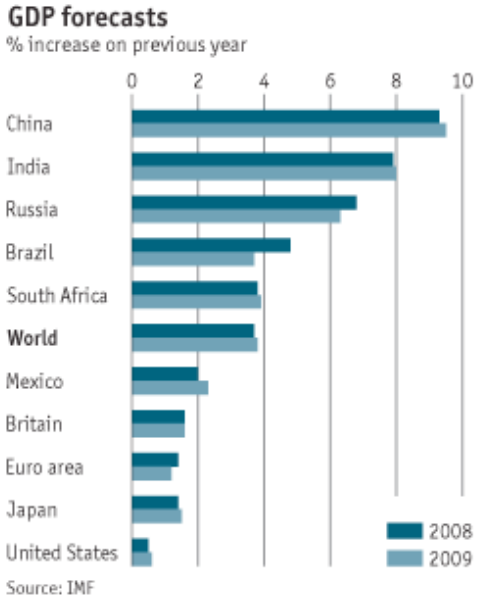
**The Economist poll of forecasters, April averages** (previous month's, if changed)

| | Real GDP, % change | | | | Consumer prices % increase | | Current account % of GDP | |
|---|---|---|---|---|---|---|---|---|
| | Low/high range | | average | | | | | |
| | 2008 | 2009 | 2008 | 2009 | 2008 | 2009 | 2008 | 2009 |
| Australia | 2.5/3.6 | 2.5/3.8 | 3.0 (3.3) | 3.0 (3.2) | 3.3 (3.1) | 2.7 | −6.1 (−5.6) | −5.7 (−5.4) |
| Belgium | 1.2/2.7 | 1.1/2.4 | 1.8 (1.9) | 1.8 (1.9) | 2.6 (2.4) | 1.8 (1.9) | 1.8 (2.0) | 2.0 (2.2) |
| Britain | 1.2/3.1 | 1.0/2.3 | 1.8 (1.9) | 1.8 (2.0) | 2.6 (2.4) | 2.1 (2.0) | −4.2 (−3.8) | −3.7 (−3.4) |
| Canada | 1.1/2.5 | 1.4/2.5 | 1.5 (1.7) | 2.1 (2.2) | 1.7 (1.9) | 2.0 | nil (0.4) | −0.4 nil |
| France | 1.2/1.9 | 0.9/2.2 | 1.6 | 1.6 (1.7) | 2.4 (2.2) | 1.8 (1.7) | −1.6 (−1.3) | −1.6 (−1.4) |
| Germany | 1.2/2.5 | 1.0/2.2 | 1.7 | 1.7 (1.9) | 2.3 (2.1) | 1.8 (1.7) | 6.2 (5.2) | 5.8 (5.2) |
| Italy | 0.1/1.7 | 0.4/1.8 | 0.8 (1.0) | 1.1 (1.4) | 2.6 (2.4) | 1.9 | −2.5 (−2.3) | −2.4 (−2.3) |
| Japan | 0.9/2.1 | 1.0/2.2 | 1.3 (1.4) | 1.5 (1.6) | 0.7 (0.6) | 0.6 (0.5) | 4.7 | 4.7 (4.8) |
| Netherlands | 1.4/3.5 | 1.4/2.4 | 2.5 (2.3) | 1.9 (2.1) | 2.0 | 2.1 | 7.2 (6.8) | 6.9 (6.6) |
| Spain | 1.8/3.8 | 1.0/3.0 | 2.4 | 2.1 | 3.6 (3.5) | 2.7 (2.6) | −9.2 (−9.1) | −8.5 (−8.3) |
| Sweden | 2.1/3.3 | 1.4/3.1 | 2.4 (2.6) | 2.3 (2.5) | 2.8 (2.6) | 2.2 | 6.9 (6.1) | 6.9 (6.1) |
| Switzerland | 1.5/2.8 | 1.0/2.4 | 2.1 (2.0) | 1.7 (1.9) | 1.8 (1.6) | 1.2 | 15.1 (14.6) | 14.9 |
| United States | 0.8/2.2 | 0.9/2.6 | 1.2 (1.5) | 1.7 (2.2) | 3.3 (3.2) | 2.3 | −4.7 | −4.2 (−4.3) |
| Euro area | 1.1/2.6 | 1.1/2.2 | 1.6 (1.7) | 1.6 (1.8) | 2.7 (2.5) | 2.0 | 0.1 (−0.1) | nil (−0.1) |

Sources: ABN AMRO, BNP Paribas, Citigroup, Decision Economics, Deutsche Bank, Economist Intelligence Unit, Goldman Sachs, HSBC Securities, KBC Bank, JPMorgan Chase, Morgan Stanley, Scotiabank, UBS

## Short Term

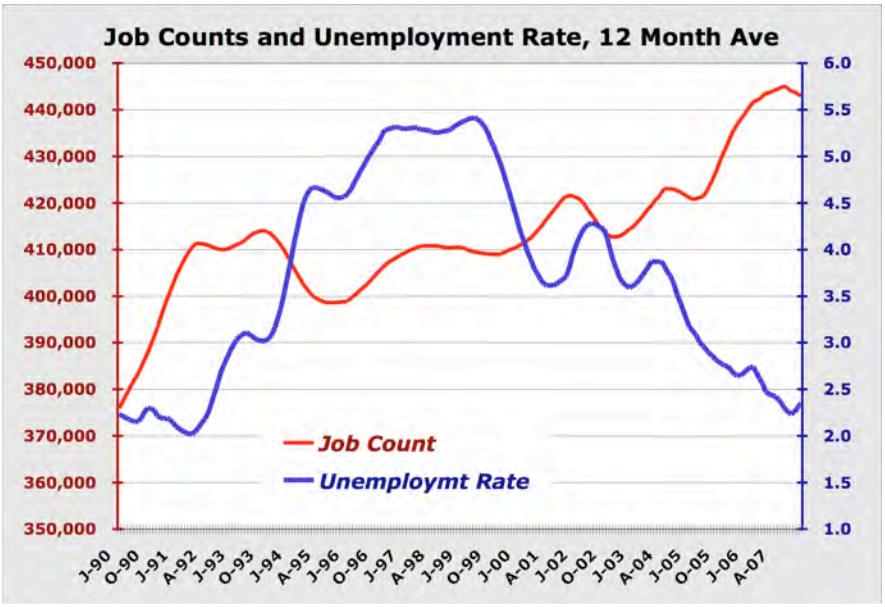
Up through the 1st quarter of 2008, the Hawaiian economy is growing slowly but steadily, fueled largely by federal spending that is consistent and present for the long-term, and visitor spending that has been steady. That said, a number of event have lead most economic forecasters to expect growth to fall to zero in the 2nd quarter, and stay that way until the 4th quarter.



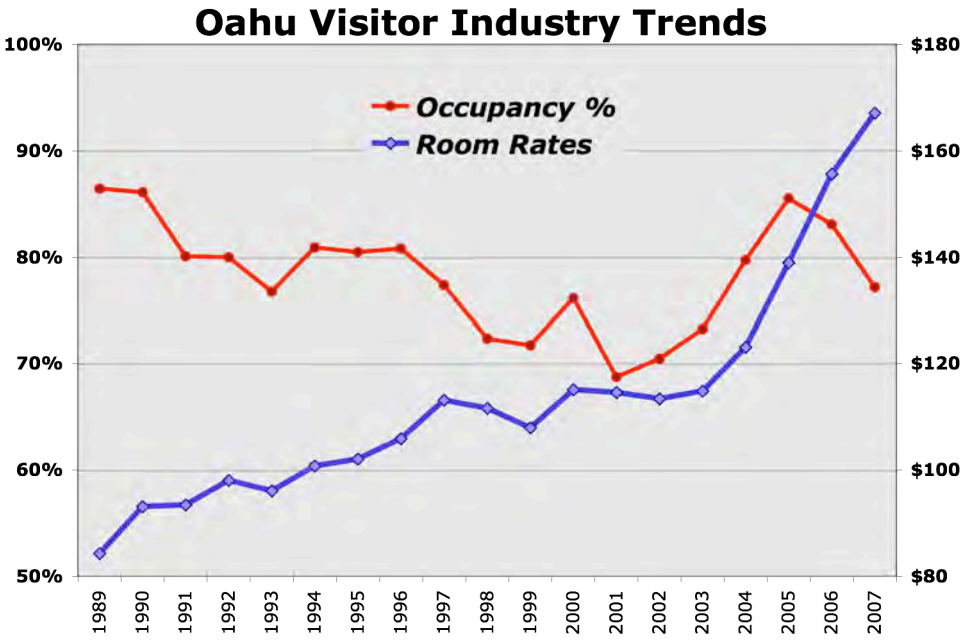

What events? A local and a national airline ceased passenger operations, and a cruise ship operator cut it's capacity back to one ship from three. Add to that the fact that the US economy is entering a recession (one that looks to be sharper than the last two, thanks to falling home prices and falling consumer spending). Thus, it looks like tourism will be down in 2008, before growing again next year. To be sure there are

some positives: per the IMF, the global economy continues to grow and will probably not fall into recession (and that is why they forecast a soft landing for the US).

That said, Hawaii is in much better shape than the US. Per the island's economic activity - real personal income statewide is in its eleventh consecutive year of growth. The state also had the lowest unemployment nationally for 2007, 2.6%. It also was the lowest in 2006, at 2.4%.




Per DBEDT, total visitor arrivals should decline 1.4 percent in 2008, and visitor expenditures growth will be at 1.5 percent. For 2009, both visitor arrivals and visitor days are predicted to grow 1.2 percent, while the visitor expenditures are forecast to increase 4.2 percent.

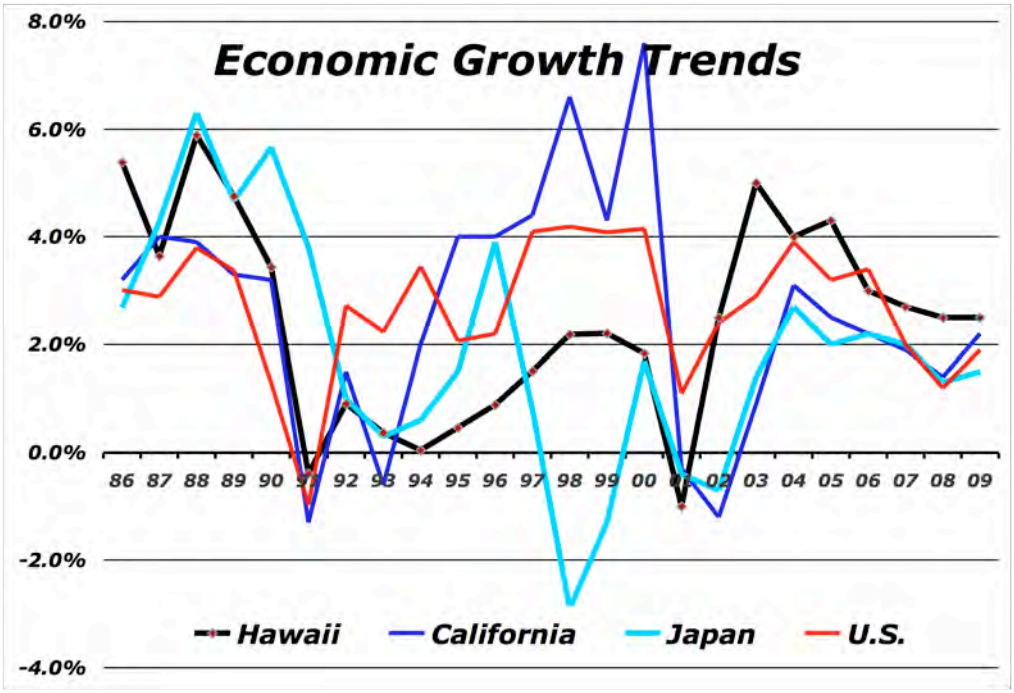


Building permit levels still remain high, suggesting a solid construction activity in 2008. Government construction keeps on rising, with the ongoing multi-billion military housing privatization initiative lasting several more years. All in all, construction continued to show robust, though slower, job growth. Overall, total wage and salary jobs are now expected to grow 1.4 percent in 2008, and 1.3 percent in 2009.

While the economy has continued to grow, costs have grown faster over the last couple years. This is now cooling down, with real personal income slated to grow at 1.6 percent this year, up from 1.3 last year and behind the 1.9 percent forecast for each of the next two years.

Looking ahead, the eastbound Asian market shows strong economic growth continuing, albeit at a lower level. World GNP also is looking good. Further, the rise in energy prices should fuel visitor (and second home) demand from the homes of natural resources: Canada, Alaska and the Rocky Mountain states. Then, the revival of Waikiki will play out well with the devalued dollar, spurring higher occupancies and room rates. The growth in visitor industry should support the second home and retirement housing market here.

However, all told, there is a slowdown going on in the major markets relative to our visitor industry, per the Economist Poll of Forecasters (as illustrated in the ECONOMIC GROWTH Chart). As such, US visitor demand for Oahu's recreational goods and services looks to fall over the next 1-2 years.




Beyond tourism, the federal government is pouring billions into Oahu's economy, due to the military activity post 9/11. On Oahu, there are several major funded programs: the addition of several new military platforms (the Stryker brigade), the upgrading the communications and logistics infrastructure and the privatization of military housing (Hawaii would gain 3,700 troops by 2011 as 50,000 service members are brought home to the United States from Germany and South Korea).

In sum, Hawaii is slowing down significantly relative to 2003-2004, with the silver lining that this is some chance of escaping the US downturn, thanks to steady federal spending (mainly on military housing, but also on other upgrades), relatively stable housing values (prices falling by 3-5% this

year and possibly next), replacement Asian visitors (especially with the strong Yen) and falling interest rates.

## *Longer Term:*

Looking ahead, we think Oahu's visitor industry is in fundamentally good shape. In the first place, its major renovations and additions will attract new timers and repeat visitors – Waikiki has gotten a major facelift, and Ko Olina has a Disney 800 unit vacation club slash hotel coming in. Further out, Turtle Bay will be sold at low enough price so that there will be an addition of at least 1,000 units combining both short-term and long-term housing on the property.

Longer term, our major visitor markets will return to economic growth in 2-3 years, then grow steadily for several after that. Added to that, we expect it will be boosted by two trends:

- The movement away visiting 'foreign' resorts, due to terrorism in Bali and other places, and
- The low value of the dollar, which makes vacations in Hawaii cheaper for foreigners and foreign vacations more expensive for Americans.

Oahu will grow also by diversifying recreational goods and services into different short-term visitor segments (time share, vacation rentals, bed-and-breakfasts and partial ownership products) and long-term immigration in order to upgrade one's quality of life (second home ownership, retirement communities).

Potentially equal to the visitor trade is federal spending, mainly for national security. The outlook here is just as optimistic, if not more, given the present nuclear threat of Korea and the future threat of China becoming expansionist. The net of this increased funding due as the military upgrades, extends and populates their facilities on the island, from home porting another aircraft carrier to upgrading the missile defense network. Finally, as the war in Iraq winds down, there will be a large-scale repatriation of military personnel to their home base, here on Oahu.

Finally, the state and county have some major infrastructure projects ahead, with the wherewithal to indulge in some countercyclical spending. This is above and beyond the light rail transport system, which will contribute more than the stated cost of $3.8 billion, given the housing, office and retail development surrounding these transit stations.

Given these trends, our expectation over the next 3-5 years is good job growth and rising income levels on Oahu, more than enough to accelerate a relatively high level of migration into the island from domestic and international sources. Over the ensuing 3-5 years, we see an economic consolidation, but no letdown in income growth and job stability: the term of federal spending is for 10 years, and the spending levels have been set.

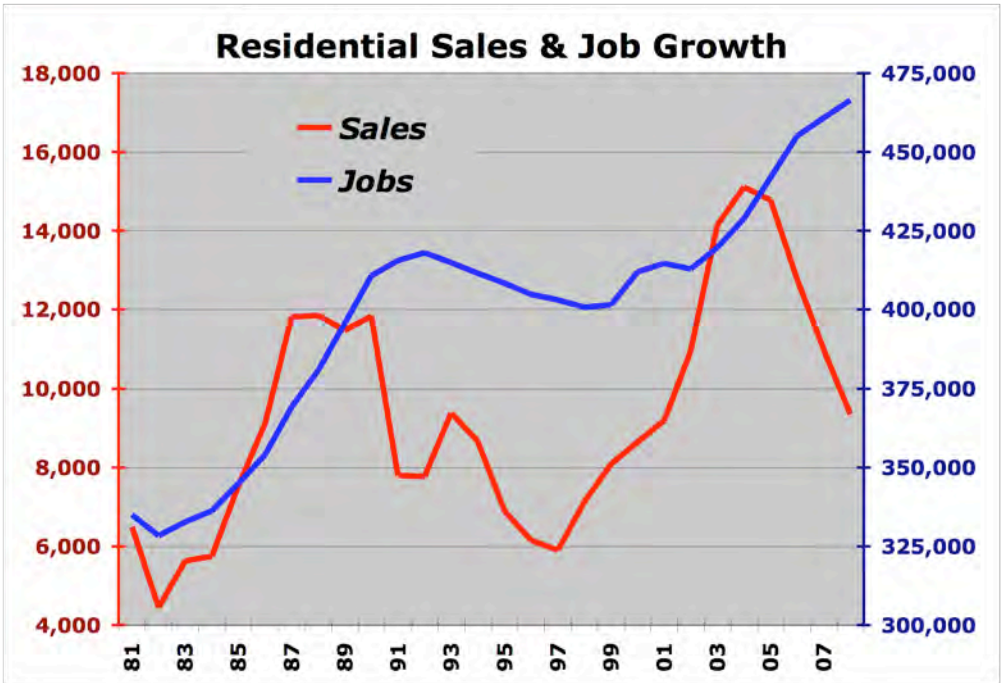
## *Housing Demand:*

Looking at the relationship between the economy and residential development, the major link is that the economy's performance drives the demand side of the real estate market. Looking at the market from the grassroots, the commonly accepted truth of purchasing a home is: "When I have a job, I can't afford a house. And when I can afford a house, I don't have a job."

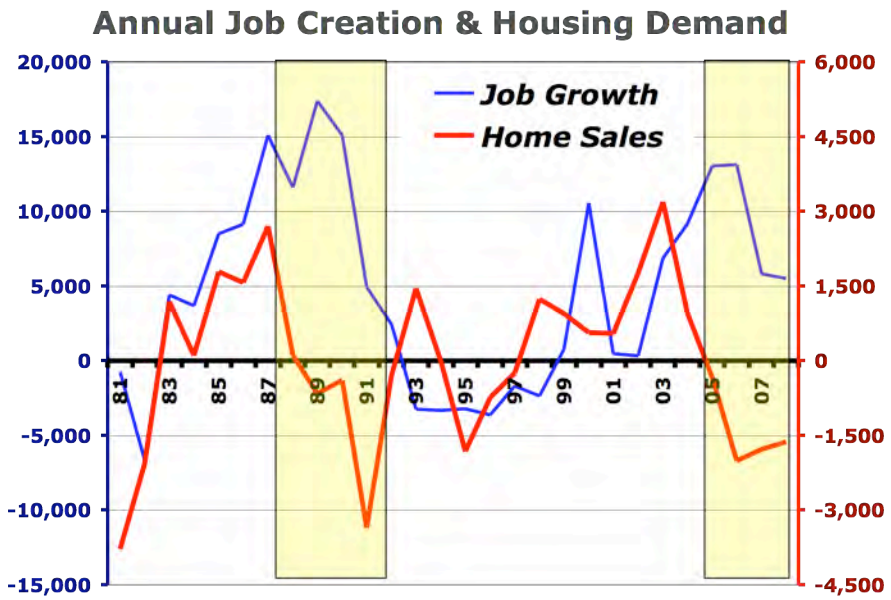
In short, economic expansion fuels a residential boom, pushing the prices of homes out of many households' ability to purchase. Indeed, this is often so exaggerated that there is a political backlash, wherein local public agencies act to increase the supply of housing. Unfortunately, they look to the housing industry to provide them with most of this subsidy, which often counterproductive, as it hurts the goose that lays the golden egg.

On the supply side, given the extremely long time it takes to entitle residential development, is less affected both in the short and the long term. In particular, the lack of land on this island, combined with a NIMBY sentiment and high costs of production, has keep long-term supply of residential land low and in decline. We turn now to look at the various linkages in between the economy and the property market, starting with job growth and housing sales.

Interestingly, there has not been the same high degree of job growth (adding 80,000 plus jobs in 7 years, as opposed to 60,000 in 6 years) in this economic cycle, as there was in the last one. This can be seen in the blue line in the RESIDENTIAL SALES & JOB GROWTH Chart. Either there is a lot of informal job growth, hidden from the statisticians, or there is a lot more job growth coming in the pipeline (such as non-payroll jobs i.e., self-employed, contract labor). Whatever the explanation, this abundance of jobs gives support for a strong housing market.

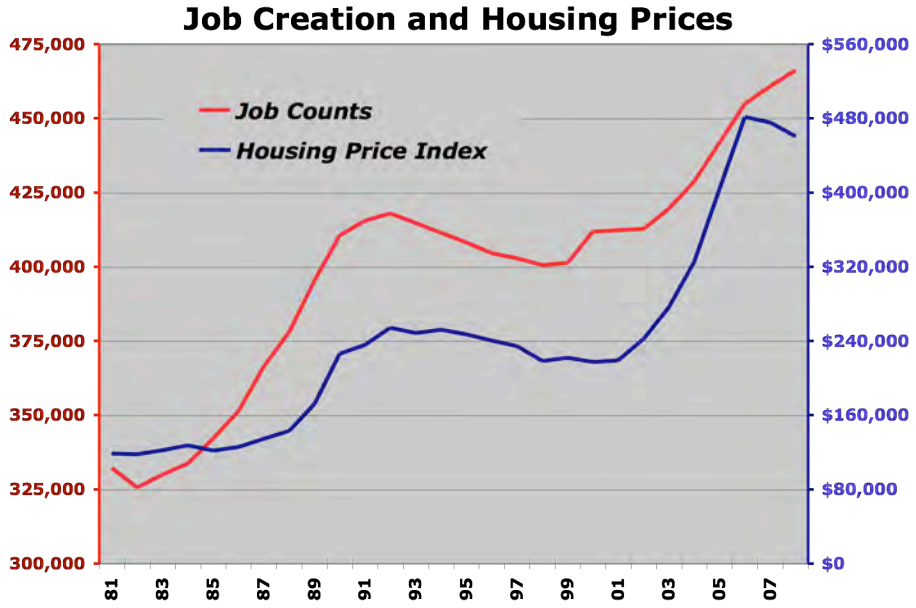


Another way of looking at this is the annual change in job counts and residential sales. The ANNUAL JOB GROWTH AND HOUSING DEMAND Chart isolates the annual changes in job growth and home sales, and shows even more clearly the periods of price growth. This is when



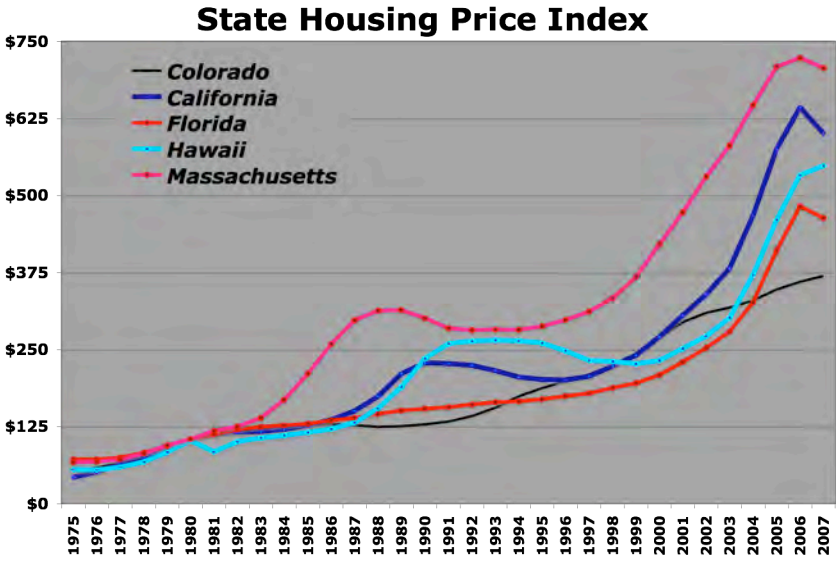

there are more jobs than houses to buy (demand greater than supply), shown in the chart by a yellow shaded area. It remains to be seen whether job growth will continue to support current price levels, given recent dramatic price appreciation and negative buyer psychology.

Another way to visualize this is to examine relationship between job count growth and housing prices (as an index of resale and new, condo and single family) in the JOB CREATION AND HOUSING PRICES Chart. Historically, a decline in prices has been caused by a decrease in job growth, but this is not the case at this point in the cycle. Instead, it looks like price increases went much higher than was sustainable, and the two lines converged, when there normally would be some separation. As such, it looks like price declines have now brought the relationship back near its historic norm.

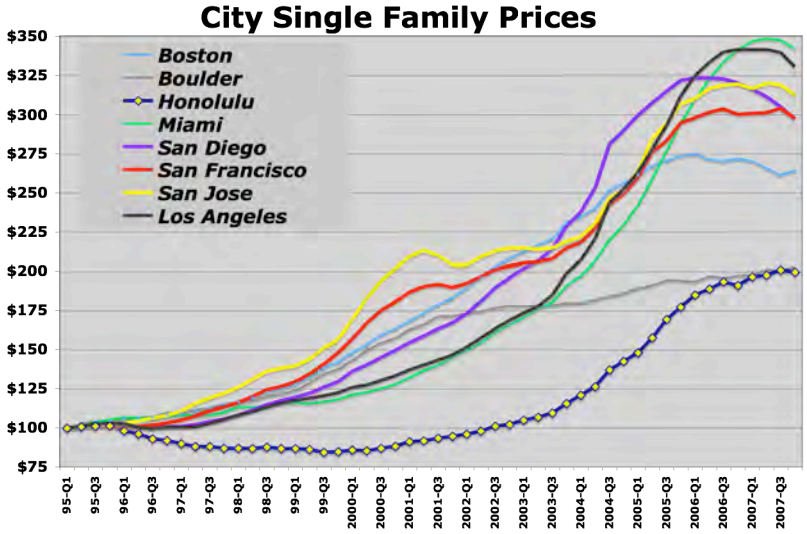


Interestingly, in the last cycle, it took a lot of job growth before there was an impact on home prices (and not very much of an impact, relative to this cycle. Somewhat the opposite, home prices in this cycle really took off, relative to job growth in this cycle.

Some or much of this could be attributable to offshore demand, both in terms of second home purchases and price arbitrage between regions. But with prices across the nation falling, this demand will ease up, allowing our prices to decline (plus lower demand due reduced tourism). Note: On the other hand, since Hawaii's and Honolulu's prices didn't rise as dramatically vis-à-vis national ones, there's less of a reason for them to go down much, going forward.



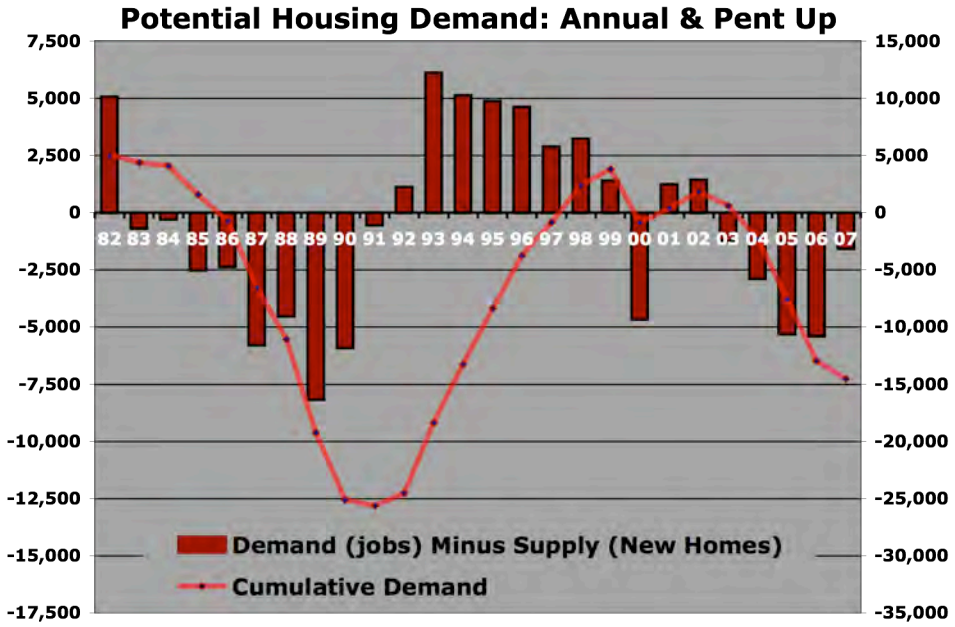

The STATE HOUSING PRICES (Log) Chart, showing OFHEO's same sale single family home price index, illustrates this 'arbitrage' effect.




A similar chart is done for the reduced wealth effect, showing the CITY SINGLE FAMILY PRICES, of the metropolitan areas that are Hawaii's major tourism markets.

When there's not enough homes available (either because of strong job creation or second home demand) in any one year, then the residual of that is set aside as pent-up demand for next year. We tried to quantify this pent-up demand by taking a factor of housing demand via job creation, and matching that up with new housing supply.

What we found is a potential undersupply, and this is demonstrated in the HOUSING DEMAND: ANNUAL & PENT UP chart (with the annual demand shown as purple bars, and the cumulative of that, shown as the red line). To be sure, many of these jobs are ones that make a wage better suited to purchasing a starter condominium rather than a single family home.




However, this leads to a concern going forward: if the growth of jobs is outpacing the supply of housing, will it continue to underwrite rising housing prices, with the effect of reducing the number of workers that are available to businesses within the local economy. This is what is behind the recent initiatives to grow the stock of workforce housing.

Now, we turn to examine the residential market in detail, starting with supply.

# IV. ANALYSIS OF HOUSING SUPPLY IN THE MARKET

The study guidelines call for an analysis of household sizes and types in the market.

## Oahu Condominium Housing Stock

As noted earlier, most of Oahu's condominium housing stock is quite old:

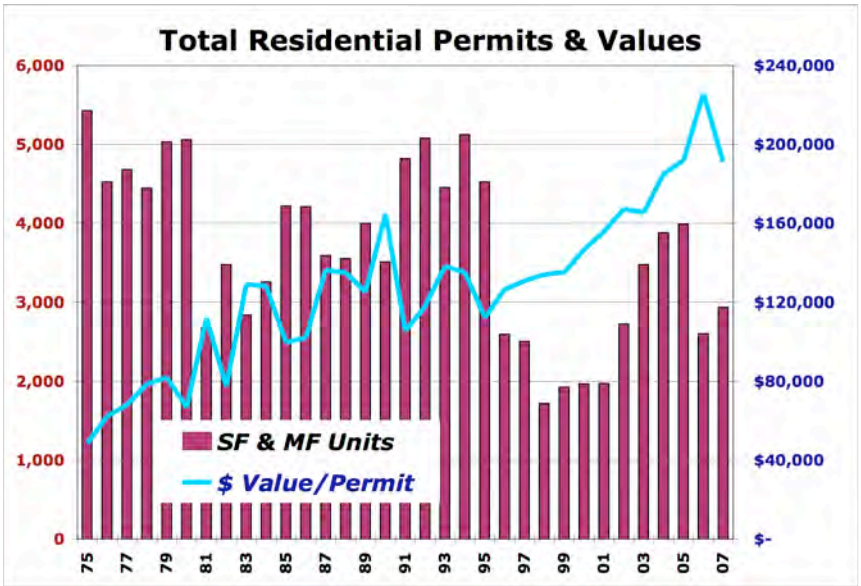
- 17% of the total condo housing stock was built before 1970
- 46% of it was built between 1970-1979,
- 18% was built between 1980-1989, and,
- 15% was built between 1990-1999.

Furthermore, most of Oahu's condominium housing stock is quite small:

- 13% of all condominium units on Oahu are between 1,250 and 1,500 sq. ft.,
- 7% of all units are between 1,500 and 1,750 sq. ft.,
- 3% of all units are between 1,750 and 2,000 sq. ft., and
- 1% of all units are over 2,000 sq. ft.

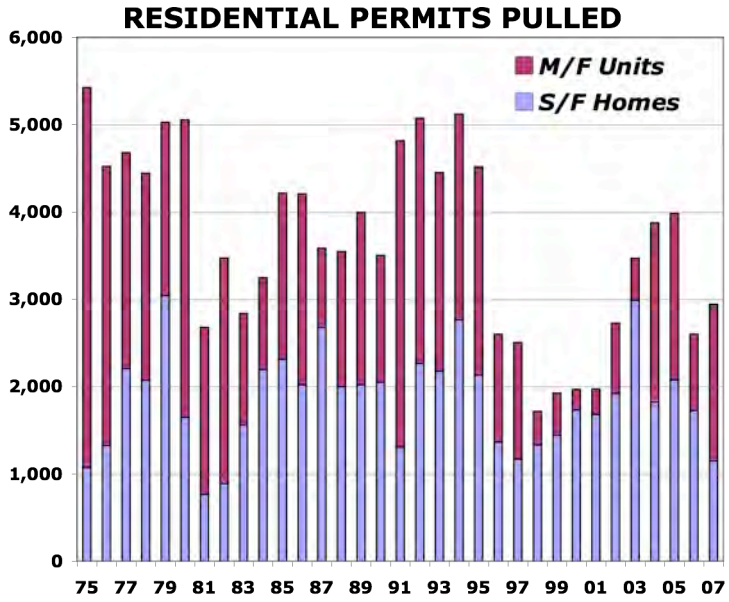
The rest of the condo stock, 76%, averages less than 1,250 sq. ft. in size.

## Future Housing Supply, Short Term




The easiest way to look where the housing market is going short-term is by examining permits for building residential units. A high level of activity indicates more supply, which means that more demand will be met, with a potential for prices adjusting downwards. Obviously, a low level of permits indicates small increases will be made to the stock of housing (and potentially higher prices). In addition, low levels of per unit value indicate that the units being built are for the lower end of the market (and vice versa).

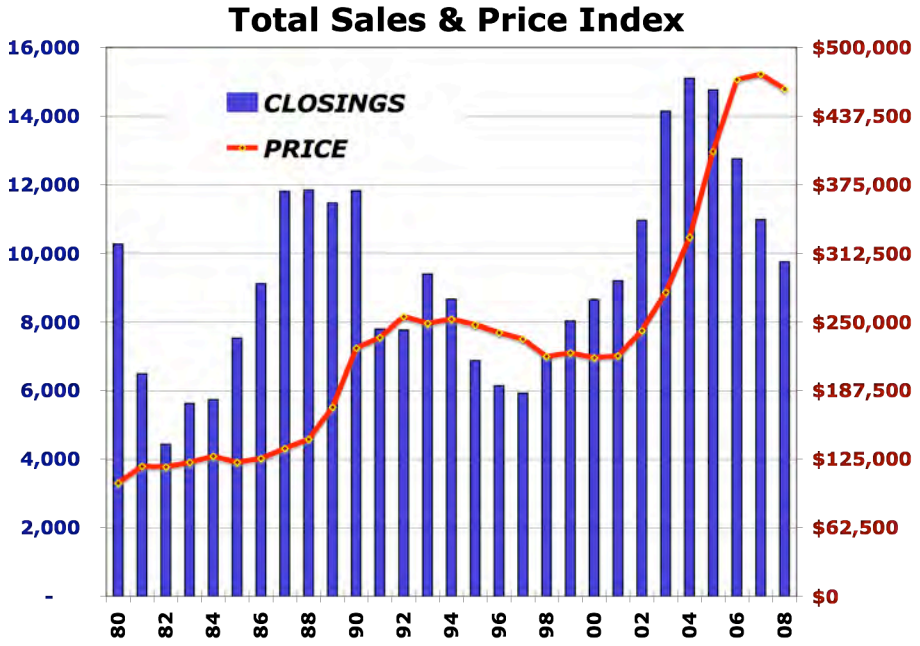
A quick overview of the TOTAL RESIDENTIAL PERMITS AND VALUES Chart shows that the number of permitted units is below historical levels. On the other hand, the value per permitted unit has rocketed higher since 1995.



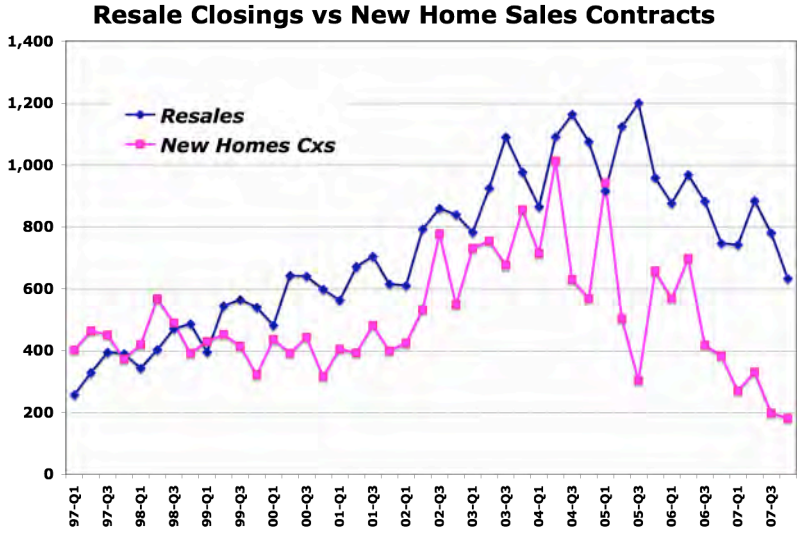

In sum, there has not been much housing production on Oahu during this last real estate boom.

# V. CURRENT RESALE REAL ESTATE MARKET

## Total Market




**SALES & PRICES:** Oahu's market for residential property is now four years passed the top of the cycle. Sales are off 45% from the peak, down to the 9,800 mark. At this level, it is right about the historical 20-year average of 9,300 sales/year. Unlike the last cycle, this one did not linger at the peak – instead, it went down by double digits in each of the last three years, 2006+.



The chart also shows that the developer market lead the way, followed shortly after by resales. The table below looks at the component parts of the market:

## RECENT HOUSING ACTIVITY

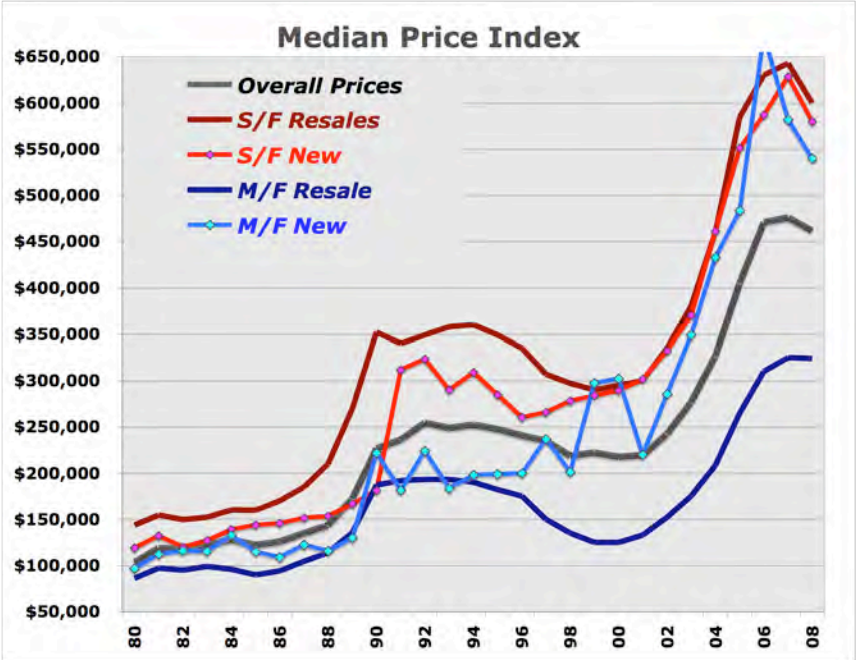
| | Totals | Resale Homes | New Homes | Resale Condos | New Condo |
|---|---|---|---|---|---|
| 2002 | 10,961 | 3,906 | 1,229 | 5,406 | 420 |
| 2003 | 14,152 | 4,420 | 2,063 | 6,907 | 762 |
| 2004 | 15,107 | 4,702 | 1,611 | 7,888 | 906 |
| 2005 | 14,773 | 4,617 | 1,170 | 7,790 | 1,196 |
| 2006 | 12,762 | 4,041 | 1,058 | 6,380 | 1,283 |
| 2007 | 10,983 | 3,627 | 586 | 5,499 | 1,271 |
| 2008* | 9,123 | 2,700 | 583 | 4,400 | 1,440 |

* Forecast based on YTD data, Feb., 2008

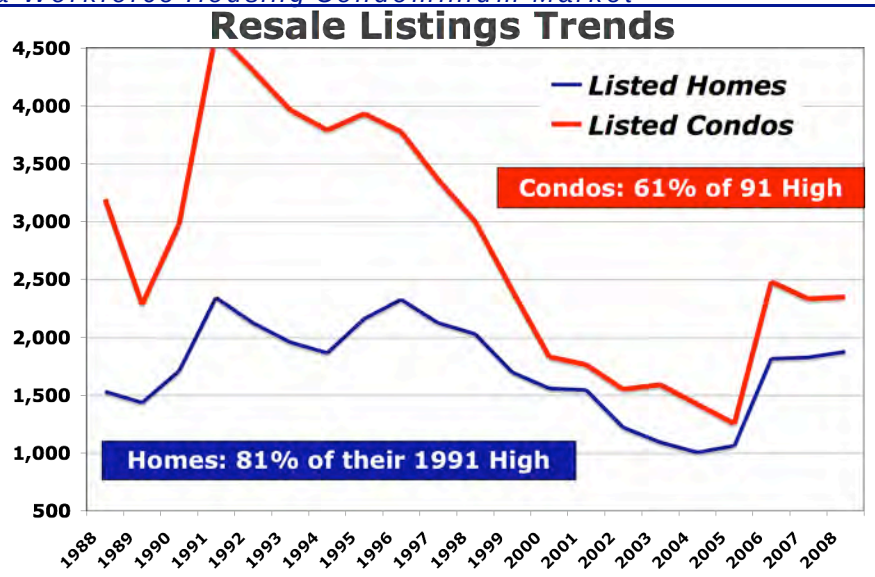
It shows:

- That the market for total single family homes peaked in 2003 five years ago,
- That the condo market topped out in 2005, three years ago, and
- That the new market peaked also in 2003, five years ago, while resales hit the ceiling in 2004, four years ago.

As seen in the MEDIAN PRICE INDEX Chart, demand pushing prices stopped last year. The All Housing price index (all resales, single family and multifamily, and all new sales, single family and multifamily) fell from $475,955 in 2007, top of the market, to $461,000 YTD this year. That is a 3.2% fall, and will probably be added to as the year continues. The cumulative rise in prices, since they turned up in 2000, is over 110%.

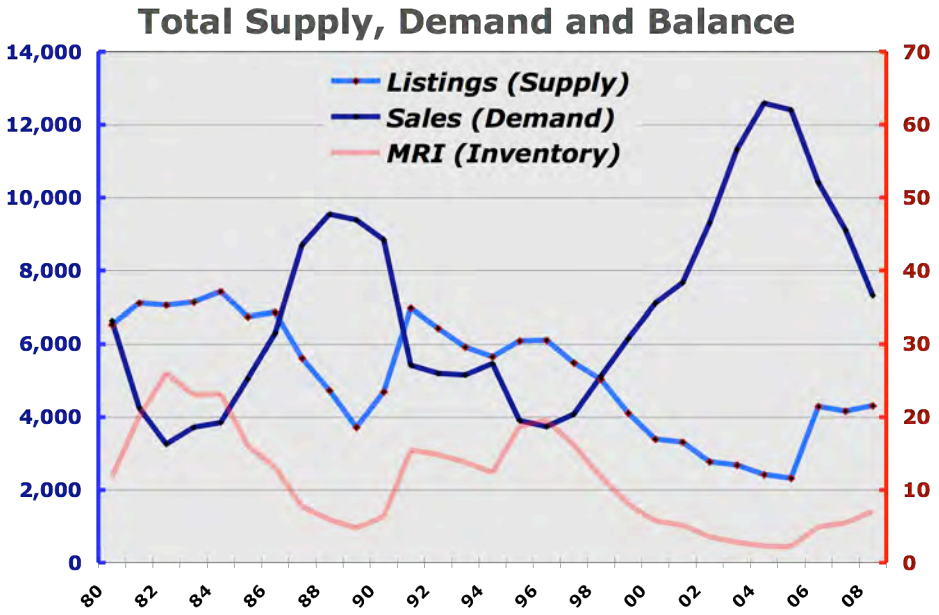



**LISTINGS AND MONTHS OF REMAINING INVENTORY:** With demand peaked, the issue of supply becomes important, particularly for future prices. Traditionally, Oahu's major source for housing supply came from resale listings -- new sales averaged 18% of all sales, 1999-2008.



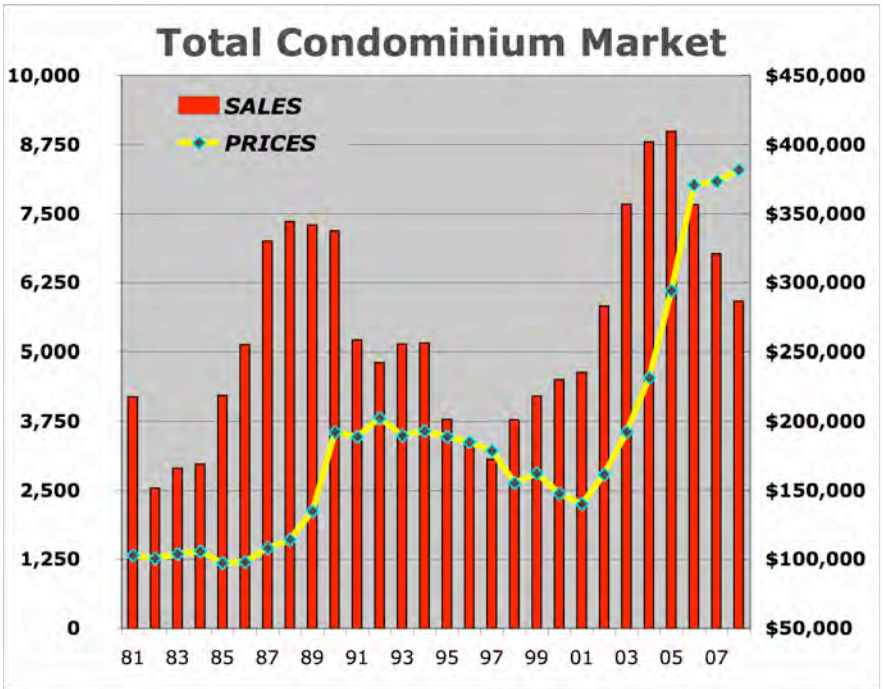

As seen in the RESALE LISTINGS Chart, listings have expanded dramatically this year: single family listings are at 81% of where they were at the top of the last cycle, 1996, while condos are 58% of the way up to their high point, set in 1995.

While alarming if taken out of context, listing levels need to be related to sales and inventory. This can be seen, in the TOTAL SUPPLY, DEMAND AND BALANCE Chart, which shows the balance in the relationship between listings (supply) and sales (demand) – months of remaining inventory (MRI).



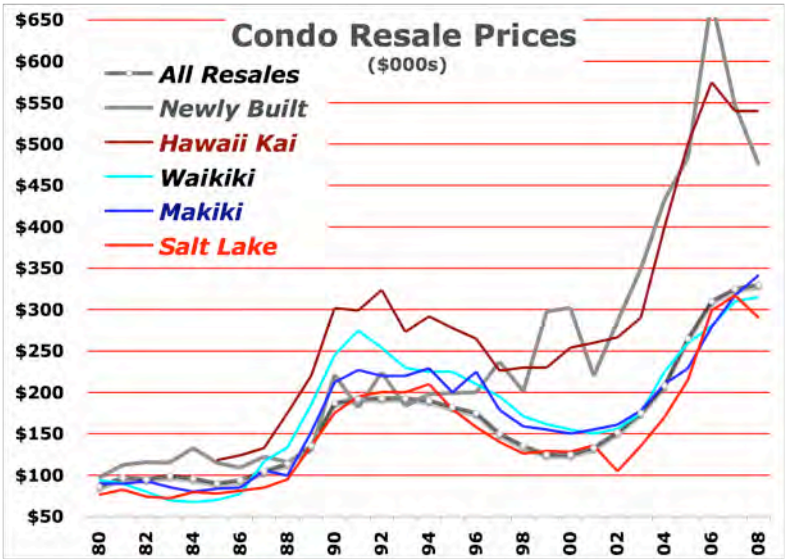

Months of Remaining Inventory is the number of total listings (supply) divided by current demand, and expressed in the amount of time it would take current demand to exhaust current supply. Currently, there is only 7 months of supply available on the market, which is still lower than the 8.9 average over the last 20 years.

## *Condominium Market:*

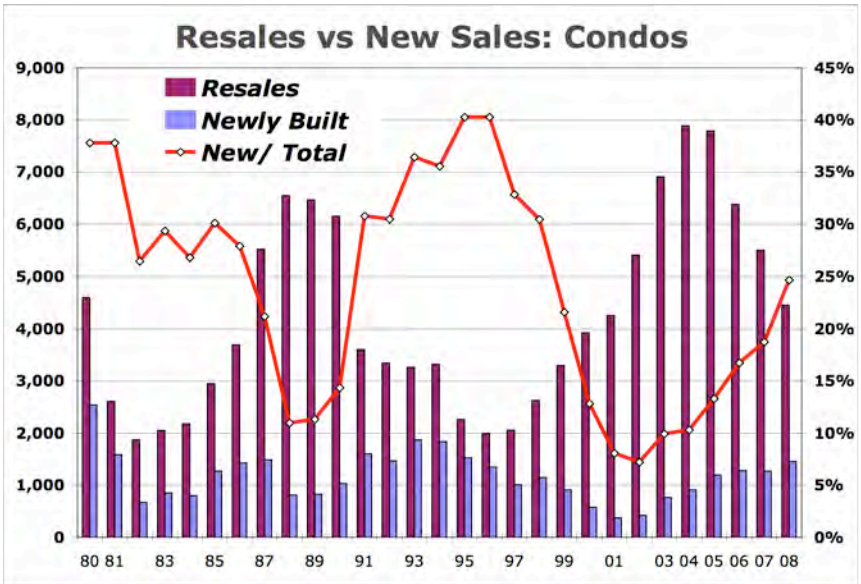



**RESALE CLOSINGS AND PRICES:** There has been three years of falling sales, each by double digits, and this year the YTD fall is almost 13%. Note that the overall market is about 500 units below its historical ten-year average.

Along with rates and confidence, what is hampering demand is high prices: the price index had five straight years of double-digit appreciation, and then settled for single digits the last two. As seen from the price chart, much of this was caused by the new home prices, fed by the luxury high-rise projects in and around Waikiki.

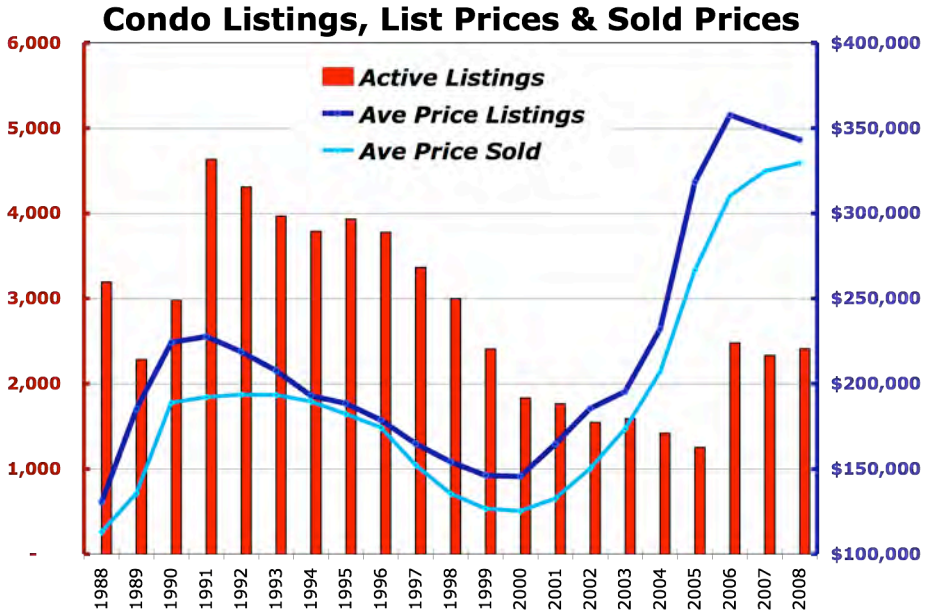


Thanks to this pricing, multifamily ones are producing at an accelerated pace, meeting demand With the high end of the market taking a breather, the next segment that could well become more active is workforce housing (and what could lie ahead is several years of 1,250 plus unit closings).

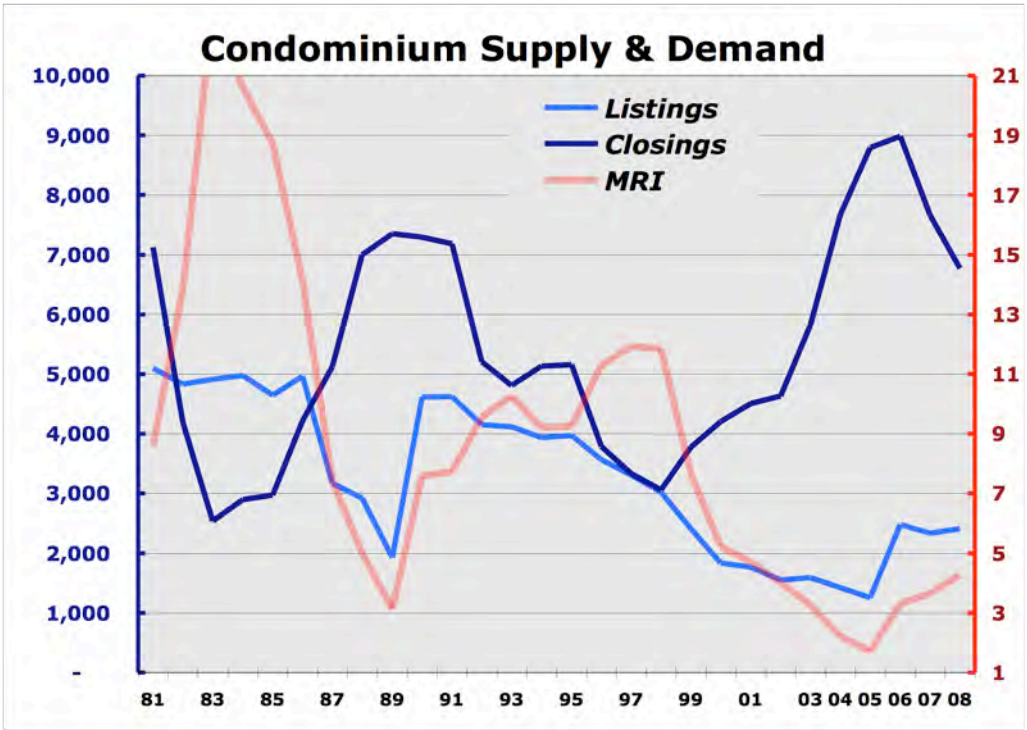



**LISTINGS:** As seen in the LISTINGS, LIST PRICES & SOLD PRICE Chart, the inventory of active listings has been up for three years, at about the same level, with not enough demand to move it, but neither much new supply.

Pricing is interesting, as the listing prices have fallen by 2% in each of the last 2 years, which the sold prices haven't stopped rising.



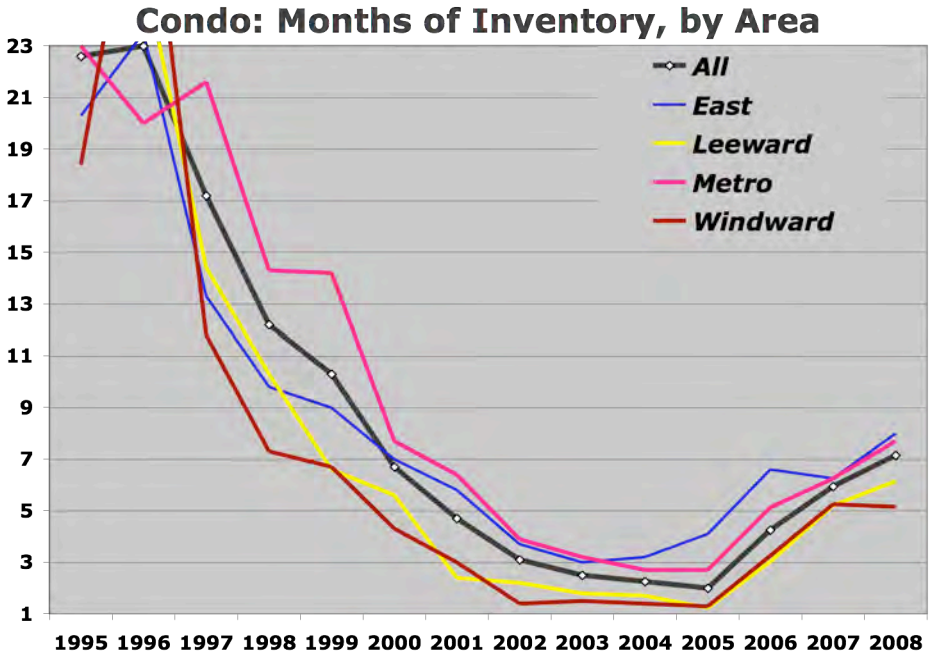

**SUPPLY/DEMAND BALANCE**: Again, when listings are seen in context with sales, listing levels are not particularly alarming. This can be seen, in the TOTAL SUPPLY, DEMAND AND



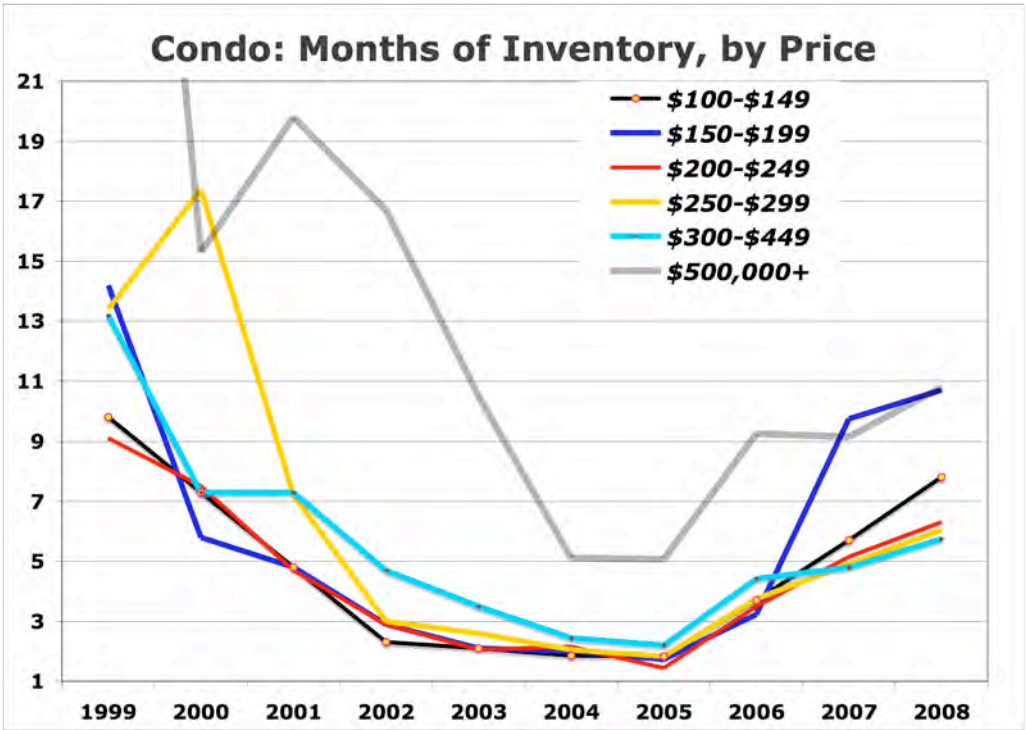

BALANCE Chart, which shows the balance in the relationship between listings (supply) and sales (demand) – months of remaining inventory (MRI).

Currently, there is 4.3 months of supply available on the market, which is still lower than the 8.9 average over the last 20 years.

When breaking the MRI into segments based on location and price, we can see which communities experiencing the tightest markets (Leeward Oahu and Windward Oahu)…



…and which price segments ($250,000 to $299,000 price range and $300,000 - $499,000 price range.

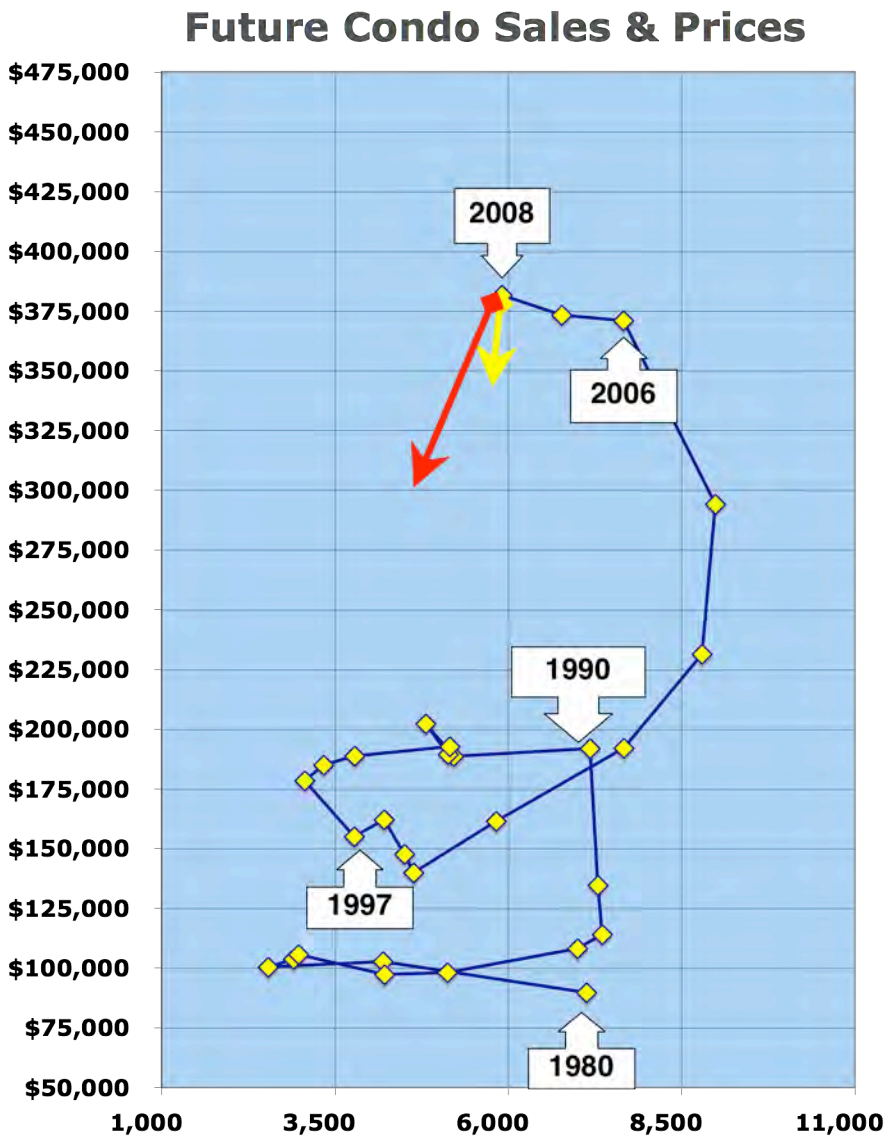



Finally, the question is where the market will go this year? The following chart plots sales and prices over a long period, and it shows the last cycle's top to bottom swing had a loss in price of around 20%, and the activity going from around 7,000 sales to 3,500.

OUTLOOK FOR RESALES

*This FORECASTING SALES AND PRICES Chart plots the relationship between price and sales, with sales at the bottom and price on the right. It illustrates the general tendency of markets to follow a pattern (or cycle) that starts with low sales and low prices, moves to higher sales followed by higher prices, goes to yet higher prices and lower sales, followed by even lower sales with faltering (and then falling) prices.*

*The yellow points on the blue line in the chart represent the market's position (in terms of the intersection of closings and prices) for every year since 1978. The arrows at the call out box for 2065 illustrate our general outlook or forecast (the red arrow illustrates our pessimistic view and the yellow one our optimistic view).*



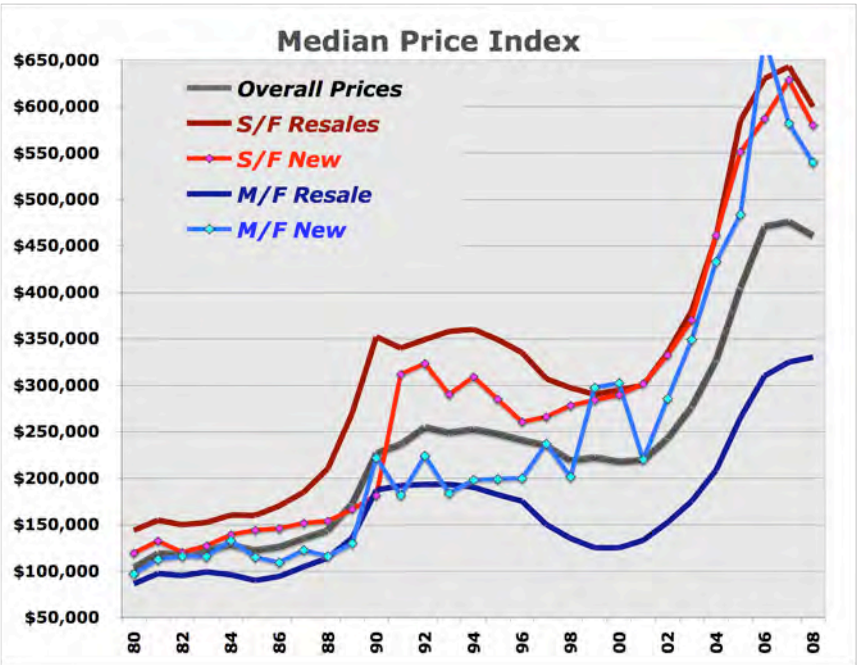

The red (worst case) illustrates a deep price decline and further paring of sales activity. The yellow (better) arrow shows that there will be some price depreciation, and no more material decline in sales.

## VI. THE CURRENT NEW HOME MARKET

**CLOSINGS AND PRICES:** Interestingly, the new homes market had its first breakout year in a decade in 2003, hitting 2,845 units. Unfortunately, it was not able to build on it, thanks to the concrete strike and other material shortages (including zoned land, ultimately).

Part of the reason for this is that several major master planned communities are running out of land (or have run out of land). Relative to several years ago, Waikele, Kapolei and Kunia are no longer producing homes this year, and Mililani will be out of its inventory of entitled lots this year or the next. Furthermore, there may not be a smooth transition to higher production, as Horton's big project in Kapolei, Koa Ridge and Waiawa are more than 3 years away from delivering homes (or more)

Indeed, the strength and breadth of the market was such that when builders ran into these shortages, they had to raise prices. And as they raised prices, they slowly had to roll out single family and into condominium production.

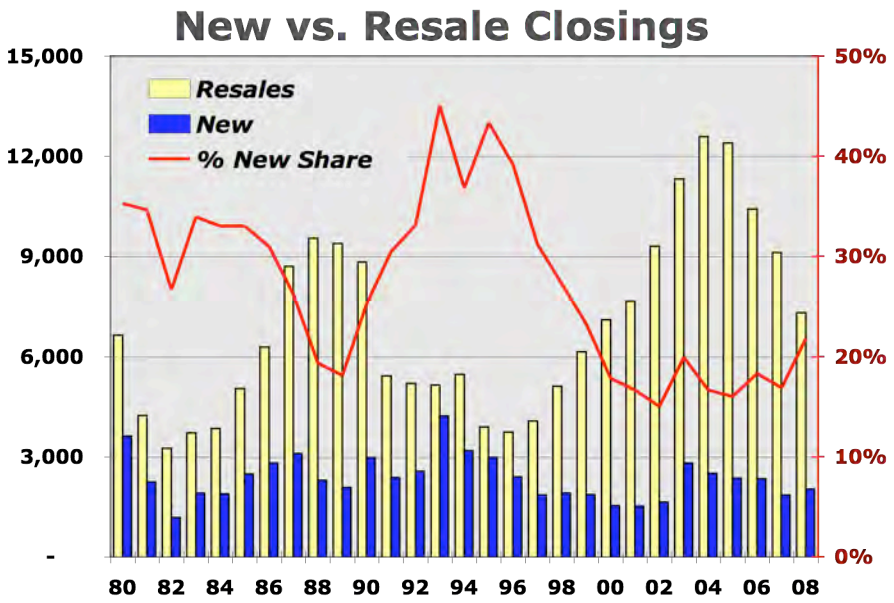


Prices also held back sales – the new MF homes price index climbed sharply the last few years, thanks to a bevy of high-end, high-rise closings (up over 40%). Indeed, the index went from being the fourth or the fifth lowest price index (in the last cycle) to being the top of the second or third (and the spread between itself and its resale MF brethren increased dramatically.

Breaking out the pricing trends by resale and new, condo and single family, the MEDIAN PRICE INDEX Chart shows that single family developers were able to price their homes at or just below the comparable area resale homes, while the condominium market was able to price substantially above resales, thanks to the stronger market for new product and high-end infill locations (like Hawaii Kai, Kapiolani or Waikiki) or on resorts (Ko Olina).

At this stage in the cycle, developers are targeting demand for primary housing, mainly workforce in nature, and trying to bring their cost of construction to a level that allows them to build in this lower price segment.

In spite of all of this activity, the developer share of the overall market is quite low, particularly by historical standards (as seen in the NEW Vs RESALE CLOSING Chart). Even with the strong growth this year, developer market share has only just moved above the high teens. This leads us to believe that this sector can grow further in 2008 and beyond, if and as resources are available at a reasonable cost.




The following table gives a better description of the trends in the new homes market. It shows the contracts (Sales), closings, the average list prices, and the average closing prices.

**TOTAL NEW HOMES MARKET TRENDS**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|
| Sales | *2,288* | *3,018* | *2,930* | *2,410* | *2,132* | *1,423* |
| Closed | *1,509* | *2,563* | *2,246* | *2,291* | *2,144* | *1,845* |
| Ave List $ | *$338,117* | *$424,579* | *$505,617* | *$558,164* | *$693,812* | *$802,509* |
| Ave Closed $ | *$321,419* | *$364,894* | *$451,788* | *$516,902* | *$687,753* | *$595,185* |

As seen, the sales (contracts written) have been slowing since 2003, but really fell off in 2007. The culprit firstly was single family (see below) and not condos.

**TOTAL NEW CONDOMINIUM MARKET TRENDS**

| | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| Sales | *1,196* | *1,747* | *1,343* | *1,482* | *897* |
| Closed | *635* | *754* | *1,166* | *1,155* | *1,302* |
| Ave List $ | *$509,845* | *$532,971* | *$579,316* | *$740,963* | *$910,501* |
| Ave Closed $ | *$349,083* | *$432,780* | *$483,687* | *$773,978* | *$581,338* |

As seen, while sales are off, closings have not really slowed down, even in 2007. This is because many of them came on high-rise reservations and contracts that had been written 20-28 months earlier.

**HIGH-RISE NEW CONDOMINIUM MARKET TRENDS**

| | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| Sales | *475* | *1,043* | *608* | *1,184* | *663* |
| Closed | *35* | *245* | *383* | *629* | *893* |
| Ave List $ | *$802,407* | *$599,978* | *$674,241* | *$824,029* | *$1,081,267* |
| Ave Closed $ | *$609,943* | *$512,653* | *$437,512* | *$1,015,943* | *$643,553* |

In fact, the condo market will not see a decline in closings until after this year, when 2 high-rise projects complete (and even then, there are another couple high-rise projects coming through the pipeline.

Interestingly, the low-end of the new condo market in the suburban communities, i.e., the developers of town home and flats, have also slowed down markedly. This, however, is more a function of developers not building many of these units (which have a lower per unit profit margin, as opposed to the high end). This is about to change, with the onset of the push to build more affordable housing coinciding with the fall off of demand for the higher end homes and condos.

**LOW-RISE NEW CONDOMINIUM MARKET TRENDS**

| | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| Sales | *721* | *704* | *735* | *298* | *234* |
| Closed | *600* | *509* | *783* | *526* | *409* |
| Ave List $ | *$317,104* | *$433,698* | *$500,793* | *$410,928* | *$426,664* |
| Ave Closed $ | *$333,866* | *$394,334* | *$506,273* | *$484,631* | *$445,501* |

Thus, the slowdown in the resale market has also been felt in the new home segment. Notwithstanding the strong showing of high-rise sales and closings, the rest of the market has taken a breather, with lighter traffic, slower reservations and an increase in incentives (no closing costs, credits, pre-paying points, interest rate buy-downs).

That said, this softness in the market is not being felt by all new projects: case in point is the success that Country Club Village 6, a new project in Salt Lake, enjoyed several months ago, selling out in 2 days. Their success was due to buyer's desires to have newly built housing over similarly configured resale units at an equal or lesser price. As mentioned, the supply of new housing has not been keeping up with demand, both historically and contemporarily.

## VII. THE CURRENT MARKET FOR COMPARABLE PRODUCT

Review of Project in the Marketplace: Prior to looking at the open market for comparable units, we want to review our projection of the pricing of this project:

**HOLOMUA, OVERALL**

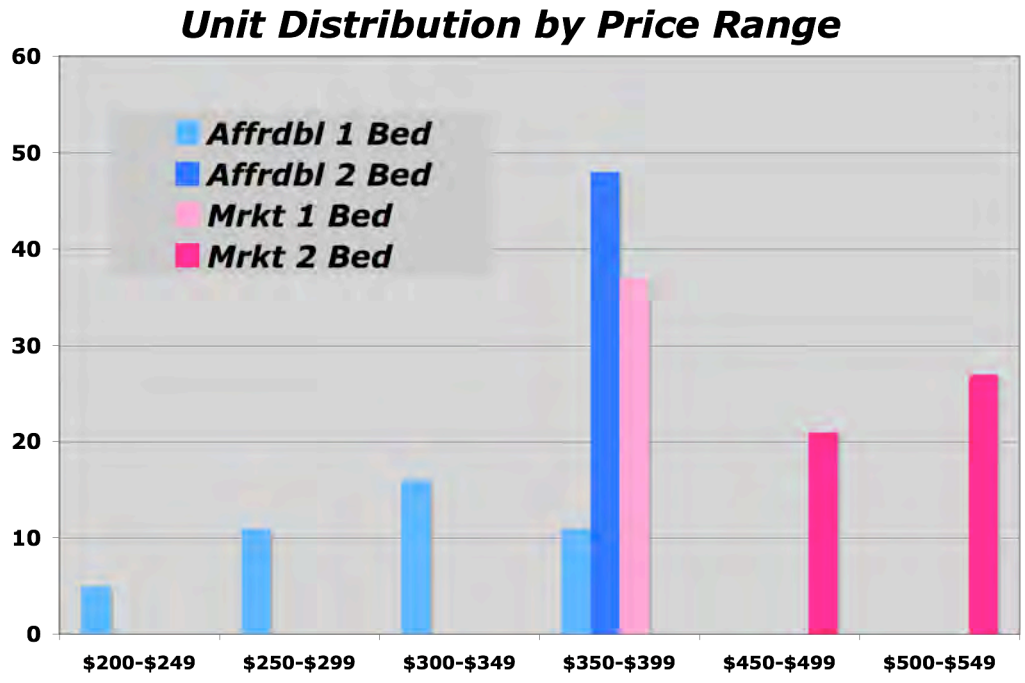
| Project | Beds | Count | Ave sf | Ave $ | Min $ | Max $ | Ave $/sf |
|---|---|---|---|---|---|---|---|
| Holomua | 1 | 80 | 484 | $336,000 | $243,000 | $375,000 | $694 |
| | 2 | 96 | 719 | $452,500 | $399,000 | $544,300 | $629 |
| Total | | 176 | 612 | $400,000 | $243,000 | $544,300 | $654 |

Next, we break these units out by affordable and market rate units.

**PROJECT DETAILS OF HOLOMUA, BY MARKET AND BY AFFORDABLES**

| | Beds | Count | Ave sf | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|
| Affordables | 1 | 43 | 458 | $313,000 | $243,700 | $353,900 |
| | 2 | 48 | 719 | $399,000 | $399,000 | $399,000 |
| A4dbl Total | | 91 | 596 | $358,500 | $243,700 | $399,000 |
| Market | 1 | 37 | 515 | $362,000 | $355,100 | $374,800 |
| | 2 | 48 | 719 | $508,000 | $473,000 | $544,300 |
| Market Total | | 85 | 630 | $445,000 | $355,100 | $544,300 |

The distribution of these units in terms of pricing is described in the following chart, showing that the main burden of supply falls on the price range of $350,000 to $399,000. Within that, the most populous units would be the Affordable 2 Bedroom and the Market 1 Bedroom.



This section describes the trends and shows the status of the current market for comparable units to the affordable ones proposed by this project. Before drilling down into the specific unit types and their existing values, we start by looking at the larger market. This would be all condominiums sold in fee-simple above the price of $225,000 and below the price of $550,000 that were either one or two bedroom unit types over the past few years. While this is a very indistinct market, it provides a benchmark to judge the more precise market segmentation that follows.

**OAHU CONDOMINIUM MARKET, 2003 TO 2008**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 2,053 | $320,869 | 851 | 38 | 98.5% | $377 |
| 2005 | 3,060 | $330,918 | 786 | 29 | 99.4% | $421 |
| 2006 | 3,227 | $339,321 | 759 | 51 | 98.2% | $447 |
| 2007 | 2,828 | $349,379 | 762 | 56 | 98.0% | $458 |
| 2008 | 2,226 | $346,078 | 750 | 55 | 97.8% | $461 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 49% | 3.1% | -8% | -22% | 0.9% | 11.6% |
| 2006 | 5% | 2.5% | -3% | 73% | -1.2% | 6.1% |
| 2007 | -12% | 3.0% | 0% | 11% | -0.2% | 2.6% |
| 2008 | -21% | -0.9% | -2% | -2% | -0.2% | 0.6% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -21% | -1% | -2% | -2% | -0.2% | 0.6% |
| 2 Yr | -17% | 1% | -1% | 5% | -0.2% | 1.6% |
| 3 Yr | -9% | 2% | -2% | 28% | -0.5% | 3.1% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **4.27** | 103% | | | | |
| **2007** | **4.79** | 102% | | | | |
| **2008** | **6.58** | 102% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 604 | $332,086 | 781 | 30 | | $425 |
| 2006-1Q-A | 1,147 | $350,478 | 744 | 54 | | $471 |
| 2007-2Q-M | 1,130 | $358,055 | 732 | 71 | | $489 |
| 2008-1Q-A | 1,220 | $352,901 | 736 | 81 | | $479 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 89.9% | 5.5% | -4.7% | 79.3% | | 10.8% |
| 2007 | -1.5% | 2.2% | -1.5% | 29.8% | | 3.7% |
| 2008 | 8.0% | -1.4% | 0.5% | 15.1% | | -1.9% |
| Yr | Listed | Price | Intr sf | DOM | | $/sf |
| 1 Yr | 8.0% | -1.4% | 0.5% | 15.1% | | -1.9% |
| 2 Yr | 3.2% | 0.4% | -0.5% | 22.5% | | 0.9% |
| 3 Yr | 32.1% | 2.1% | -1.9% | 41.4% | | 4.2% |

As seen, the market's sales have been dropping for the last two years. At the same time, prices still were rising, except for this year (2008), when they started to fall by a small amount, 1%. Another measure of value, the price per square foot trend, almost exactly tracks the other measure, save for the fact that it is slightly up this year, not down. Then, the Days on Market indicator (DOM) is fairly stable, having risen substantially in 2005. Next is the Sales Price to List Price ratio, which was fairly consistent in falling gradually since 2006. Next, we look at the supply side of the market, listings.

Listings have grown, 8% this year and as a result the Months of Remaining Inventory (MRI) has risen somewhat significantly, now at 6.58 months. Then, listing prices are falling, albeit not by much. Listing DOM is up again, now a bit over 80 days, but the average value for listings $/sf is down, more than price points, -1.9%.

Next, we look at the area around Downtown/Makiki to Waikiki/Moilili, TMK Zone 1-2, for the same data parameters:

**TMK 1-2 CONDOMINIUM MARKET, 2003 TO 2008**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 1,166 | $334,190 | 795 | 42 | 98.0% | $420 |
| 2005 | 1,292 | $354,847 | 726 | 36 | 98.8% | $489 |
| 2006 | 1,205 | $360,113 | 680 | 51 | 97.7% | $530 |
| 2007 | 1,259 | $374,196 | 700 | 54 | 97.7% | $534 |
| 2008 | 956 | $368,996 | 692 | 62 | 97.2% | $534 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 11% | 6.2% | -9% | -16% | 0.8% | 16.3% |
| 2006 | -7% | 1.5% | -6% | 45% | -1.2% | 8.4% |
| 2007 | 4% | 3.9% | 3% | 6% | 0.1% | 0.9% |
| 2008 | -24% | -1.4% | -1% | 13% | -0.6% | -0.1% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -24% | -1% | -1% | 13% | -0.6% | -0.1% |
| 2 Yr | -10% | 1% | 1% | 10% | -0.3% | 0.4% |
| 3 Yr | -9% | 1% | -2% | 21% | -0.6% | 3.0% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **4.47** | 103% | | | | |
| **2007** | **4.72** | 103% | | | | |
| **2008** | **7.03** | 103% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 297 | $355,717 | 719 | 37 | | $495 |
| 2006-1Q-A | 449 | $371,988 | 669 | 59 | | $556 |
| 2007-2Q-M | 495 | $385,865 | 659 | 71 | | $586 |
| 2008-1Q-A | 560 | $381,329 | 672 | 88 | | $567 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 51.2% | 4.6% | -6.9% | 60.0% | | 12.4% |
| 2007 | 10.2% | 3.7% | -1.5% | 20.2% | | 5.3% |
| 2008 | 13.1% | -1.2% | 2.0% | 23.1% | | -3.2% |
| Yr | Listed | Price | Intr sf | DOM | | $/sf |
| 1 Yr | 13.1% | -1.2% | 2.0% | 23.1% | | -3.2% |
| 2 Yr | 11.7% | 1.3% | 0.3% | 21.6% | | 1.1% |
| 3 Yr | 24.9% | 2.4% | -2.1% | 34.4% | | 4.8% |

Relative to the island wide market, this segment is higher priced than its big brother, but slower activity wise, at least so far for 2008. Other comparisons: TMK Zone 1-2's price points are slightly more volatile, and the trends for MRI, DOM and Sales to List $ are slightly more pessimistic.

Next, we look at the supply side of the market, listings: Listings have grown, 13% this year and as a result the Months of Remaining Inventory (MRI) has risen significantly, now at 7.03 months. The other news is that listing prices are falling, albeit not by much. Listing DOM is up again, now at almost 90 days, but the average value for listings $/sf is down, more than price points, -3.2% vs. -0.1%.

## *One Bedroom Affordable Market*

Relative to the larger market, there has been pretty good activity in this market, and prices have been rock solid. A particular indication of this market's sustainability is the seen in the MRI, which is a very low number (even given that overall activity is down). This is also borne out by the lower DOM and the higher Sales$/List$ ratio. Finally, the List to Sale Price premium shows that sellers expect buyers to accept higher prices, going forward.

**ONE BEDROOM FEE-SIMPLE TMK 1-2 MARKET OVERVIEW**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 569 | $272,766 | 603 | 39 | 98.3% | $452 |
| 2005 | 621 | $285,812 | 574 | 33 | 99.0% | $498 |
| 2006 | 576 | $303,029 | 566 | 47 | 97.9% | $535 |
| 2007 | 574 | $304,015 | 564 | 53 | 97.7% | $539 |
| 2008 | 455 | $312,184 | 566 | 63 | 97.1% | $551 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 9% | 4.8% | -5% | -15% | 0.8% | 10.1% |
| 2006 | -7% | 6.0% | -1% | 41% | -1.2% | 7.6% |
| 2007 | 0% | 0.3% | 0% | 12% | -0.2% | 0.6% |
| 2008 | -21% | 2.7% | 0% | 20% | -0.6% | 2.4% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -21% | 3% | 0% | 20% | -0.6% | 2.4% |
| 2 Yr | -11% | 2% | 0% | 16% | -0.4% | 1.5% |
| 3 Yr | -9% | 3% | 0% | 24% | -0.7% | 3.5% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **4.23** | 101% | | | | |
| **2007** | **4.52** | 103% | | | | |
| **2008** | **6.65** | 102% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 135 | $288,046 | 558 | 34 | | $516 |
| 2006-1Q-A | 203 | $305,796 | 539 | 56 | | $567 |
| 2007-2Q-M | 216 | $314,204 | 541 | 66 | | $581 |
| 2008-1Q-A | 252 | $317,114 | 556 | 89 | | $570 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 50.4% | 6.2% | -3.4% | 66.9% | | 9.9% |
| 2007 | 6.4% | 2.7% | 0.3% | 17.6% | | 2.4% |
| 2008 | 16.7% | 0.9% | 2.8% | 34.3% | | -1.8% |
| Yr | Sold | Price | Intr sf | DOM | | $/sf |
| 1 Yr | 16.7% | 0.9% | 2.8% | 34.3% | | -1.8% |
| 2 Yr | 11.5% | 1.8% | 1.5% | 25.9% | | 0.3% |
| 3 Yr | 24.5% | 3.3% | -0.1% | 39.6% | | 3.5% |

Relative to the overall market, this project's 43 unit offering is less than 10% of the projected 2008 market (or 7.4% of 2007), a very low figure given the attractiveness of new product. The average size of market units is larger (566 vs. 458 sf), but then again, so is it's average age (32 years), and floor level (7$^{th}$, indicating that many walk-up units).

**TOTAL ONE-BEDROOM PRODUCT OFFERINGS**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 43 | 458 | $313,293 | $243,700 | $353,900 | $684 | $532 | $773 |

Next, we take each of the smaller market segments (by $50,000 increments) and examine the micro market relative to the project's offerings, starting with the $200,000 to $250,000 one.

Simply put, this is a market that is disappearing, as sellers, understanding they can get much higher prices for their units, migrate upwards to that price segment. That said, most indicators – listings, prices, price per square feet, DOM, Sales Prices to Listing Prices - are steady. The Months of Remaining Inventory (MRI) is up because sales are so down.

**ONE BEDROOM MARKET $200,000 to $250,000**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 229 | $221,359 | 571 | 45 | 98.4% | $388 |
| 2005 | 183 | $223,604 | 530 | 36 | 99.4% | $422 |
| 2006 | 110 | $227,524 | 484 | 56 | 97.7% | $470 |
| 2007 | 103 | $230,994 | 471 | 43 | 97.9% | $491 |
| 2008 | 46 | $227,992 | 474 | 55 | 97.7% | $481 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | -20% | 1.0% | -7% | -20% | 1.0% | 8.8% |
| 2006 | -40% | 1.8% | -9% | 57% | -1.7% | 11.4% |
| 2007 | -6% | 1.5% | -3% | -23% | 0.2% | 4.4% |
| 2008 | -56% | -1.3% | 1% | 28% | -0.2% | -2.0% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -56% | -1% | 1% | 28% | -0.2% | -2.0% |
| 2 Yr | -31% | 0% | -1% | 2% | 0.0% | 1.2% |
| 3 Yr | -34% | 1% | -4% | 21% | -0.6% | 4.6% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **4.80** | 101% | | | | |
| **2007** | **3.73** | 101% | | | | |
| **2008** | **8.44** | 104% | | | | |
| | | | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 49 | $228,969 | 514 | 37 | | $446 |
| 2006-1Q-A | 44 | $230,220 | 466 | 72 | | $494 |
| 2007-2Q-M | 32 | $232,977 | 462 | 56 | | $504 |
| 2008-1Q-A | 32 | $236,503 | 466 | 90 | | $508 |
| | | | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | -10.2% | 0.5% | -9.3% | 96.8% | | 10.9% |
| 2007 | -27.3% | 1.2% | -0.8% | -21.9% | | 2.0% |
| 2008 | 0.0% | 1.5% | 0.7% | 59.1% | | 0.8% |
| | | | | | | |
| Yr | Sold | Price | Intr sf | DOM | | $/sf |
| 1 Yr | 0.0% | 1.5% | 0.7% | 59.1% | | 0.8% |
| 2 Yr | -13.6% | 1.4% | 0.0% | 18.6% | | 1.4% |
| 3 Yr | -12.5% | 1.1% | -3.1% | 44.7% | | 4.6% |

Relative to this, the project's proposed market five unit offering is likely to be sold out quickly, simply because there are so few quality offerings on the open market (average floor is 2.7, average year when units were built, 1963).

**ONE BEDROOM PRODUCT OFFERINGS, $200,000 to $250,000**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 5 | 358 | $246,700 | $243,700 | $249,700 | $689 | $681 | $697 |

The units here are mainly in walk-up buildings located well off the major thoroughfare streets, with poor parking and security.

**ONE BEDROOM RESALE COMPS, $200,000 to $250,000**

| Area | Building | Sld | Ave $ | Ave Int sf | DOM | Ave sls/lst | Ave $/sf |
|---|---|---|---|---|---|---|---|
| ALA MOANA | Six Twenty Sheridan | 3 | $224,000 | 499 | 55 | 97.0% | $449 |
| DOWNTOWN | Harbor Square | 1 | $249,000 | 469 | 176 | 100.0% | $531 |
| | Qn Emma Gardens | 1 | $225,000 | 574 | 63 | 91.8% | $392 |
| HOLIDAY MART | Kapiolani Manor | 2 | $242,000 | 484 | 67 | 97.8% | $500 |
| KAKAAKO | Rycroft Manor | 1 | $245,000 | 431 | 21 | 98.8% | $568 |
| KAPIO/KINAU/WARD | Kinau Villa | 1 | $226,000 | 827 | 55 | 94.6% | $273 |
| MAKIKI AREA | 1040 Kinau | 1 | $220,000 | 467 | 44 | 93.4% | $471 |
| | 1134 Kinau | 1 | $230,000 | 467 | 29 | 97.9% | $493 |
| | Hale Poki | 1 | $225,000 | 455 | 11 | 93.8% | $495 |
| | Kaahumanu Plaza | 1 | $245,000 | 561 | 120 | 98.0% | $437 |
| | Kaihee Kai | 1 | $240,000 | 499 | 10 | 96.4% | $481 |
| | Keeaumoku Hale | 1 | $237,000 | 450 | 11 | 99.2% | $527 |
| | Makiki Colony | 2 | $236,000 | 485 | 88 | 94.4% | $487 |
| | Makiki Palms | 1 | $243,000 | 533 | 43 | 98.0% | $456 |
| | Pacificana Atlas | 2 | $240,000 | 510 | 10 | 100.0% | $471 |
| MOILIILI | Clairmont | 1 | $236,000 | 429 | 16 | 96.7% | $550 |
| | Hale Hoaloha | 1 | $224,000 | 395 | 7 | 99.6% | $567 |
| | Kaualana Manor | 5 | $234,000 | 604 | 111 | 96.1% | $387 |
| | Rainbow Terrace | 1 | $239,000 | 570 | 10 | 100.0% | $419 |
| | University Villa | 1 | $225,000 | 494 | 6 | 98.3% | $455 |
| | Waialae Pl | 3 | $218,333 | 445 | 79 | 98.1% | $491 |
| UNIVERSITY | Kulanui Hale | 4 | $236,875 | 389 | 42 | 95.5% | $609 |
| WAIKIKI | 417 Namahana | 1 | $215,000 | 525 | 210 | 100.0% | $410 |
| | Blvd Tower | 1 | $240,000 | 506 | 117 | 96.4% | $474 |
| | Hawaiian Crown | 2 | $236,000 | 409 | 11 | 99.0% | $577 |
| | Island Colony | 3 | $239,833 | 568 | 41 | 95.0% | $422 |
| | Kalakauan | 5 | $224,400 | 434 | 56 | 98.8% | $518 |
| | Kuhio Village | 1 | $230,000 | 433 | 41 | 95.8% | $531 |
| | Pacific Islander | 1 | $232,000 | 464 | 7 | 100.9% | $500 |
| | Rosalei Ltd | 11 | $227,945 | 459 | 61 | 96.6% | $497 |
| | Waikiki Cove | 1 | $225,000 | 550 | 5 | 113.1% | $409 |
| | Waikiki Park Hgts | 1 | $245,000 | 537 | 16 | 91.4% | $456 |

As seen, most of these buildings are aged, with dated and inefficient designs, poor security and high maintenance costs. In comparison, this is newly built construction located in a very livable neighborhood. As such, we believe that any development that produced such a unit and priced it in this price range would encounter quite a lot of demand.

Next, we look at the market segment immediately above this one.

In relation to the prior segment, this one is much more substantial, inasmuch as most of the 'cheaper' unit sales have migrated into it. Relative to the overall market, this segment has a much better MRI, plus steady prices and a more realistic List to Sales Premium ratio (101%, showing slight optimism on the part of sellers that they will get buyers to pay a 1% extra amount, due to market conditions). On the other hand, the DOM and Sales$/List$ indicators are worse than the overall market. Listings are growing faster (25% vs. 16%) in this market than in the overall one, but prices aren't going up as fast (0.2% vs. 0.9%).

**ONE BEDROOM MARKET $250,000 to $300,000**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 169 | $273,179 | 606 | 42 | 98.2% | $451 |
| 2005 | 200 | $273,194 | 580 | 31 | 99.3% | $471 |
| 2006 | 161 | $277,516 | 548 | 47 | 97.7% | $506 |
| 2007 | 175 | $277,375 | 546 | 56 | 97.3% | $508 |
| 2008 | 147 | $278,040 | 540 | 66 | 96.6% | $515 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 18% | 0.0% | -4% | -28% | 1.1% | 4.6% |
| 2006 | -20% | 1.6% | -5% | 53% | -1.5% | 7.5% |
| 2007 | 9% | -0.1% | 0% | 18% | -0.5% | 0.3% |
| 2008 | -16% | 0.2% | -1% | 19% | -0.7% | 1.3% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -16% | 0% | -1% | 19% | -0.7% | 1.3% |
| 2 Yr | -4% | 0% | -1% | 19% | -0.6% | 0.8% |
| 3 Yr | -9% | 1% | -2% | 30% | -0.9% | 3.0% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **3.65** | 100% | | | | |
| **2007** | **4.11** | 101% | | | | |
| **2008** | **6.12** | 101% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 33 | $274,097 | 565 | 25 | | $485 |
| 2006-1Q-A | 49 | $277,152 | 528 | 50 | | $525 |
| 2007-2Q-M | 60 | $280,821 | 519 | 56 | | $541 |
| 2008-1Q-A | 75 | $281,421 | 535 | 70 | | $526 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 48.5% | 1.1% | -6.6% | 100.2% | | 8.3% |
| 2007 | 22.4% | 1.3% | -1.7% | 12.6% | | 3.0% |
| 2008 | 25.0% | 0.2% | 3.2% | 23.4% | | -2.9% |
| Yr | Sold | Price | Intr sf | DOM | | $/sf |
| 1 Yr | 25.0% | 0.2% | 3.2% | 23.4% | | -2.9% |
| 2 Yr | 23.7% | 0.8% | 0.7% | 18.0% | | 0.1% |
| 3 Yr | 32.0% | 0.9% | -1.7% | 45.4% | | 2.8% |

In comparison between the market and the project, the project's offerings are better priced ($20,000, on average) but smaller in size. The number of units offered is well under a 10% market share (2008) and 6.2% of market for 2007.

**ONE BEDROOM PRODUCT OFFERINGS, $250,000 to $300,000**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 11 | 358 | $258,700 | $251,200 | $266,200 | $723 | $702 | $744 |

The average year that these resale units were built in was 1971, making them not very comparable. Thus, we believe there is a good likelihood that this project will be very well received.

**ONE BEDROOM RESALE COMPS, $250,000 to $300,000**

| Area | Building | Sold | Ave $ | Ave Int sf | DOM | Ave sls/lst | |
|---|---|---|---|---|---|---|---|
| ALA MOANA | Atkinson Towers Inc | 1 | $271,000 | 730 | 48 | 87.4% | $371 |
| KAPAHULU | Summer Villa | 4 | $282,000 | 542 | 48 | 98.4% | $520 |
| | Sun Hala | 2 | $289,750 | 546 | 130 | 97.7% | $531 |
| KAPIO /WARD | King Manor | 2 | $292,000 | 632 | 16 | 99.4% | $462 |
| KAPIOLANI | Ala Wai Plaza | 1 | $292,000 | 602 | 86 | 94.2% | $485 |
| | Marco Polo Apts | 1 | $290,000 | 589 | 191 | 90.9% | $492 |
| | Regency Tower | 2 | $286,500 | 600 | 139 | 96.0% | $478 |
| MAKIKI AREA | 1134 Kinau | 1 | $265,000 | 467 | 51 | 100.0% | $567 |
| | 1650 Piikoi | 1 | $285,000 | 561 | 211 | 98.6% | $508 |
| | Maile Terrace | 1 | $275,000 | 798 | 27 | 92.0% | $345 |
| | Makiki Bel Aire | 1 | $270,000 | 440 | 69 | 96.8% | $614 |
| | Makiki Plaza | 1 | $280,000 | 715 | 51 | 93.6% | $392 |
| | Makini At Kinau | 13 | $286,577 | 467 | 6 | 100.0% | $614 |
| | Matlock Hale | 2 | $282,500 | 664 | 50 | 99.1% | $425 |
| | Piikoi Tower | 1 | $280,000 | 1,975 | 1 | 93.3% | $142 |
| | Rose Terrace | 2 | $287,750 | 563 | 116 | 98.9% | $511 |
| | Wilder House | 2 | $297,250 | 638 | 66 | 97.1% | $466 |
| MCCULLY | Fern Gardens | 2 | $281,500 | 532 | 38 | 96.9% | $529 |
| MOILIILI | Hale Kulanui | 4 | $278,250 | 580 | 19 | 99.1% | $480 |
| | Hale Luana | 1 | $255,000 | 625 | 67 | 100.0% | $408 |
| | Hono Hale Towers | 2 | $254,500 | 481 | 26 | 97.6% | $530 |
| | Kaualana Manor | 1 | $252,000 | 604 | 36 | 96.9% | $417 |
| | Rainbow Place | 1 | $285,000 | 540 | 48 | 95.0% | $528 |
| | Rainbow Place | 1 | $270,000 | 540 | 27 | 90.3% | $500 |
| PUNAHOU | Alexander Gardens | 1 | $250,000 | 446 | 11 | 96.5% | $561 |
| | Banyan Tree Plaza | 1 | $294,500 | 514 | 70 | 98.5% | $573 |
| | Punahou Sunset | 1 | $289,000 | 552 | 9 | 99.8% | $524 |
| | Punahou Wilder | 1 | $255,000 | 594 | 40 | 89.5% | $429 |
| | Tiare Apts | 1 | $295,000 | 629 | 58 | 95.2% | $469 |
| WAIKIKI | 418 Namahana | 1 | $258,000 | 436 | 42 | 100.0% | $592 |
| | Aloha Lani | 14 | $274,393 | 415 | 53 | 96.6% | $661 |
| | Bamboo | 1 | $263,000 | 372 | 18 | 95.6% | $707 |
| | Hale Moani | 2 | $282,000 | 523 | 122 | 96.3% | $539 |
| | Hawaiian Crown | 2 | $264,000 | 409 | 64 | 99.7% | $645 |
| | Hawaiian Monarch | 1 | $288,000 | 476 | 102 | 96.3% | $605 |
| | Island Colony | 2 | $268,250 | 620 | 82 | 98.5% | $433 |
| | La Casa | 3 | $282,167 | 559 | 46 | 93.9% | $505 |
| | Pavillion At Waikiki | 2 | $280,000 | 547 | 107 | 96.6% | $512 |
| | Waikiki Imperial Apts | 1 | $279,000 | 516 | 89 | 100.0% | $541 |
| | Waikiki Lanais | 2 | $299,474 | 576 | 64 | 100.0% | $520 |
| | Waikiki Park Hgts | 2 | $280,000 | 513 | 9 | 94.1% | $546 |
| | Walina Apts | 2 | $287,000 | 625 | 87 | 94.4% | $459 |

The next market segment up in price shows about the same steady activity between 2007 and YTD 2008. What is noteworthy is how close in number the 2007 sales are to the projected 2008 sales – a sign that there is a lot more demand out there than represented by these numbers Further, the MRI is more favorable here, as is the DOM and the Sale$/List$ ratio (as well as the List/Sales Premium). In addition, listings aren't going up as quickly, but the list prices are rising moderately.

**ONE BEDROOM MARKET $300,000 to $350,000**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 106 | $320,190 | 641 | 24 | 98.4% | $500 |
| 2005 | 135 | $324,079 | 614 | 32 | 98.5% | $528 |
| 2006 | 187 | $322,789 | 599 | 43 | 97.9% | $539 |
| 2007 | 165 | $324,272 | 593 | 51 | 98.1% | $547 |
| 2008 | 151 | $323,509 | 578 | 58 | 96.9% | $560 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 27% | 1.2% | -4% | 33% | 0.1% | 5.7% |
| 2006 | 39% | -0.4% | -2% | 33% | -0.6% | 2.1% |
| 2007 | -12% | 0.5% | -1% | 19% | 0.2% | 1.5% |
| 2008 | -9% | -0.2% | -3% | 14% | -1.2% | 2.4% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -9% | 0% | -3% | 14% | -1.2% | 2.4% |
| 2 Yr | -10% | 0% | -2% | 16% | -0.5% | 1.9% |
| 3 Yr | 6% | 0% | -2% | 22% | -0.5% | 2.0% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **3.40** | 99% | | | | |
| **2007** | **4.51** | 100% | | | | |
| **2008** | **5.18** | 101% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 24 | $327,442 | 602 | 41 | | $544 |
| 2006-1Q-A | 53 | $320,506 | 573 | 49 | | $560 |
| 2007-2Q-M | 62 | $325,695 | 561 | 76 | | $581 |
| 2008-1Q-A | 65 | $326,177 | 585 | 110 | | $558 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 120.8% | -2.1% | -4.8% | 19.3% | | 2.8% |
| 2007 | 17.0% | 1.6% | -2.1% | 56.6% | | 3.8% |
| 2008 | 4.8% | 0.1% | 4.4% | 44.5% | | -4.0% |
| Yr | Sold | Price | Intr sf | DOM | | $/sf |
| 1 Yr | 4.8% | 0.1% | 4.4% | 44.5% | | -4.0% |
| 2 Yr | 10.9% | 0.9% | 1.1% | 50.5% | | -0.1% |
| 3 Yr | 47.6% | -0.1% | -0.9% | 40.1% | | 0.9% |

In comparison with the resale market, the developer units are smaller and the prices on average are lower. Notably, the market units are quite old, on average, built in 1971. Furthermore, they are located, on average on a lower floor.

**ONE BEDROOM MARKET $300,000 to $350,000**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 16 | 517 | $344,763 | $337,100 | $349,400 | $666 | $651 | $675 |

The share of market that these 16 units represent is under 10% for 2007, and 10.5% for 2008. While the largest of all the segments looked at so far, it is not out of line, certainly it is in line with the other, earlier, segments.

Indeed, as seen in the list of comparable units noted below, there are very few projects of a recent vintage.

**ONE BEDROOM RESALE MARKET COMPS, $300,000 to $350,000**

| Area | Building | Clsd | Ave $ | Ave Int sf | DOM | Ave Sls/Lst | |
|---|---|---|---|---|---|---|---|
| ALA MOANA | Atkinson Plaza | 1 | $306,000 | 583 | 26 | 90.5% | $525 |
| MOILIILI | Crystal Park | 3 | $320,500 | 594 | 58 | 98.7% | $540 |
| | Hale Kulanui | 1 | $305,000 | 619 | 8 | 100.0% | $493 |
| | Hausten | 3 | $324,000 | 609 | 22 | 100.3% | $532 |
| | Kings Gate | 3 | $334,000 | 791 | 46 | 107.7% | $422 |
| | Mccully Villa | 2 | $311,500 | 532 | 48 | 97.0% | $586 |
| | Scenic Towers | 5 | $321,200 | 557 | 31 | 98.6% | $576 |
| | Twenty One Hundred | 2 | $327,500 | 518 | 165 | 96.5% | $633 |
| PAWAA | Hale Kaheka | 2 | $337,500 | 608 | 58 | 98.6% | $555 |
| | Kapiolani Towers | 1 | $320,000 | 698 | 1 | 97.0% | $458 |
| PUNAHOU | Alexander | 2 | $325,000 | 667 | 111 | 97.1% | $487 |
| PUNCHBOWL | Kinau Lanais | 1 | $305,000 | 689 | 30 | 95.3% | $443 |
| | Lunalilo Tower | 1 | $315,000 | 599 | 32 | 94.0% | $526 |
| WAIKIKI | 442 Lewers St | 1 | $320,000 | 556 | 200 | 97.6% | $576 |
| | 444 Nahua | 4 | $340,000 | 520 | 233 | 94.4% | $654 |
| | Aloha Lani | 5 | $312,800 | 460 | 55 | 97.5% | $679 |
| | Blvd Tower | 1 | $310,000 | 587 | 217 | 98.7% | $528 |
| | Canal House | 4 | $329,500 | 604 | 68 | 93.6% | $546 |
| | Chateau Waikiki | 5 | $337,000 | 554 | 76 | 96.7% | $608 |
| | Fairway Villa | 3 | $317,000 | 557 | 79 | 94.3% | $569 |
| | Four Paddle | 4 | $344,333 | 553 | 129 | 96.1% | $623 |
| | Island Colony | 2 | $310,000 | 597 | 104 | 94.8% | $519 |
| | Keoni Ana | 4 | $326,500 | 648 | 52 | 98.0% | $504 |
| | La Casa | 8 | $327,225 | 599 | 40 | 98.2% | $547 |
| | Niihau Apts Inc | 1 | $327,000 | 487 | 9 | 100.0% | $671 |
| | Pacific Monarch | 1 | $340,000 | 443 | 277 | 94.7% | $767 |
| | Palms Inc | 1 | $338,000 | 615 | 32 | 100.0% | $550 |
| | Pavillion At Waikiki | 5 | $326,400 | 563 | 45 | 97.6% | $580 |
| | Seashore | 1 | $335,000 | 467 | 42 | 95.7% | $717 |
| | Villa On Eaton Square | 1 | $345,000 | 593 | 164 | 93.5% | $582 |
| | Waikiki Imperial Apts | 2 | $315,500 | 598 | 21 | 97.4% | $528 |
| | Waikiki Lanais | 1 | $329,500 | 558 | 14 | 103.0% | $591 |
| | Waikiki Skytower | 1 | $317,500 | 602 | 27 | 94.8% | $527 |
| | Walina Apts | 1 | $301,000 | 625 | 45 | 97.4% | $482 |
| WAIKIKI Total | | 62 | $325,239 | 570 | 74 | 96.8% | $571 |

Finally, the last market segment in the one bedroom market that is germane to these affordable one-bedroom units is the $350,000 to $399,000 segment.

This market is a bit more volatile, in terms of activity, but steadier in terms of price. This is shown by the jump in the MRI in 2008, as well in the DOM. That noted, the other induces of the market show it to be stable.

**ONE BEDROOM MARKET $350,000 to $399,000**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 65 | $375,466 | 649 | 36 | 97.7% | $578 |
| 2005 | 103 | $370,682 | 592 | 36 | 98.5% | $626 |
| 2006 | 118 | $376,909 | 616 | 45 | 98.2% | $612 |
| 2007 | 131 | $371,501 | 627 | 59 | 97.5% | $592 |
| 2008 | 112 | $375,981 | 623 | 70 | 97.7% | $604 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 58% | -1.3% | -9% | 1% | 0.8% | 8.3% |
| 2006 | 15% | 1.7% | 4% | 25% | -0.3% | -2.3% |
| 2007 | 11% | -1.4% | 2% | 30% | -0.7% | -3.2% |
| 2008 | -15% | 1.2% | -1% | 19% | 0.2% | 1.9% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -15% | 1% | -1% | 19% | 0.2% | 1.9% |
| 2 Yr | -2% | 0% | 1% | 25% | -0.2% | -0.6% |
| 3 Yr | 4% | 0% | 2% | 25% | -0.3% | -1.2% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **5.80** | 100% | | | | |
| **2007** | **5.68** | 101% | | | | |
| **2008** | **8.57** | 100% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 29 | $371,134 | 589 | 33 | | $630 |
| 2006-1Q-A | 57 | $375,082 | 575 | 56 | | $652 |
| 2007-2Q-M | 62 | $376,943 | 584 | 70 | | $646 |
| 2008-1Q-A | 80 | $375,457 | 588 | 89 | | $639 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 96.6% | 1.1% | -2.4% | 72.4% | | 3.5% |
| 2007 | 8.8% | 0.5% | 1.5% | 25.4% | | -1.0% |
| 2008 | 29.0% | -0.4% | 0.7% | 26.0% | | -1.1% |
| Yr | Listed | Price | Intr sf | DOM | | $/sf |
| 1 Yr | 29.0% | -0.4% | 0.7% | 26.0% | | -1.1% |
| 2 Yr | 18.9% | 0.1% | 1.1% | 25.7% | | -1.1% |
| 3 Yr | 44.8% | 0.4% | 0.0% | 41.2% | | 0.5% |

In comparison with what's available on the market (listings) and the developer units, we note that the average floor for both the developer units and the listings is 13th. Finally, the average age of both listings and closed is 33 years.

**ONE BEDROOM MARKET $350,000 to $399,000**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 11 | 516 | $352,382 | $350,600 | $353,900 | $683 | $680 | $686 |

The share of market of these 11 units is again less than 10%.

Finally, relative to the developer units, the market units are larger and much more expensive.

Unlike earlier segments, there are some comparables drawn from more recent projects (all of which are substantially higher priced than these developer units).

**ONE BEDROOM RESALE MARKET COMPS, $325,000 to $375,000**

| Area | Building | Count | Ave $ | Ave Int sf | DOM | Ave sls/lst | |
|---|---|---|---|---|---|---|---|
| ALA MOANA | Summer Palace | 3 | $361,333 | 545 | 21 | 99.5% | $663 |
| | Sunset Towers | 2 | $371,500 | 642 | 54 | 90.9% | $579 |
| MOILIILI | Crystal Park | 2 | $328,250 | 594 | 4 | 99.7% | $553 |
| | Hausten | 2 | $331,500 | 606 | 13 | 102.0% | $547 |
| | Kings Gate | 3 | $334,000 | 791 | 46 | 107.7% | $422 |
| | Scenic Towers | 3 | $326,000 | 561 | 28 | 98.6% | $581 |
| | Twenty One Hundred | 2 | $349,750 | 518 | 214 | 97.9% | $676 |
| PAWAA | Hale Kaheka | 6 | $353,667 | 606 | 46 | 98.6% | $584 |
| PUNAHOU | Alexander | 1 | $330,000 | 667 | 48 | 95.7% | $495 |
| | Banyan Tree Plaza | 1 | $370,000 | 715 | 23 | 96.1% | $517 |
| PUNCHBOWL | 950 Prospect | 1 | $342,000 | 523 | 10 | 100.9% | $654 |
| | Bel-air Plaza | 1 | $333,000 | 518 | 30 | 101.2% | $643 |
| | Dowsett Point | 1 | $365,000 | 771 | 9 | 100.0% | $473 |
| | Ka Hale Moi | 1 | $358,000 | 675 | 39 | 97.0% | $530 |
| WAIKIKI | 444 Nahua | 2 | $355,000 | 524 | 121 | 97.2% | $678 |
| | 445 Nahua | 2 | $330,500 | 524 | 62 | 95.4% | $631 |
| | Ala Wailani | 1 | $360,000 | 818 | 69 | 95.9% | $440 |
| | Canal House | 3 | $346,667 | 606 | 49 | 95.1% | $572 |
| | Chateau Waikiki | 9 | $352,222 | 553 | 60 | 95.7% | $637 |
| | Fairway Villa | 1 | $326,000 | 555 | 129 | 95.5% | $587 |
| | Four Paddle | 7 | $353,286 | 553 | 116 | 95.5% | $639 |
| | Hale Moani | 1 | $325,000 | 583 | 61 | 96.2% | $557 |
| | Ilikai Apt Bldg | 4 | $354,313 | 500 | 167 | 86.5% | $709 |
| | Island Colony | 2 | $360,000 | 570 | 56 | 95.0% | $632 |
| | Kaiolu Sunrise | 1 | $349,000 | 627 | 309 | 100.0% | $557 |
| | Keoni Ana | 2 | $331,000 | 643 | 75 | 98.5% | $515 |
| | La Casa | 5 | $334,560 | 601 | 36 | 98.5% | $557 |
| | Leisure Heritage | 1 | $360,000 | 720 | 4 | 100.0% | $500 |
| | Liliuokalani Gardens | 1 | $352,000 | 549 | 39 | 91.4% | $641 |
| | Niihau Apts Inc | 1 | $327,000 | 487 | 9 | 100.0% | $671 |
| | Pacific Monarch | 1 | $340,000 | 443 | 277 | 94.7% | $767 |
| | Palms Inc | 1 | $338,000 | 615 | 32 | 100.0% | $550 |
| | Pavillion At Waikiki | 5 | $342,800 | 554 | 44 | 98.4% | $618 |
| | Seashore | 1 | $335,000 | 467 | 42 | 95.7% | $717 |
| | Seaside Suites | 2 | $355,000 | 623 | 185 | 95.3% | $570 |
| | Villa On Eaton Square | 8 | $354,125 | 658 | 110 | 96.1% | $538 |
| | Waikiki Lanais | 1 | $329,500 | 558 | 14 | 103.0% | $591 |
| | Waikiki Skytower | 2 | $365,000 | 585 | 133 | 95.6% | $624 |
| | Waikiki Townhouse | 1 | $360,000 | 682 | 99 | 95.5% | $528 |

As seen, these units compare well with what the alternatives are on the market above (given the benefits of location, price, new construction, view), we believe these units should be able to sell out within a period of 0-1 months (similar to Country Club Village 6).

## *Two Bedroom Affordable Market*

Relative to the one bedroom market, the two-bedroom market shows a lower activity, but a very stable pricing trend. Some of this is due to the bracket creep, wherein many units have seen such price appreciation of late that they now do not fit within these price brackets (especially in this 'lower' end price bracket).

**TWO BEDROOM FEE-SIMPLE CONDO MARKET $350,000 - $450,000**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 206 | $389,353 | 968 | 46 | 98.0% | $402 |
| 2005 | 240 | $398,506 | 879 | 41 | 98.6% | $453 |
| 2006 | 190 | $401,448 | 830 | 56 | 96.8% | $484 |
| 2007 | 194 | $400,379 | 815 | 67 | 97.6% | $491 |
| 2008 | 189 | $401,798 | 841 | 62 | 96.6% | $478 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 17% | 2.4% | -9% | -9% | 0.6% | 12.7% |
| 2006 | -21% | 0.7% | -6% | 36% | -1.8% | 6.7% |
| 2007 | 2% | -0.3% | -2% | 19% | 0.9% | 1.5% |
| 2008 | -3% | 0.4% | 3% | -8% | -1.1% | -2.8% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -3% | 0% | 3% | -8% | -1.1% | -2.8% |
| 2 Yr | 0% | 0% | 1% | 5% | -0.1% | -0.6% |
| 3 Yr | -7% | 0% | -1% | 16% | -0.7% | 1.8% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **4.36** | 101% | | | | |
| **2007** | **4.64** | 101% | | | | |
| **2008** | **4.95** | 102% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 59 | $400,473 | 871 | 43 | | $460 |
| 2006-1Q-A | 69 | $404,100 | 800 | 69 | | $505 |
| 2007-2Q-M | 75 | $405,771 | 779 | 69 | | $521 |
| 2008-1Q-A | 78 | $410,672 | 818 | 77 | | $502 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 16.9% | 0.9% | -8.2% | 60.0% | | 9.9% |
| 2007 | 8.7% | 0.4% | -2.6% | -0.5% | | 3.1% |
| 2008 | 4.0% | 1.2% | 4.9% | 11.5% | | -3.6% |
| Yr | Listed | Price | Intr sf | DOM | | $/sf |
| 1 Yr | 4.0% | 1.2% | 4.9% | 11.5% | | -3.6% |
| 2 Yr | 6.3% | 0.8% | 1.2% | 5.5% | | -0.2% |
| 3 Yr | 9.9% | 0.8% | -1.9% | 23.7% | | 3.1% |

Note how the MRI is one of the strongest ones seen, that the DOM is very low and stable, and the Sale$ to List$ ratio is also one of the most consistent we've seen.

**TWO BEDROOM MARKET $350,000 to $450,000**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 48 | 719 | $399,000 | $399,000 | $399,000 | $555 | $555 | $555 |

While these 48 affordable units constitute a 25% share of the 2008 estimated market (YTD basis), we take note of just how strong this market segment is relative to the entire market (down by double digits, with MRI levels 50% to 200% higher). As commonly happens, new supply often generates new demand (which is to say that the provision of new housing supply at values demonstrably under market convinces a number of potential buyers to become actual buyers).

**TWO BEDROOM RESALE MARKET COMPS, $400,000 to $450,000**

| Area | Building | Count | Ave $ | Ave Int sf | DOM | Ave sls/lst | $/sf |
|---|---|---|---|---|---|---|---|
| HOLIDAY MART | Coty Tower | 1 | $430,000 | 858 | 31 | 95.6% | $501 |
| | Kapiolani Belaire | 4 | $421,750 | 943 | 77 | 98.1% | $447 |
| | Woodrose | 1 | $415,000 | 770 | 15 | 97.6% | $539 |
| KINAU/WARD | One Archer Lane | 2 | $442,500 | 782 | 86 | 96.3% | $566 |
| MAKIKI AREA | Consulate | 1 | $410,000 | 750 | 7 | 95.6% | $547 |
| | Fountains At Makiki | 1 | $430,000 | 906 | 15 | 97.7% | $475 |
| | Healani Hale | 1 | $415,000 | 842 | 14 | 97.6% | $493 |
| | Liholiho Townhouses | 1 | $405,000 | 963 | 14 | 104.4% | $421 |
| | 1 Kalakaua Senior Liv | 1 | $440,000 | 709 | 137 | 97.9% | $621 |
| | Piikoi Atrium | 1 | $400,000 | 962 | 127 | 97.6% | $416 |
| | Princess Kealoha | 1 | $430,000 | 922 | 55 | 93.7% | $466 |
| | Wilder House | 1 | $430,000 | 864 | 41 | 94.3% | $498 |
| | Wilder Regent | 2 | $427,000 | 893 | 30 | 98.3% | $478 |
| MOILIILI | Contessa | 4 | $430,000 | 1,044 | 73 | 99.2% | $412 |
| | Kings Gate | 2 | $415,000 | 933 | 59 | 97.2% | $445 |
| | Rainbow Place | 1 | $420,000 | 760 | 99 | 100.0% | $553 |
| | Twenty One Hundred | 1 | $440,000 | 778 | 59 | 97.8% | $566 |
| PAWAA | Hale Kaheka | 4 | $423,750 | 877 | 80 | 103.4% | $483 |
| | Kapiolani Towers | 1 | $405,000 | 795 | 5 | 100.0% | $509 |
| PUNAHOU | Banyan Tree Plaza | 1 | $435,000 | 981 | 174 | 100.0% | $443 |
| | Punahou Chalet | 1 | $420,000 | 792 | 51 | 98.8% | $530 |
| PUNCHBOWL | Prospect Tower Apts | 2 | $429,500 | 815 | 120 | 98.3% | $527 |
| | Sky Tower Apts | 2 | $415,000 | 866 | 32 | 98.9% | $479 |
| | Victoria Plaza | 1 | $400,000 | 865 | 24 | 97.7% | $462 |
| WAIKIKI | 1717 Ala Wai | 1 | $420,000 | 922 | 45 | 95.7% | $456 |
| | 2121 Ala Wai | 4 | $418,472 | 665 | 108 | 94.6% | $630 |
| | 2122 Ala Wai | 7 | $417,786 | 684 | 38 | 98.0% | $611 |
| | 2466 Kuhio At Waikiki | 1 | $419,900 | 986 | 236 | 101.2% | $426 |
| | Governor Cleghorn | 1 | $420,000 | 889 | 91 | 93.5% | $472 |
| | Harbor View Plaza | 1 | $425,000 | 801 | 93 | 94.9% | $531 |
| | Keoni Ana | 2 | $425,000 | 820 | 172 | 96.2% | $518 |
| | Monte Vista | 3 | $413,333 | 684 | 60 | 98.5% | $604 |
| | Oahu Surf 2 | 1 | $438,000 | 856 | 148 | 100.0% | $512 |
| | Palms Inc | 1 | $432,000 | 906 | 139 | 92.9% | $477 |
| | Waikiki Lanais | 3 | $426,667 | 802 | 47 | 95.9% | $532 |

In summary, as with the one-bedroom units, these units are positioned very advantageously in the marketplace. Their share of market is very low and thus they should be able to sell out in 2-3 months of release.

## *One Bedroom (Unrestricted) Market*

As seen, this market segment has grown dramatically these last few years, as the overall real estate market has taken off. YTD 2008 has seen a downturn in activity, but not in either prices or $/sf values. The MRI, while not extremely low, is relatively stable. DOM is up this year, but Sales Prices to List Prices are flat.

**ONE BEDROOM TMK 1-2 OPEN MARKET OVERVIEW**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 94 | $388,042 | 674 | 39 | 97.8% | $576 |
| 2005 | 150 | $387,014 | 610 | 39 | 98.5% | $634 |
| 2006 | 184 | $392,135 | 617 | 42 | 98.1% | $636 |
| 2007 | 213 | $390,681 | 632 | 51 | 97.6% | $618 |
| 2008 | 168 | $390,919 | 625 | 70 | 97.6% | $625 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 60% | -0.3% | -9% | -1% | 0.7% | 10.1% |
| 2006 | 23% | 1.3% | 1% | 8% | -0.4% | 0.3% |
| 2007 | 16% | -0.4% | 2% | 21% | -0.5% | -2.8% |
| 2008 | -21% | 0.1% | -1% | 37% | -0.1% | 1.1% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -21% | 0% | -1% | 37% | -0.1% | 1.1% |
| 2 Yr | -3% | 0% | 1% | 29% | -0.3% | -0.8% |
| 3 Yr | 6% | 0% | 1% | 22% | -0.3% | -0.5% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **5.67** | 100% | | | | |
| **2007** | **6.14** | 102% | | | | |
| **2008** | **7.57** | 99% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 32 | $376,309 | 590 | 31 | | $638 |
| 2006-1Q-A | 87 | $391,800 | 585 | 55 | | $669 |
| 2007-2Q-M | 109 | $397,212 | 594 | 72 | | $668 |
| 2008-1Q-A | 106 | $387,991 | 596 | 85 | | $651 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 171.9% | 4.1% | -0.7% | 74.4% | | 4.9% |
| 2007 | 25.3% | 1.4% | 1.5% | 32.3% | | -0.1% |
| 2008 | -2.8% | -2.3% | 0.3% | 17.8% | | -2.6% |
| Yr | Listed | Price | Intr sf | DOM | | $/sf |
| 1 Yr | -2.8% | -2.3% | 0.3% | 17.8% | | -2.6% |
| 2 Yr | 11.3% | -0.5% | 0.9% | 25.1% | | -1.3% |
| 3 Yr | 64.8% | 1.1% | 0.4% | 41.5% | | 0.7% |

The average size of the listed units are larger (596 vs. 515 sf), but on a lower floor (12th floor vs. 18th floor) and aged (on average, built in 1975).

**TOTAL ONE BEDROOM PRODUCT OFFERINGS**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 37 | 515 | $362,584 | $355,100 | $374,800 | $705 | $690 | $728 |

Relative to the overall market, this project's 37 unit offering some 22% of the projected 2008 market (or 17.4% of 2007). This is a higher threshold than the average market share for the affordable units, but this should not be a significant factor, given the small number of unit offerings (37) and the latent demand for housing in town from the broader market (island wide).

Unlike earlier segments, there are some comparables drawn from more recent projects (all of which are substantially higher priced than these developer units).

**ONE BEDROOM RESALE MARKET COMPS, $350,000 to $399,000**

| Area | Building | Clsd | Ave $ | Ave Int sf | DOM | Ave sls/lst | Ave $/sf |
|---|---|---|---|---|---|---|---|
| KINAU/WARD | One Archer Lane | 5 | $391,400 | 586 | 56 | 95.7% | $667 |
| MAKIKI AREA | 1451 Young St | 1 | $370,000 | 567 | 120 | 96.1% | $653 |
| | Anga-roa | 3 | $376,333 | 730 | 42 | 97.7% | $516 |
| | Mott-smith Laniloa | 1 | $369,500 | 628 | 55 | 92.5% | $588 |
| | Wilder At Piikoi | 3 | $365,833 | 591 | 29 | 96.8% | $619 |
| MOILIILI | Twenty One Hundred | 1 | $364,500 | 531 | 169 | 100.0% | $686 |
| PAWAA | Hale Kaheka | 6 | $367,500 | 607 | 67 | 98.7% | $605 |
| PUNAHOU | Banyan Tree Plaza | 2 | $382,500 | 715 | 34 | 95.1% | $535 |
| PUNCHBOWL | Dowsett Point | 1 | $365,000 | 771 | 9 | 100.0% | $473 |
| | Ka Hale Moi | 1 | $358,000 | 675 | 39 | 97.0% | $530 |
| WAIKIKI | 444 Nahua | 1 | $370,000 | 527 | 9 | 100.0% | $702 |
| | Ala Wailani | 1 | $360,000 | 818 | 69 | 95.9% | $440 |
| | Canal House | 1 | $360,000 | 598 | 7 | 100.0% | $602 |
| | Chateau Waikiki | 10 | $373,100 | 549 | 74 | 95.7% | $680 |
| | Four Paddle | 7 | $370,714 | 556 | 93 | 96.0% | $666 |
| | Ilikai Apt Bldg | 6 | $365,208 | 500 | 131 | 90.6% | $730 |
| | Island Colony | 3 | $366,667 | 568 | 76 | 97.1% | $646 |
| | Kaiolu Sunrise | 1 | $380,000 | 625 | 44 | 98.7% | $608 |
| | Leisure Heritage | 1 | $360,000 | 720 | 4 | 100.0% | $500 |
| | Liliuokalani Gardens | 3 | $382,467 | 558 | 93 | 104.2% | $686 |
| | Pacific Monarch | 1 | $385,000 | 443 | 6 | 105.5% | $869 |
| | Palms At Waikiki | 1 | $399,000 | 793 | 1 | 100.0% | $503 |
| | Pavillion At Waikiki | 3 | $365,333 | 563 | 15 | 104.3% | $649 |
| | Seaside Suites | 2 | $355,000 | 623 | 185 | 95.3% | $570 |
| | Villa On Eaton Square | 10 | $364,300 | 678 | 88 | 97.1% | $538 |
| | Waikiki Skytower | 2 | $365,000 | 585 | 133 | 95.6% | $624 |
| | Waikiki Townhouse | 1 | $360,000 | 682 | 99 | 95.5% | $528 |
| | Waipuna | 1 | $399,000 | 725 | 115 | 100.0% | $550 |

As seen, these units compare well with what is currently on the market. Indeed, with the strong location relative to the low price (to say nothing of the attractiveness of new construction), we believe these units should be able to sell out within a period of 3-5 months (not unlike Country Club Village 6).

Now, we turn to the two-bedroom market.

## *Two Bedroom (Unrestricted) Market*

As seen in other lower end price segments, the two bedroom one in the $450,000-$550,000 price range shows the same pattern of dramatic increase, 2004-2007, as the real estate cycle takes off, and then a slowing in the later years as pricing pressures kick in. Here again, we see a big jump in activity, followed by a downturn this year (as estimated, using YTD data) (indeed, the 3 year trend is zero). The MRI has jumped this year, mainly thanks to a falloff in sales (an occurrence occasioned by a migration out of this price segment into the one above it). Most of the other factors are positive – the price per square foot values are rising, DOM is down and the Sales price to List price ratio is one of the highest in the overall market.

**TWO BEDROOM MARKET SEGMENT $450,000 - $550,000**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 164 | $495,185 | 1,124 | 42 | 97.7% | $440 |
| 2005 | 244 | $493,849 | 1,013 | 34 | 98.8% | $488 |
| 2006 | 216 | $491,640 | 978 | 65 | 97.4% | $503 |
| 2007 | 331 | $493,281 | 976 | 55 | 98.1% | $505 |
| 2008 | 189 | $493,374 | 967 | 54 | 98.1% | $510 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 49% | -0.3% | -10% | -18% | 1.1% | 10.7% |
| 2006 | -11% | -0.4% | -3% | 92% | -1.4% | 3.1% |
| 2007 | 53% | 0.3% | 0% | -17% | 0.8% | 0.5% |
| 2008 | -43% | 0.0% | -1% | -1% | 0.0% | 1.0% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -43% | 0% | -1% | -1% | 0.0% | 1.0% |
| 2 Yr | 5% | 0% | -1% | -9% | 0.4% | 0.7% |
| 3 Yr | 0% | 0% | -2% | 25% | -0.2% | 1.5% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **6.11** | 101% | | | | |
| **2007** | **4.46** | 100% | | | | |
| **2008** | **7.68** | 100% | | | | |
| | | | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 52 | $498,027 | 1,010 | 44 | | $493 |
| 2006-1Q-A | 110 | $497,421 | 939 | 70 | | $530 |
| 2007-2Q-M | 123 | $495,426 | 945 | 72 | | $524 |
| 2008-1Q-A | 121 | $495,131 | 977 | 86 | | $507 |
| | | | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 111.5% | -0.1% | -7.0% | 58.6% | | 7.4% |
| 2007 | 11.8% | -0.4% | 0.6% | 2.9% | | -1.0% |
| 2008 | -1.6% | -0.1% | 3.4% | 20.2% | | -3.3% |
| | | | | | | |
| Yr | Listed | Price | Intr sf | DOM | | $/sf |
| 1 Yr | -1.6% | -0.1% | 3.4% | 20.2% | | -3.3% |
| 2 Yr | 5.1% | -0.2% | 2.0% | 11.6% | | -2.2% |
| 3 Yr | 40.6% | -0.2% | -1.0% | 27.3% | | 1.0% |

In comparison with the market listed units, the developer offerings are smaller, but on a higher floor (13th floor vs. 19th floor) and aged (on average, built in 1977).

**TOTAL TWO BEDROOM PRODUCT OFFERINGS**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 21 | 698 | $485,595 | $473,000 | $499,700 | $696 | $678 | $716 |

The market share represented by these 21 developer units is 11% of the estimated 2008 market (but 6% of the 2007 market). Again, at these prices, there should be more than adequate demand.

In the comp section that follows, the 34 sales at Moana Pacific should be noted in the following sense: the prices here were set over 2 years ago, when the units went to market. As such, they could under-represent by a substantial margin the current values in the market.

**TWO BEDROOM RESALE MARKET COMPS, $450,000 to $499,000**

| Area | Building | Clsd | Ave $ | Ave Int sf | DOM | Ave sls/lst | Ave $/sf |
|---|---|---|---|---|---|---|---|
| ALA MOANA | Sunset Towers | 2 | $477,500 | 900 | 46 | 95.7% | $531 |
| KAKAAKO | 1133 Waimanu | 2 | $469,500 | 732 | 71 | 99.0% | $642 |
| | Imperial Plaza | 2 | $490,000 | 945 | 32 | 96.1% | $519 |
| | Moana Pacific | 34 | $477,059 | 940 | 1 | 100.0% | $508 |
| | Royal Capitol Plaza | 4 | $483,500 | 881 | 81 | 97.3% | $549 |
| KINAU/WARD | One Archer Lane | 4 | $474,750 | 804 | 40 | 99.1% | $590 |
| MAKIKI AREA | 1450 Young St | 1 | $499,000 | 790 | 12 | 100.0% | $632 |
| | One Kalakaua Senior Liv | 10 | $463,250 | 775 | 107 | 97.9% | $598 |
| | Wilder Regent | 1 | $450,000 | 835 | 16 | 93.9% | $539 |
| MOILIILI | Contessa | 4 | $465,500 | 1,117 | 10 | 99.5% | $417 |
| | Kapiolani House | 1 | $460,000 | 1,200 | 41 | 96.8% | $383 |
| | Parkland Gardens | 1 | $450,000 | 790 | 64 | 125.7% | $570 |
| | Twenty One Hundred | 1 | $453,000 | 778 | 68 | 98.7% | $582 |
| PAWAA | Hale Kaheka | 1 | $498,000 | 882 | 12 | 100.0% | $565 |
| PUNAHOU | Banyan Tree Plaza | 5 | $478,200 | 997 | 52 | 99.1% | $480 |
| PUNCHBOWL | Kamaaina | 1 | $470,000 | 812 | 10 | 100.2% | $579 |
| WAIKIKI | 1717 Ala Wai | 3 | $475,000 | 928 | 103 | 93.9% | $512 |
| | Ala Wai Terrace | 1 | $471,136 | 743 | 243 | 97.1% | $634 |
| | Aloha Towers | 1 | $475,000 | 965 | 161 | 96.0% | $492 |
| | Chateau Waikiki | 2 | $455,750 | 616 | 38 | 95.4% | $740 |
| | Governor Cleghorn | 1 | $450,000 | 830 | 13 | 98.3% | $542 |
| | Leisure Heritage | 1 | $475,000 | 900 | 22 | 95.2% | $528 |
| | Scandia Towers | 1 | $474,000 | 743 | 10 | 100.0% | $638 |
| | Waipuna | 5 | $476,000 | 937 | 74 | 95.3% | $508 |

Given the size of the existing market, we think that there is an additional (and substantial) amount of latent demand that goes unsatisfied due to the fact that there has been no new product (supply) in these price ranges in this area in recent times.

On top of that, given the views of these units, their pricing advantage, the fact they compare well against existing construction (while they will be newly built), and particularly given the strong views, we believe these units should be able to sell out within a period of 1-6 months (again, similar to Country Club Village 6).

The last of the price segments is the two bedroom one in the $500,000-$550,000 price range. It shows a choppy trend , in the sense that it went up in 2005 and down in 2007, then up again last year. This is due to the completion of newly built units in each of the up years (21 units at Laniakea in 2005 and 43 units from Moana Pacific in 2007). As such, the more natural level of market activity would be between 80 – 100 units, p.a. That said, what is notable is the stability of prices, the fall in DOM and the very steady (and low MRI).

**TWO BEDROOM MARKET SEGMENT $450,000 - $550,000**

| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
|---|---|---|---|---|---|---|
| 2004 | 75 | $522,941 | 1,146 | 43 | 97.0% | $456 |
| 2005 | 103 | $523,279 | 1,043 | 35 | 98.7% | $502 |
| 2006 | 83 | $519,270 | 991 | 60 | 97.2% | $524 |
| 2007 | 140 | $523,314 | 1,004 | 55 | 98.1% | $521 |
| 2008 | 77 | $524,773 | 1,012 | 39 | 97.8% | $519 |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 2005 | 37% | 0.1% | -9% | -20% | 1.7% | 10.0% |
| 2006 | -19% | -0.8% | -5% | 74% | -1.5% | 4.4% |
| 2007 | 69% | 0.8% | 1% | -10% | 0.9% | -0.5% |
| 2008 | -45% | 0.3% | 1% | -28% | -0.3% | -0.5% |
| | Sold | Price | Intr sf | DOM | Sale$/List$ | $/sf |
| 1 Yr | -45% | 0% | 1% | -28% | -0.3% | -0.5% |
| 2 Yr | 12% | 1% | 1% | -19% | 0.3% | -0.5% |
| 3 Yr | 1% | 0% | -1% | 12% | -0.3% | 1.1% |
| | **MRI** | List/Sales Premium | | | | |
| **2006** | **5.78** | 102% | | | | |
| **2007** | **4.11** | 101% | | | | |
| **2008** | **5.77** | 100% | | | | |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2005-2Q-A | 20 | $530,970 | 1,047 | 45 | | $507 |
| 2006-1Q-A | 40 | $528,538 | 963 | 76 | | $549 |
| 2007-2Q-M | 48 | $527,855 | 968 | 60 | | $545 |
| 2008-1Q-A | 37 | $527,278 | 1,048 | 79 | | $503 |
| | Listings | Price | Intr sf | DOM | | $/sf |
| 2006 | 100.0% | -0.5% | -8.1% | 70.4% | | 8.3% |
| 2007 | 20.0% | -0.1% | 0.5% | -20.9% | | -0.6% |
| 2008 | -22.9% | -0.1% | 8.3% | 31.0% | | -7.7% |
| Yr | Listed | Price | Intr sf | DOM | | $/sf |
| 1 Yr | -22.9% | -0.1% | 8.3% | 31.0% | | -7.7% |
| 2 Yr | -1.5% | -0.1% | 4.4% | 5.1% | | -4.2% |
| 3 Yr | 32.4% | -0.2% | 0.2% | 26.8% | | 0.0% |

In comparison with the market listed units, the developer offerings are much smaller, but on a higher floor (20th floor vs. 13th floor) and aged (on average, built in 1978).

**TOTAL TWO BEDROOM PRODUCT OFFERINGS**

| Count | Sq Ft | Ave $ | Min $ | Max $ | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|---|
| 27 | 736 | $526,937 | $502,200 | $544,300 | $716 | $683 | $740 |

The market share represented by these 27 developer units is 35% of the estimated 2008 market (but 19% of the 2007 market). As this is a higher market share, it may take two years, rather than

one, to sell out completely (which is normal in development, as it takes over two years to market and complete a project). That said, these values hold up in comparison with the other resale comps that were sold last year, particularly when considering this is new construction, high location in the building and then unobstructed views on 3 out of the 4 sides (and on the fourth side, views are blocked only up to the 16th floor).

**TWO BEDROOM RESALE MARKET COMPS, $500,000 to $599,000**

| Area | Building | Closed | Ave $ | Ave Int sf | DOM | Ave sls/lst | Ave $/sf |
|---|---|---|---|---|---|---|---|
| HOLIDAY MART | Princess Leilani | 2 | $525,000 | 1,086 | 67 | 98.8% | $483 |
| KAKAAKO | 1134 Waimanu | 1 | $505,000 | 747 | 13 | 100.0% | $676 |
| | 1350 Ala Moana | 3 | $586,333 | 948 | 101 | 97.9% | $618 |
| | 1351 Ala Moana | 6 | $567,667 | 972 | 79 | 97.2% | $584 |
| | Imperial Plaza | 9 | $530,667 | 999 | 63 | 97.1% | $531 |
| | Moana Pacific | 106 | $553,538 | 986 | 2 | 99.8% | $561 |
| KINAU/WARD | One Archer Lane | 7 | $537,429 | 790 | 67 | 98.7% | $681 |
| MAKIKI AREA | 1450 Young St | 3 | $503,000 | 742 | 35 | 98.8% | $678 |
| | 1451 Young St | 3 | $503,333 | 757 | 98 | 98.2% | $665 |
| | Makiki Manor | 1 | $537,000 | 1,100 | 75 | 97.8% | $488 |
| | Mott-smith Laniloa | 5 | $543,800 | 898 | 36 | 97.4% | $606 |
| | 1 Kalakaua Senior Liv | 4 | $536,500 | 867 | 75 | 97.7% | $619 |
| MOILIILI | Sovereign | 2 | $527,500 | 1,312 | 118 | 93.6% | $402 |
| WAIKIKI | 1717 Ala Wai | 3 | $519,000 | 1,003 | 90 | 97.4% | $518 |
| | 250 Ohua | 1 | $565,000 | 1,067 | 13 | 98.3% | $530 |
| | Aloha Towers | 3 | $525,000 | 1,060 | 135 | 96.1% | $495 |
| | Harbor View Plaza | 1 | $500,000 | 801 | 29 | 92.6% | $624 |
| | Hawaiian Monarch | 1 | $550,000 | 1,151 | 6 | 89.4% | $478 |
| | Leisure Heritage | 1 | $596,432 | 955 | 34 | 96.5% | $625 |
| | Liliuokalani Plaza | 1 | $530,000 | 1,040 | 210 | 98.3% | $510 |
| | Marina Towers | 1 | $520,000 | 1,000 | 94 | 96.5% | $520 |
| | Oahu Surf | 1 | $520,000 | 773 | 60 | 98.5% | $673 |
| | Parkview | 1 | $550,000 | 942 | 9 | 95.7% | $584 |
| | Regency Beachwalk | 5 | $562,400 | 693 | 25 | 100.0% | $812 |
| | Scandia | 1 | $515,000 | 1,014 | 225 | 98.2% | $508 |
| | Wailana At Waikiki | 2 | $532,500 | 1,176 | 126 | 88.0% | $453 |
| | Waipuna | 10 | $541,700 | 985 | 124 | 98.2% | $550 |
| | Windsor The | 1 | $599,000 | 945 | 68 | 100.0% | $634 |

As in the market segment priced immediately below this one, we believe there is substantial latent demand that will absorb these particular units. Again, this is based on the comparative benefits of new construction, central location (and parking), and very strong views. In this case, we foresee that the period until sell-out would be somewhere around 4-8 months. This is based on a competent sales and marketing effort, which includes cohesive sales team, a full sales presentation, a full marketing resulting in a broad market exposure.

CONCLUSION: In light of the project's competitive prices and strong values (driven by location and new construction), these units are in good position to sell expeditiously in the marketplace. What makes this even more compelling is that the views on three out of the four sides of this building are unobstructed and expansive, allowing the developer the luxury of being in a better position that either his new or resale competition. Having such, he can respond flexibly: with good demand, he can either increase his sales velocity or raise his prices (inasmuch as the prices used in this study here had miniscule price additions per unit from a lower to a higher floor).

## VIII. DESCRIPTION OF COMPARABLE NEW PROJECTS IN MARKET

AFFORDABLE PROJECTS: On Oahu, there are no for-sale affordable housing condo projects within the TMK Zone 1-2 (or, for that matter, in the Urban Core, as defined by City Planning). There are two projects outside this area: a for-sale affordable town home project in Kapolei and an affordable high-rise in Waipahu. Both are described below:

**WAIPAHU PLANTATION HIGH-RISE CONDO PRICING, 120% AMI**

| Bedrooms/Baths | Interior Sq. Ft. | Est. Maint Fee | Parking | Est. Price Range (FS) | Ave Price |
|---|---|---|---|---|---|
| Jr. 1-Bdrm/1-Bath | 362 | $171 | 1 | $131,500 - $143,000 | $137,250 |
| 1-Bdrm/1-Bath | 444 | $208 | 1 | $182,500 - $194,500 | $188,500 |
| 2-Bdrm/1-Bath | 555 | $255 | 1 | $230,000 - $242,000 | $236,000 |
| 2-Bdrm/1-Bath | 555 | $255 | 1 | $231,000 - $243,000 | $237,000 |
| 3-Bdrm/1-Bath | 643 | 296 | 2 | $291,000 - $302,000 | $296,500 |

This project met with some resistance when it came to market, as many of the potential buyers were unsure whether they wanted to live in a high-rise (as many of them preferred a more traditional, and familiar, single family home.

In comparison with the proposed project, this one suffers a very poor location (mainly due to security concerns due to a concentration of lower priced housing in the area, traffic and the lengthy commute into Honolulu). Furthermore, the sizes of these units are extremely small, relative to

The next one met with more success, in large part because it is part of the Second City at Kapolei (and the builder is known and well-respected).

**PHASE ONE, KAPOLEI NOHONA KAI CONDO PRICING, 140% AMI**

| Beds | Count | Average Price | Average Sq Ft |
|---|---|---|---|
| 2 | 6 | $303,000 | 920 |
| 3 | 14 | $336,643 | 1,158 |
| Grand Total | 20 | $326,550 | 1,086 |

Relative to Waipahu, it is offering a much bigger unit at a much bigger price, and it has had somewhat better success (in other words, it has not been an immediate sellout). Relative to this project, it suffers from an inferior location in terms of commute to work, as well as a relative dearth of demand (families in the immediate area who would consider moving out of their older unit and into a newer one – something there is little of in Kapolei, as the oldest subdivision there is but 15 years old).

MARKET PROJECTS: There is one project that has come to market in the area of this one, 1723 Kalakaua. This 120-unit project has been marketed with some success since the beginning of the year, with more than half of their units released and/or reserved. The table below describes the project in specific. The pricing provided therein was estimated, using their current price list as a basis.

**1723 KALAKAUA UNIT OFFERINGS**

| Bed Type | Model (by sq ft) | Count | Ave sf | Ave $ | Min $ | Max $ |
|---|---|---|---|---|---|---|
| Studio | 407 | 24 | 407 | $324,241 | $305,000 | $338,500 |
| 1 | 506 | 24 | 506 | $397,018 | $385,000 | $411,250 |
| | 516 | 24 | 516 | $427,946 | $405,000 | $457,000 |
| | 544 | 24 | 544 | $431,339 | $410,000 | $460,000 |
| 1 Total | | 76 | 522 | $418,768 | $385,000 | $460,000 |
| 2 | 703 | 24 | 703 | $518,607 | $492,000 | $551,000 |
| Grand Total | | 120 | 535 | $419,830 | $305,000 | $551,000 |

As seen, the 1723 Kalakaua project's prices are considerably higher than this project, and therefore should not directly interfere with the marketing and sales of this one. Per the table below, this comparison is made obvious:

**1723 KALAKAUA UNIT OFFERINGS VS HOLOMUA**

| Bed Type | Project | Model (by sq ft) | Count | Ave sf | Ave $ |
|---|---|---|---|---|---|
| 1 | 1723 Kalakaua | 506 | 28 | 506 | $397,018 |
| | | 516 | 28 | 516 | $427,946 |
| | | 544 | 28 | 544 | $431,339 |
| | 1723 Kalakaua Total | | 84 | 522 | $418,768 |
| | Holomua | 358 | 16 | 358 | $254,950 |
| | | 511 | 16 | 511 | $363,550 |
| | | 512 | 16 | 512 | $359,150 |
| | | 515 | 16 | 515 | $348,350 |
| | | 524 | 16 | 524 | $354,450 |
| | Holomua Total | | 80 | 484 | $336,090 |
| 1 Total | | | 164 | 503 | $378,437 |
| 2 | 1723 Kalakaua | 703 | 28 | 703 | $518,607 |
| | 1723 Kalakaua Total | | 28 | 703 | $518,607 |
| | Holomua | 696 | 16 | 696 | $448,725 |
| | | 697 | 16 | 697 | $440,375 |
| | | 700 | 16 | 700 | $441,375 |
| | | 734 | 16 | 734 | $462,025 |
| | | 739 | 16 | 739 | $463,775 |
| | | 749 | 16 | 749 | $467,275 |
| | Holomua Total | | 96 | 719 | $453,925 |
| 2 Total | | | 124 | 716 | $468,531 |

This comparison is encouraging for the following reasons, mainly having to do with the fact that 1723 is higher priced:

- It is in an inferior street location, with tremendous traffic in either direction, with the accompanying noise and disruption;
- It is a lower building, without the benefit of higher floors to enjoy the views;
- Its two-bedroom units are smaller in size;

- The views are blocked on two out of three sides by buildings much higher than this one (there is a wall of buildings in both the Waikiki and the Ala Moana direction, plus one immediately across the street to the east);
- There are no park facilities within more than a normal walk.

That said, there are two other new projects that are notable, if not directly competitive.

The first is Moana Vista, which has reserved about half of its 384 market rate units at $650,000 average price. It is well-located – on Kapiolani Blvd, in between downtown and the Ala Moana shopping center. The developer is coming off of good success at a project across the street, Moana Pacific. All the units are two bedrooms and targeting the middle of the market. They are more expensive, but larger (with potentially more amenities and potentially a higher monthly maintenance fee).

**MOANA PACIFIC PROJECT DESCRIPTION**

| Models (by Sq Ftg) | Units | Ave Sq Ft | Ave Price | Ave $/sf |
|---|---|---|---|---|
| 701 | 64 | 701 | $481,219 | $686 |
| 744 | 64 | 744 | $490,344 | $659 |
| 800 | 64 | 800 | $565,156 | $706 |
| 902 | 64 | 902 | $654,406 | $726 |
| 979 | 64 | 979 | $697,969 | $713 |
| 1030 | 64 | 1,030 | $737,031 | $716 |
| Grand Total | 384 | 859 | $604,354 | $703 |

The second project was mentioned earlier: Country Club Village 6, a new project in Salt Lake, enjoyed several months ago, selling out in 2 days. Again, their success was due to good location, new product, strong local demand and pricing that was advantageous, relative to the resale market: one-bedroom units priced $218,000 to $283,000 and two bedroom units priced from $321,000 to $397,500.

The anecdotal description of conditions in the new home marketplace centers on how buyers currently are very attracted by an infill location, wanting to avoid the lengthy commute. They also prefer new construction to resale product. Finally, they are also price conscious, but only in the sense of living within their means. They are not turned off by current interest rates – indeed, they find them favorable. Lastly, they are having to deal with the general perception that the national and local economies might be tipping into a recession, with a positive reading leading to a purchase decision (and vice versa).

## *IX. TARGET MARKET AND DEMOGRAPHIC ANALYSIS*

MARKET OVERVIEW: Affordably priced housing has always been a chronic and serious problem on the island and, with the recent real estate boom, has only gotten worse. As the very strong residential real estate market cycle has pushed up housing values, it has acted to take housing off the market at the low end (especially), as owners have finally been able to cash out at a profit. Plus, high construction costs make it difficult to expand the housing stock to address the issue of its scarcity.

DEMOGRAPHIC ANALYSIS: The market area we define as the Island of Oahu, otherwise known as the City & County of Honolulu. We do this because, in general, people living on a small island identify themselves with the whole island. This is even truer when the island is very remote from all other major land areas.

Furthermore, we consider the whole island (within a 40 mile radius from the site) to be the target market because this particular product – affordable housing - is both scarce and vital.

In accessing long-term population driven housing demand, we will use the numbers from CLARITAS, a well-known demographic forecasting company. Using their household growth projection, which equates roughly to housing demand, we see a potential housing demand annually of almost 3,600 dwelling units since 2001. Note, this figure does not take into account second home demand, which absorbs about 15%-18% of the new home supply annually, and puts additional pressure on the residential market.

When this is compared to the annual production of new housing on Oahu over the same time period, we see a deficit running of some 1,200 homes.

**POPULATION GROWTH DRIVEN HOUSING DEMAND**

| | Households | 5 Yr. Growth | 1 Yr. Growth | New Home Production | ***Annual Housing Deficit*** |
|---|---|---|---|---|---|
| 2002 | 286,731 | | | | |
| 2007 | 304,505 | 17,774 | 3,555 | 2,200 | ***1,355*** |
| 2012 | 316,079 | 11,574 | 2,315 | 2,000 | ***315*** |

Looking ahead, the rate of household growth (i.e., housing demand) is projected to slow to around 2,300 dwelling units a year, 2007-2012. We believe that the production of new homes over the next few years will fall to 2,000, resulting in an estimated annual level of unmet demand of 315 households per year.

Our reasons for this are that:

1. The high-rise condominium boom has run it's course, and there will be no more 200+ unit projects moving forward, save for the high-end and around Waikiki;
2. The production builders in the state will continue to build, but at a lower level, in response to lower demand due to high prices, high costs and difficult lending environment; and
3. A number of factors, including a low supply of entitled land and a slowing economy.

As such, we foresee a deficit in housing, relative to potential demand. This will make the current shortage of housing even more acute. Thus, any project that provides housing, particularly at the low end, is both timely and meaningful.

Turning now to the specific target market, we begin by looking the demographic segments that would be the ones demanding the units provided by the proposed project.

We do this by looking at the project's specific units and the particular income group that they are dependent on demand coming from. Then, we look to see how numerous a group that is, and whether it is sizable enough to absorb this new supply.

In terms of the target market, the table below shows the income range necessary for a buyer in this target market must make in order to qualify.

**POTENTIAL MARKET'S INCOME AND TENTATIVE PRICING, GIVEN 100% - 140% OF AMI**

| People in Household | *140% of AMI* | *120% of AMI* | *100% of AMI* |
|---|---|---|---|
| 2 | *$86,580* | *$74,210* | *$61,840* |
| 3 | *$97,400* | *$83,480* | *$69,570* |

TOTAL POTENTIAL MARKET: We then relate this income maximum to the number of potential applicants that could qualify. We arbitrarily used $50,000 as a cut off, for those making 100% or more of the Area Median Income of $54,110.

Again, we turn to Claritas for an estimation of the number of people, broken out by income bands that are in a range from $61,840 to $97,400 and projected out to June 2009, which is approximately when this project will be on the market.

**POTENTIAL MARKET FOR CONDOS, BUYERS MAKING UNDER 140% AMI**

| As of 2009, June | Age 25 - 34 | Age 35 - 44 | Age 45 - 54 | Age 55 - 59 | Age 60 - 64 | Total Households |
|---|---|---|---|---|---|---|
| Income $60 - $74,999 | 5,163 | 6,818 | 7,202 | 3,245 | 2,809 | 25,235 |
| Income $75 - $99,999 | 5,310 | 8,948 | 10,694 | 5,016 | 3,998 | 33,964 |
| Totals | 10,473 | 15,766 | 17,896 | 8,261 | 6,807 | 59,199 |

This shows that there are roughly 59,000 households on Oahu in the 140% of AMI that could qualify for the total 88 affordable units that will be offered here. If the pricing were set such that buyers from the 120% and 100% of AMI can qualify, then there would be an additional 33,000 potential buyers. We extended the analysis further and found there were approximately 40,100 buyers for the one-bedroom units and 42,375 buyers for the two bedroom ones (note: there is some overlap here). Thus, demographically, there is sufficient potential demand to absorb the supply of units contemplated here.

Note, we are not considering those who are or over 64 years old, although they certainly could qualify and purchase (and constitute an additional 24%, relative to the numbers in the table).

As such, we expect there are enough potential buyers for all of these units.

## *X. PROPOSED PROJECTS IN THE MARKET AREA*

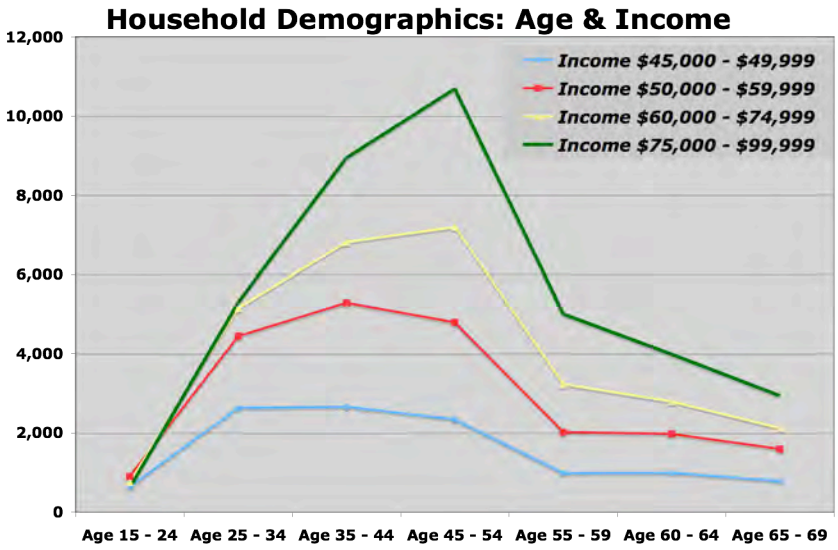
Nothing is being proposed in the immediate area. Furthermore, in other locations, such as Kakaako and the north shore, there have been projects that have been canceled due to costs (the Mormon church's Malaekahana project).

## *XI. COMMENTARY & CONCLUSIONS*

While the overall market is transitioning from a strong to a weaker market, we have shown that there are pockets of strong demand in the lower price segments of the urban condominium market. This underscores our belief that an infill project that is well designed, located and priced will be successful. We are also encouraged by recent signs (even better, a growing perception) that the country and the state will avoid a recession.

In terms of demand, we have shown that the trends in the comparable resale market segments are favorable for both the affordable and the market-rate units. Further, in terms of demographics, the potential market is certainly there: the green line in the chart below indicates that there are some 33,000 households on Oahu that could qualify for the 88 affordable units in the proposed project. To be sure, not all are interested in living in a new condominium on the outskirts of Waikiki, but if only half a percent of them were that would be sufficient to sell out the units.

In terms of potential supply, there are comparable for-sale affordable projects on the market in Kapolei and Waipahu, but they are in less desirable locations (and experiencing slower sales because of it). This infill site is in a very central location, and offers any number of savings in terms of commute (2 hours plus a day) and parking (and take the bus).




On top of that, most affordable projects are not for-sale, but for-rent (except the one in Kakaako, which is tentatively planned as a rent-to-own).

The major competition would be the resale market, but those units do not compare well, being dated, aged and not particularly well located.

Relative to the new projects coming out of the ground selling their units at market, there is none that directly compete with the at-market units of this one – they are higher priced and do not have as good a neighborhood or as strong a view plane. Again, there will be competition from the resale market, but (again) these are most likely to be infill projects that are aged and dated, or suburban projects that are located far from the center of town.

Finally, there is ample evidence historically (and recently, at Country Club Village 6), that new supply priced advantageously relative to the alternatives, the resale market, calls forth more than ample demand to absorb the new units. This is commonly known as 'getting a good deal' and is particularly important to those with limited means (i.e., at the lower end of the income spectrum).

In conclusion, there is more than sufficient demand in this market segment for well located, newly built units at these general prices and (on the supply side), little competitive interference from both the resale market and other developers. Given this, a well-marketed project such as this has the potential for selling out within 1-8 months of being released.

# Appendix C

## Correspondence with Department of Planning & Permitting

March 10, 2008

Henry Eng, FAICP
Director – Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

*Attention: Land Use Permits Division*

RE: Proposed 176-unit Residential Condominium Project
TMK (1) 2-4-6-17 & 18
1315 Kalakaua Avenue, Honolulu, Hawaii

Dear Mr. Eng

THM Partners LLC, through affiliate KRC Partners LLC, is proposing to develop a 176-unit residential condominium project on 21,339 square feet of land located at 1315 Kalakaua Avenue, Honolulu and identified by Hawaii State Tax Maps as TMK (1) 2-4-6-17 & 18. The tentative name for the project is "Holomua" and our goal is to provide "workforce" housing in urban Honolulu.

THM is working with the State of Hawaii's Hawaii Housing Finance and Development Corporation (HHFDC) to develop the project through their Dwelling Unit Revolving Fund (DURF) program. A minimum of 51% of the units will be priced at a maximum of 140% of the area median income with the balance of the units at market. In order to deliver the units at this level of pricing, we will be requesting processing of the project under HRS Chapter 201H guidelines. As part of our 201H application we will be requesting exemptions from the Land Use Ordinance standards as they relate to height, floor area, setbacks and, possibly, minimum parking requirements. A summary of the project is attached.

Based on review of the City's 201H application requirements and meetings/phone conversations with your staff, we understand we will ***not*** meet the City's eligibility requirements for the 201H application. This is primarily because the units will be priced at 140% median income, above the City's minimum affordability (i.e. 10% at 80% median, 20%

THM PARTNERS LLC, 615 Piikoi Street, Suite 808, Honolulu, HI 96814
Phone: 808.237.5287 Fax: 808 275-3235

at 81%-120% median 30% 121% to 140% median) required for eligibility. Therefore, we anticipate running the 201H application through the State for processing. Of course, we will still prepare all the appropriate documentation (environmental assessment, market study, etc), obtain required approvals, notify the neighborhood board, and meet the other requirements of the application. Further, we understand the Honolulu City Council still would need to approve the final application.

Because we do not meet the City's eligibility requirements and in an effort to save your staff's time and energy reviewing an application, we would appreciate written confirmation by the City that our proposed project does not meet the City's eligibility requirements, particularly as it relates to the minimum affordability requirements, for application into the City's 201H processing program.

Please let me know if you have any questions or comments. I can be reached at (808) 237-5287 or by email at skrivatsy@thmhawaii.com. Thank you for your assistance.

Sincerely,

Serge M. Krivatsy, MAI
Principal

DEPARTMENT OF PLANNING AND PERMITTING
**CITY AND COUNTY OF HONOLULU**

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MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

2008/ELOG-645(ec)

April 15, 2008

Mr. Serge M. Krivatsy, MAI
THM PARTNERS LLC
615 Piikoi Street, Suite 808
Honolulu, Hawaii 96814

Dear Mr. Krivatsy:

Subject: Determination of Eligibility
Chapter 201H, Hawaii Revised Statutes
Proposed For-Sale Residential Project
1315 Kalakaua Avenue - Pawaa
Tax Map Key 2-4-6: 17 and 18

This responds to your letter of March 10, 2008, requesting confirmation that the proposed housing project on the above site will not meet the eligibility requirements for processing by the Department of Planning and Permitting (DPP) of a request for exemptions pursuant to Chapter 201H, Hawaii Revised Statutes (HRS). We confirm that the proposed development, a 176-unit condominium project, will not meet the City eligibility requirements for the processing of a 201H application by the DPP.

Projects proposed to be developed pursuant to Chapter 201H, HRS, are subject to the City's Land and Housing Development Program Rules and Regulations ("the Rules"). Section III-2(a) of the Rules requires that a project developed under this section provide "not less than 10 percent" of its units for families earning less than 80 percent (80%) of the median income for the area, and 20 percent (20%) of the units for families earning between 80 percent (80%) and 120 percent (120%) of median income.

The project as described in your letter contains no provisions to set aside the required number of units for the above target income groups. You indicate that the proposed multi-family apartment building will provide a minimum of 51 percent (51%) or 90 units for sale to families earning up to 140 percent (140%) of the area median income, with the balance of the units at market prices. Since the project does not meet the City's eligibility requirements, you propose to submit a 201H application through the State Hawaii Housing Finance and Development Corporation (HHFDC) for processing. We concur that the proposed project at the above site is not considered an eligible project for processing by the DPP for the purposes of obtaining exemptions from planning, zoning and construction standards for affordable housing pursuant to Chapter 201H-38, HRS. We also confirm that the Honolulu City Council must approve any request for exemptions.

It is our understanding that the HHFDC will be requesting comments from the DPP and other agencies and then will submit the request for exemptions directly to the City Council for its action.

If you have any questions, please contact Elizabeth Chinn of our staff at 768-8021.

Very truly yours,

Robert A Bannister

for Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:nt

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# Appendix D
# Architectural Drawings

# HOLOMUA

1319 KALAKAUA AVENUE
HONOLULU, HAWAII

## DESIGN TEAM

ARCHITECT - KAZU YATO, AIA & ASSOCIATES, INC.
STRUCTURAL ENGINEER- LIBBEY HEYWOOD, INC
CIVIL ENGINEER - ENGINEERING DYNAMICS CORP.
LANDSCAPE ARCHITECT - RANDAL FUJIMOTO
MECHANICAL ENGINEER - MECHANICAL ENTERPRISES, INC.
ELECTRICAL ENGINEER - ELECTEC HAWAII, INC.

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII U.S.A.
Expiration Date: 4/30/08

THIS PROJECT WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION.

HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

TITLE SHEET

KAZU YATO, AIA & ASSOCIATES,INC.
2033 ROUNDTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 946-0040
FAX: (808) 955-0002

| DATE | |
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| DRAWN | KY |
| CHECK | KY |
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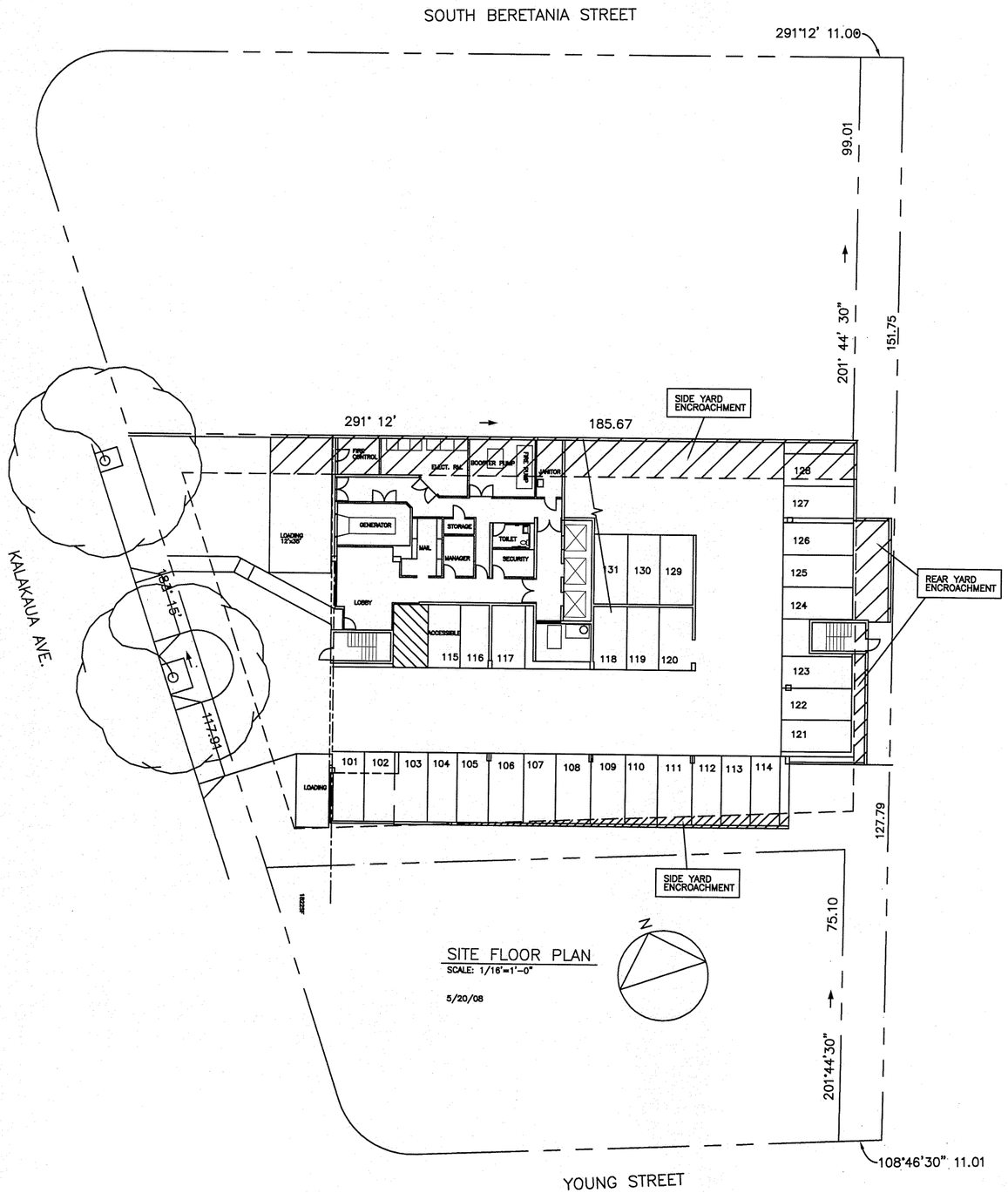


SITE FLOOR PLAN
SCALE: 1/16"=1'-0"
5/20/08

PROJECT DATA
TMK: 2-4-06:17 & 18
LOT AREA=21,339SF
ZONE= BMX-3
FAR= 2.5 (3.5 MAX. WITH BONUS)
ALLOWABLE F.A.=53,347SF
TYPE OF CONSTRUCTION=TYPE 1A

PROPOSED F.A.R.=7.26
ALLOWABLE FLOOR AREA=154,921SF

PROPOSED FA
TYP.FL.=9095X16=145,520
GRD.FL.=3162
GARAGE=730X7+470=5580
ROOF=552
TOTAL = 154,814SF

PROPOSED = 11X16=176 UNITS
8 ACCESSIBLE UNITS REQUIRED AND PROVIDED.
ACCESSIBLE UNITS SHALL CONFORM TO:
ADA ACCESSIBILITY GUIDELINE
FAIR HOUSING ACCESSIBILITY GUIDELINES
RESIDENTIAL HOUSING ACCESSIBILITY GUIDELINES

PARKING CALCULATION:
5(1BR)X1 16=80
6(2BR)X1.5X16=144
GUEST PARKING=18
TOTAL=242

PARKING PROVIDED:
P1 LEVEL=31
P2 THRU P7 LEVEL=34X6=204
P8 = 10
TOTAL=245

NOTE: WHILE THE PROJECT AS DESIGNED INCLUDES THE PARKING COUNT AS REFERENCED ABOVE, THE DEVELOPER IS REQUESTING THE OPTION TO REDUCE THE PARKING BY 34 STALLS IN THE EVENT IT IS REQUIRED TO MAKE THE PROJECT FINANCIALLY FEASIBLE.

4/21/08

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

THIS PROJECT WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION.

HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

SITE PLAN, PROJECT DATA

KAZU YATO, AIA & ASSOCIATES
2033 ROOSEVELT TERRACE
HONOLULU, HI 96822
TEL: (808) 945-0040
FAX: (808) 955-0062

| DATE | DRAWN | CHECK | FILE |
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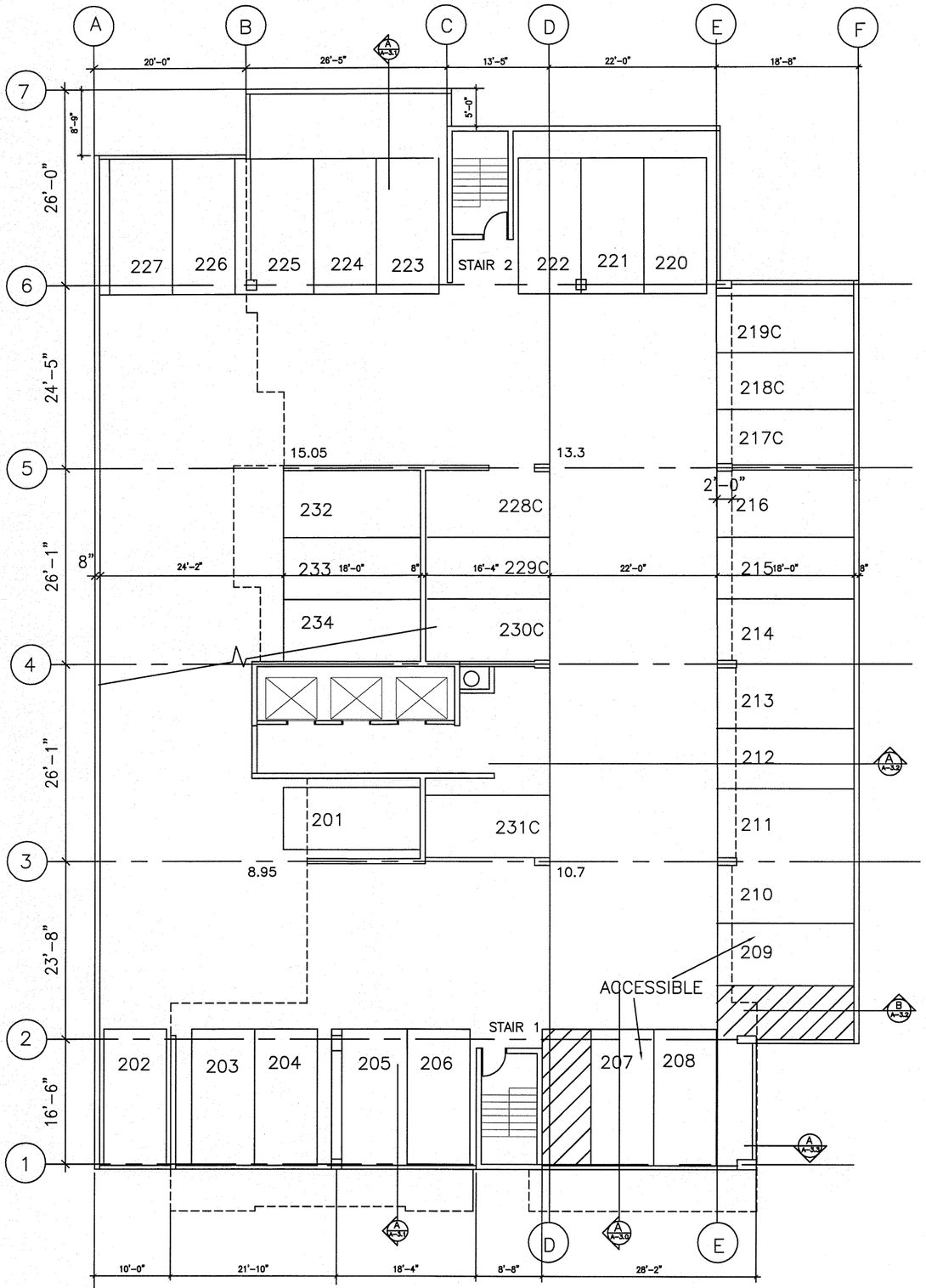
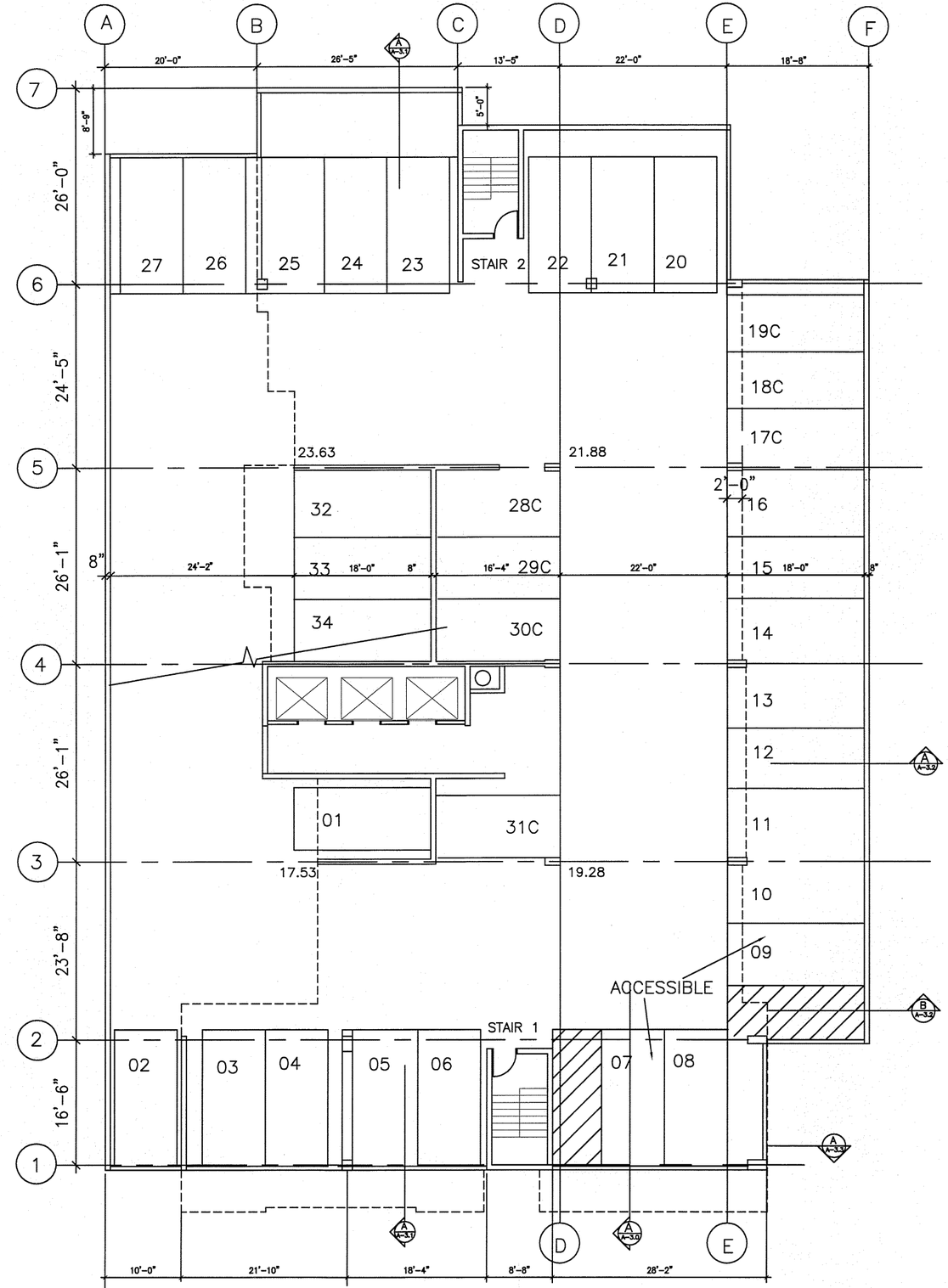



## P-2 PARKING LEVEL PLAN

SCALE:1/8"=1'-0"

729SF – STAIRS AND ELEVATOR W/LOBBY
5/16/08




## TYPICAL PARKING LEVEL PLAN–LEVELS 3,4,5,6 &7

SCALE:1/8"=1'-0"

729SF – STAIRS AND ELEVATOR W/LOBBY
5/16/08

| NO. | DATE | REVISIONS |
|---|---|---|

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

P-2 PARKING LEVEL PLAN
TYPICAL PARKING LEVEL PLAN

KAZU YATO, AIA & ASSOCIATES
2033 ROUNDTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 948-8040
FAX: (808) 948-0032

| DATE | DRAWN | CHECK | FILE |
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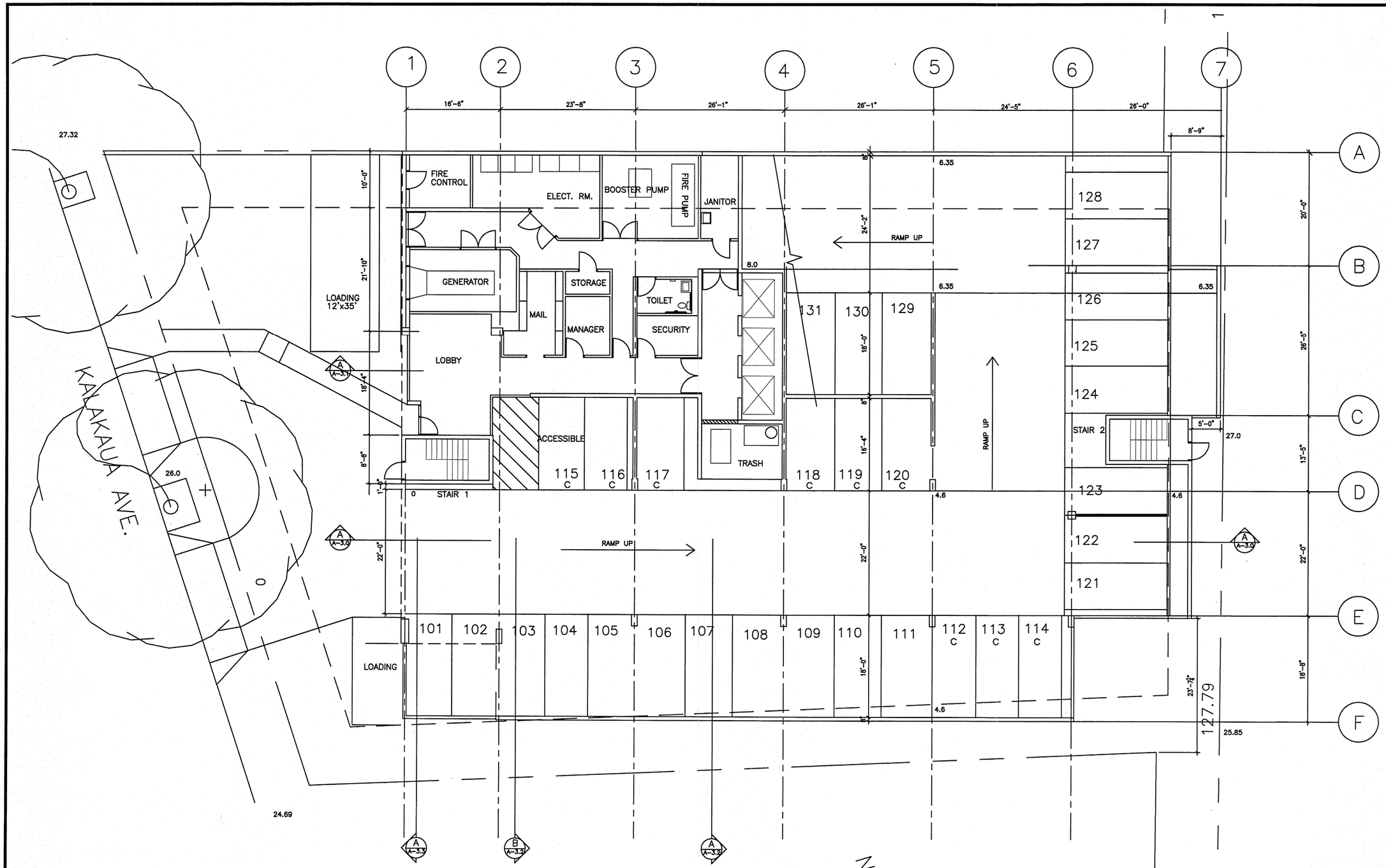


# GROUND FLOOR PLAN

SCALE:1/8"=1'-0"

3154SF

5/20/08

| NO. | DATE | REVISIONS |
|---|---|---|

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No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

GROUND FLOOR PLAN


KAZU YATO, AIA & ASSOCIATES
2033 ROUNDTOP TERRACE
PAWOOLOU, HI 96822
TEL: (808) 942-0040
FAX: (808) 955-0035


| DATE | DRAWN | CHECK | FILE |
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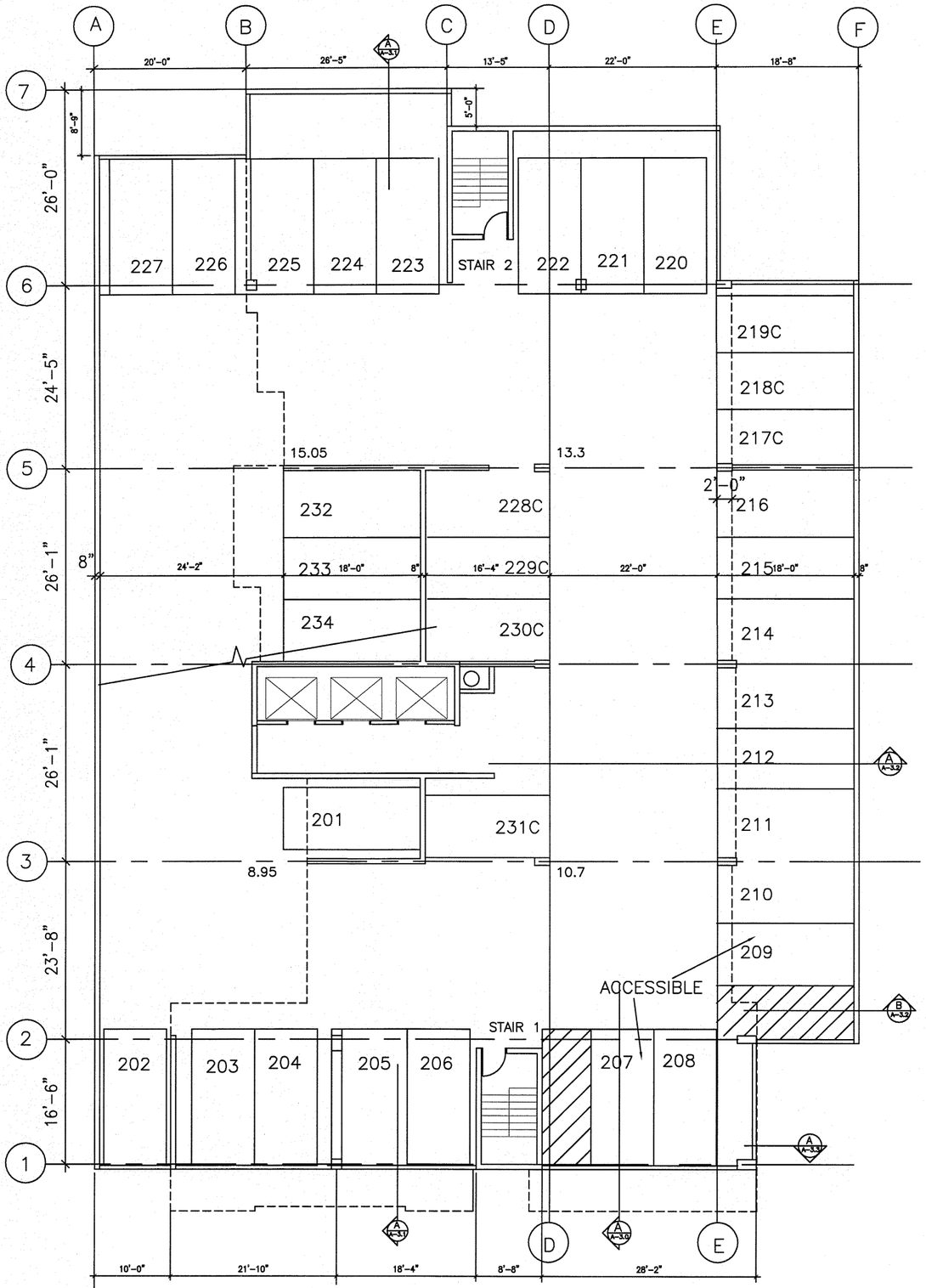
SHEET

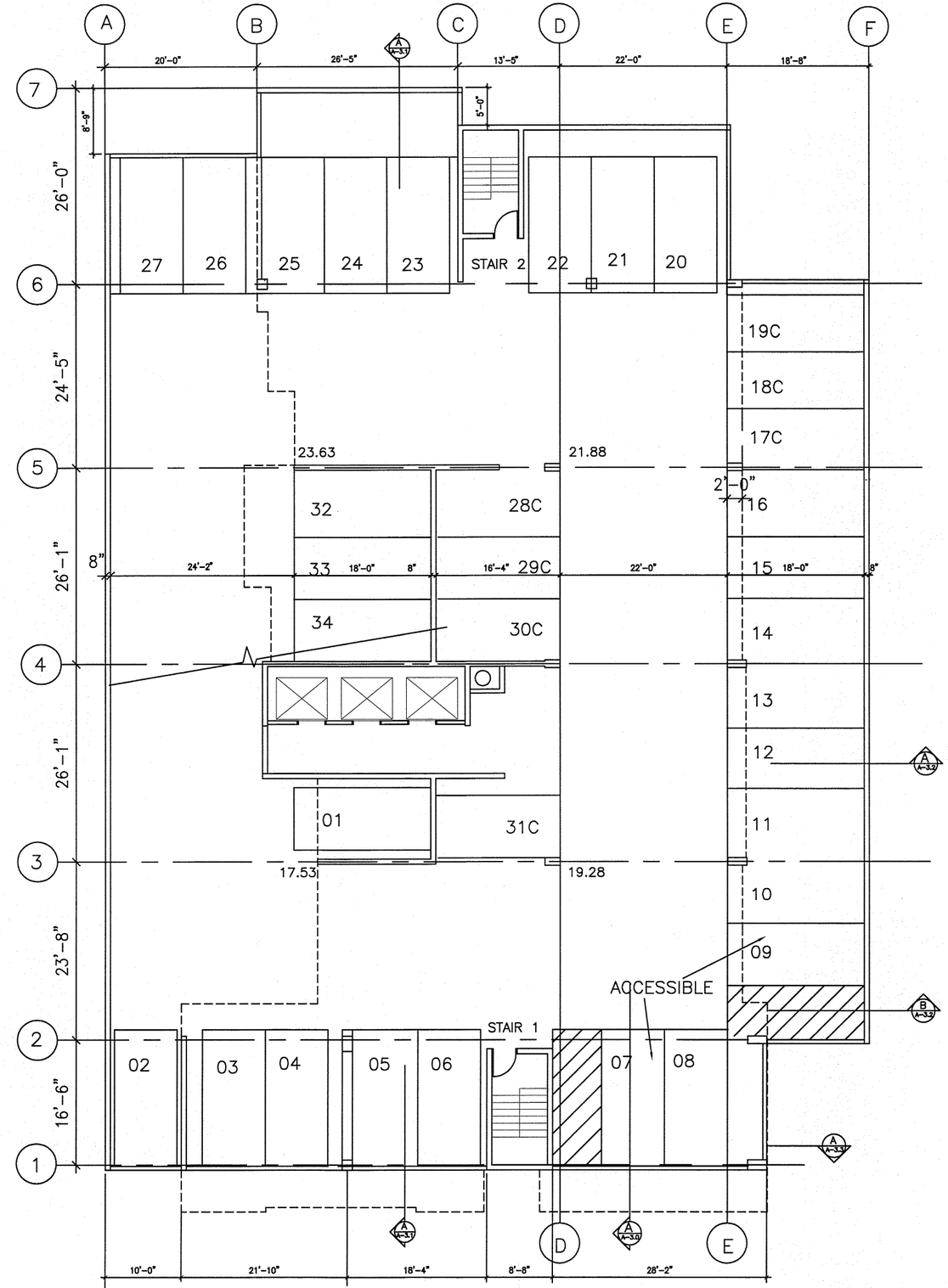
A–1




## P-2 PARKING LEVEL PLAN

SCALE:1/8"=1'-0"

729SF – STAIRS AND ELEVATOR W/LOBBY
5/16/08




## TYPICAL PARKING LEVEL PLAN–LEVELS 3,4,5,6 &7

SCALE:1/8"=1'-0"

729SF – STAIRS AND ELEVATOR W/LOBBY
5/16/08

| NO. | DATE | REVISIONS |
|---|---|---|

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

P-2 PARKING LEVEL PLAN
TYPICAL PARKING LEVEL PLAN

KAZU YATO, AIA & ASSOCIATES
2033 ROUNDTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 948-8040
FAX: (808) 948-0032

| DATE | DRAWN | CHECK | FILE |
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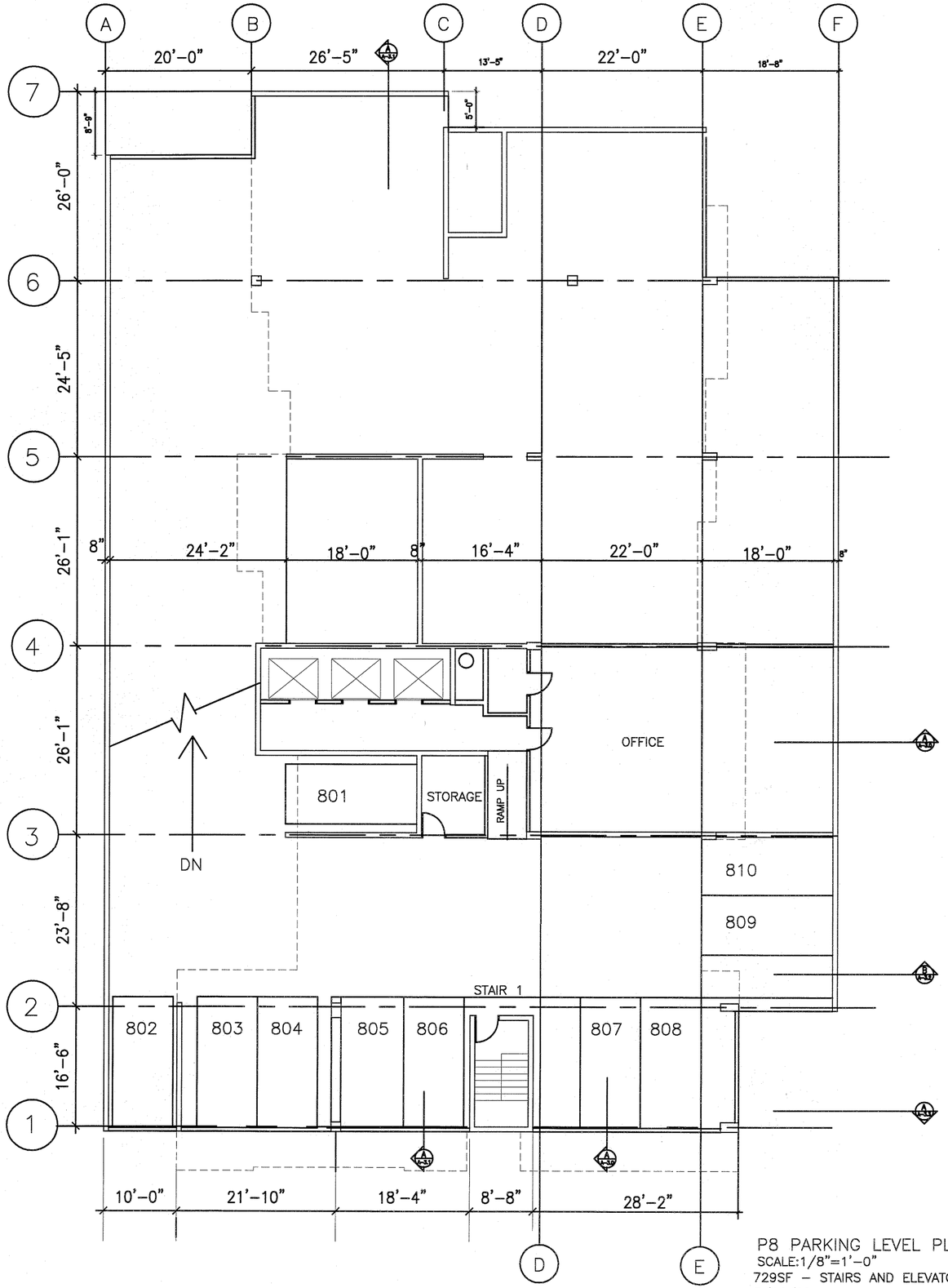


P8 PARKING LEVEL PLAN
SCALE:1/8"=1'-0"
729SF – STAIRS AND ELEVATOR W/LOBBY
5/16/08

REVISIONS

| NO. | DATE |
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HAWAII, U.S.A.
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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

P-8 PARKING LEVEL PLAN

KAZU YATO, AIA & ASSOCIATES
2033 ROUNTTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 942-0040
FAX: (808) 955-0032

| DATE | DRAWN | CHECK | FILE |
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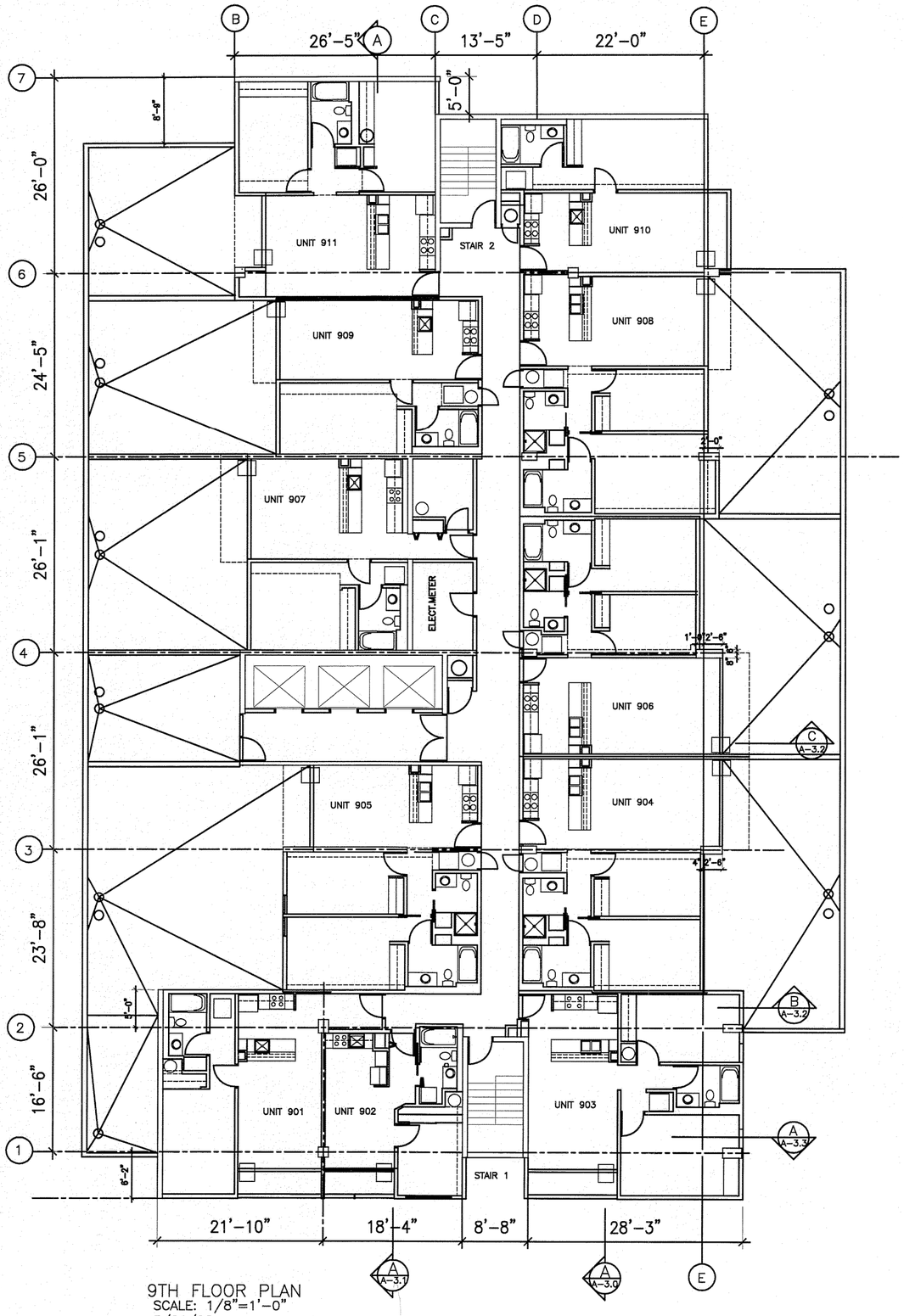
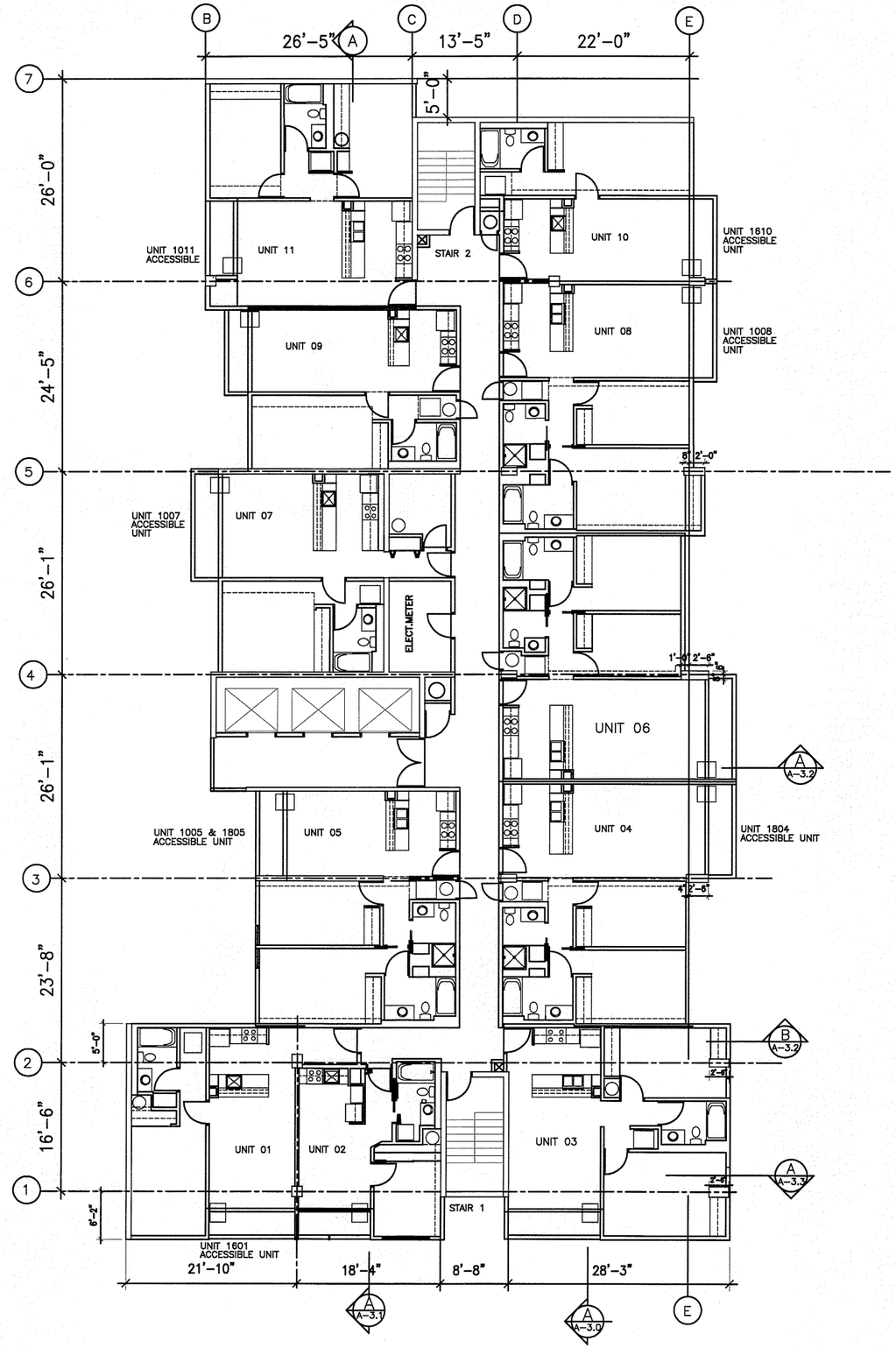



9TH FLOOR PLAN
SCALE: 1/8"=1'-0"
5/21/08




TYPICAL FLOOR PLAN– FLOORS 10 THRU 24
SCALE: 1/8"=1'-0"
9095SF
5/21/08

| NO. | DATE | REVISIONS |
|---|---|---|
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HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

9TH FLOOR PLAN
10TH FLOOR PLAN

KAZU YATO, AIA & ASSOCIATES
2033 ROUNDTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 945-0040
FAX: (808) 955-0052

| DATE | DRAWN | CHECK | FILE |
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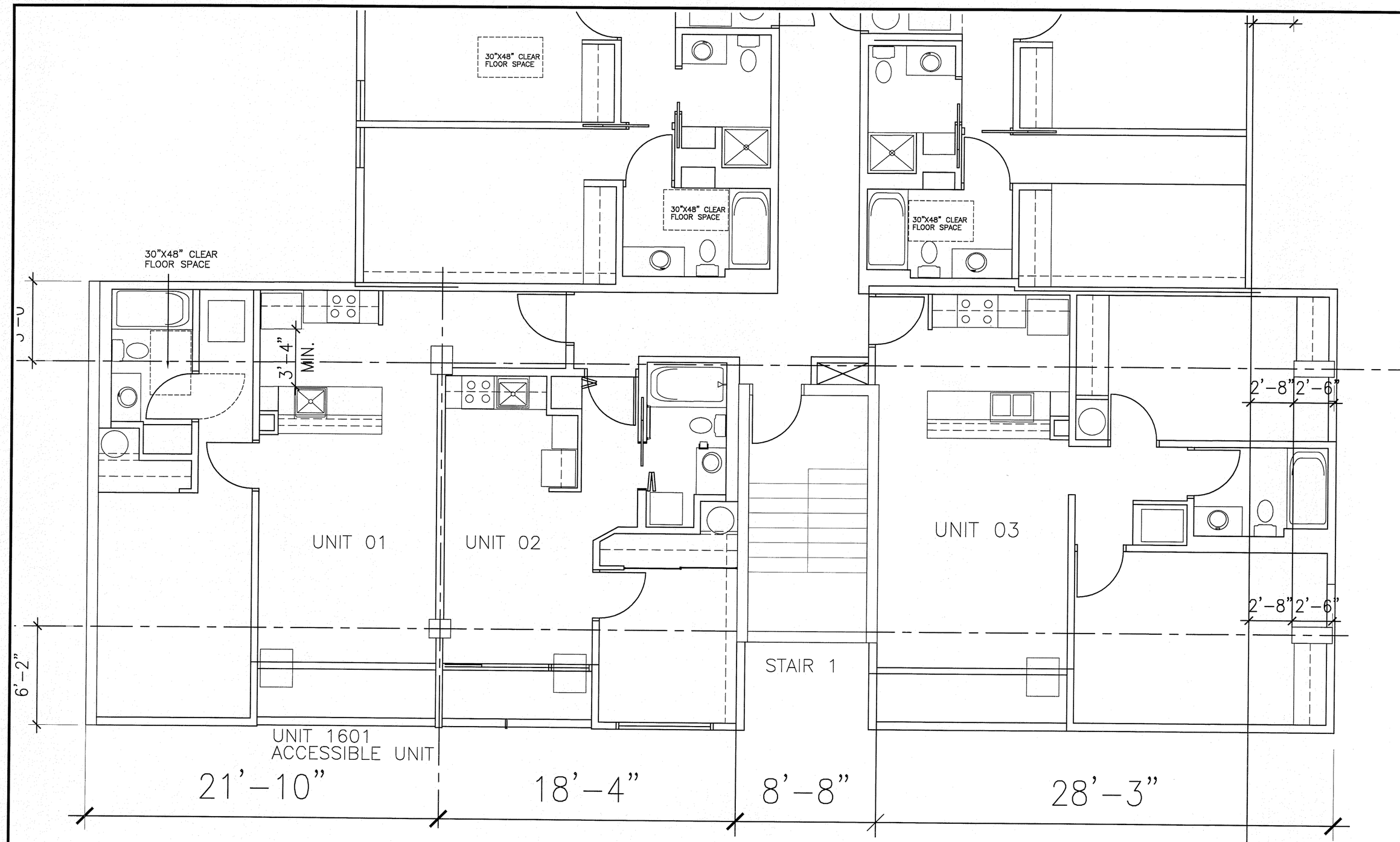


UNIT PLANS-01,02 AND 03
SCALE: 1/8"=1'-0"
5/20/08

REVISIONS

| NO. | DATE |
|---|---|
| | |

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LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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**HOLOMUA**
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

UNIT PLAN

KAZU YATO, AIA & ASSOCIATES
2033 ROUNDTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 946-0040
FAX: (808) 926-0052

| DATE | DRAWN | CHECK | FILE |
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| | KY | KY | |

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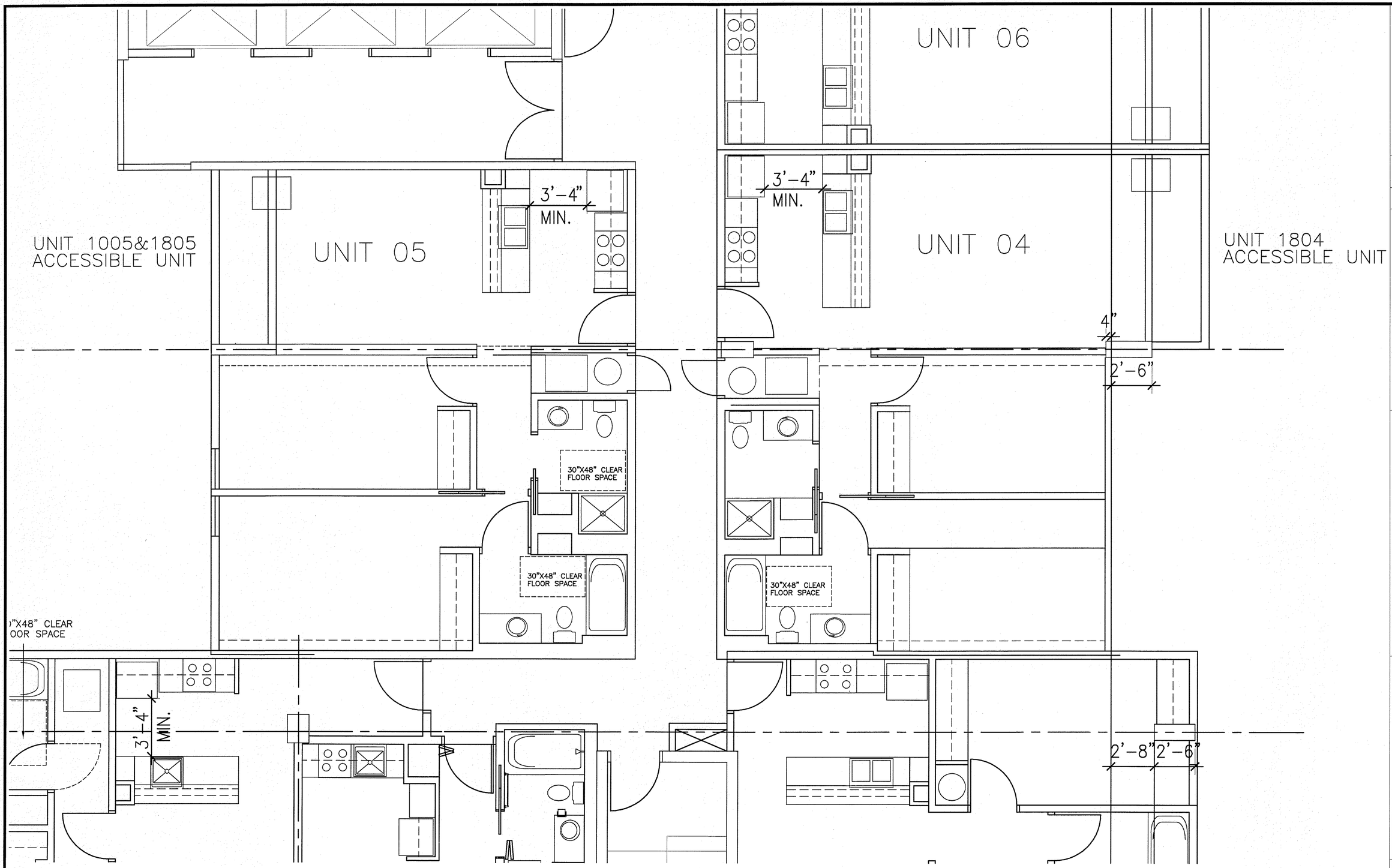
A-2.5




UNIT PLANS-04 AND 05
SCALE:3/8"=1'-0"

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.5271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

UNIT PLAN-04 AND 05

KAZU YATO, AIA & ASSOCIATES
2033 RHAMSTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 945-0040
FAX: (808) 926-0002

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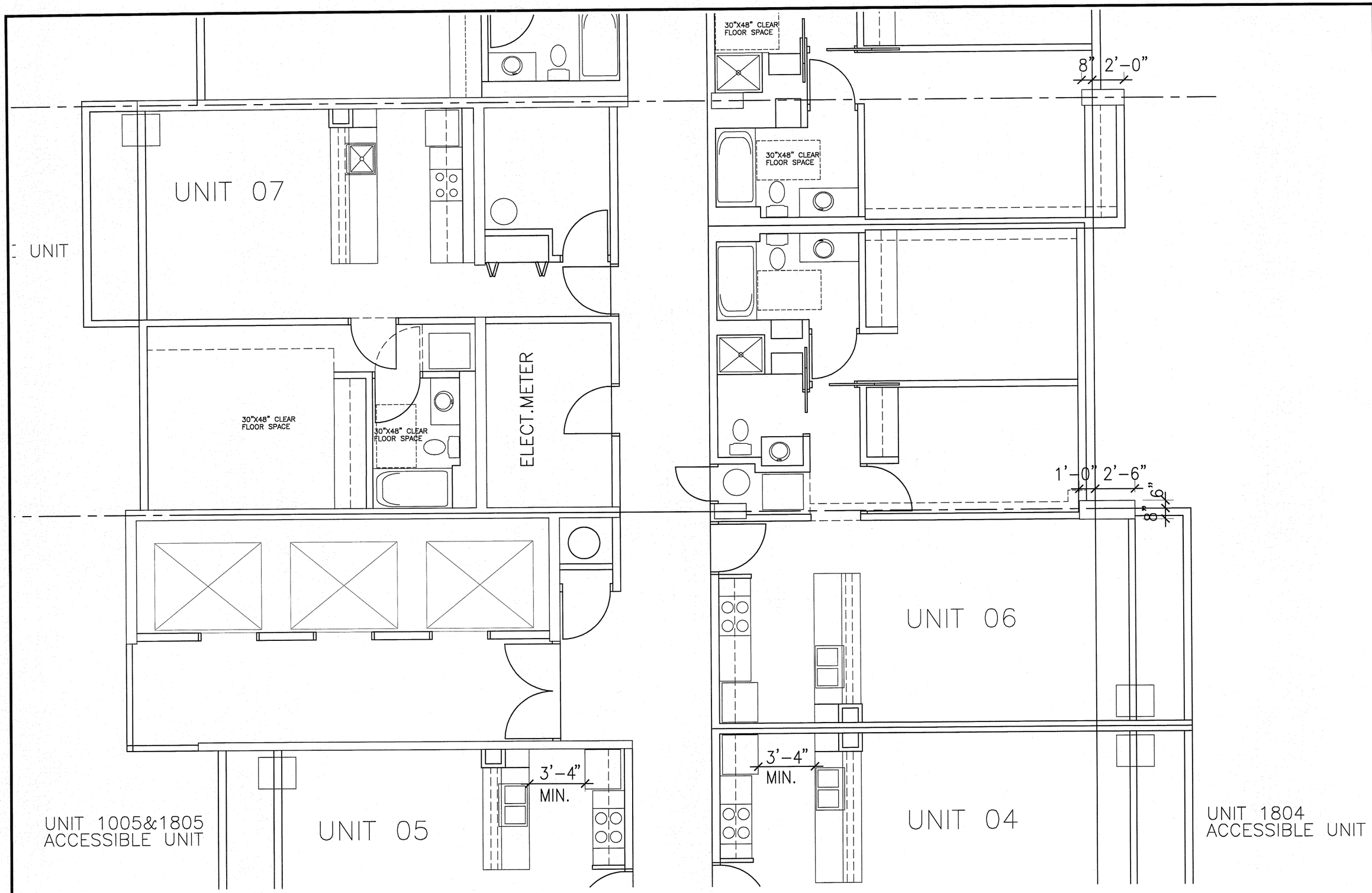


UNIT PLANS– 06 AND 07 UNITS

SCALE: 3/8"=1'-0"

| NO. | DATE | REVISIONS |
|---|---|---|

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LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HONOLULU, HAWAII

UNIT PLAN–06 AND07

KAZU YATO, AIA & ASSOCIATES
2033 ROUNETOP TERRACE
HONOLULU HI 96822
TEL: (808) 945-0040
FAX: (808) 905-0002

| DATE | DRAWN | CHECK | FILE |
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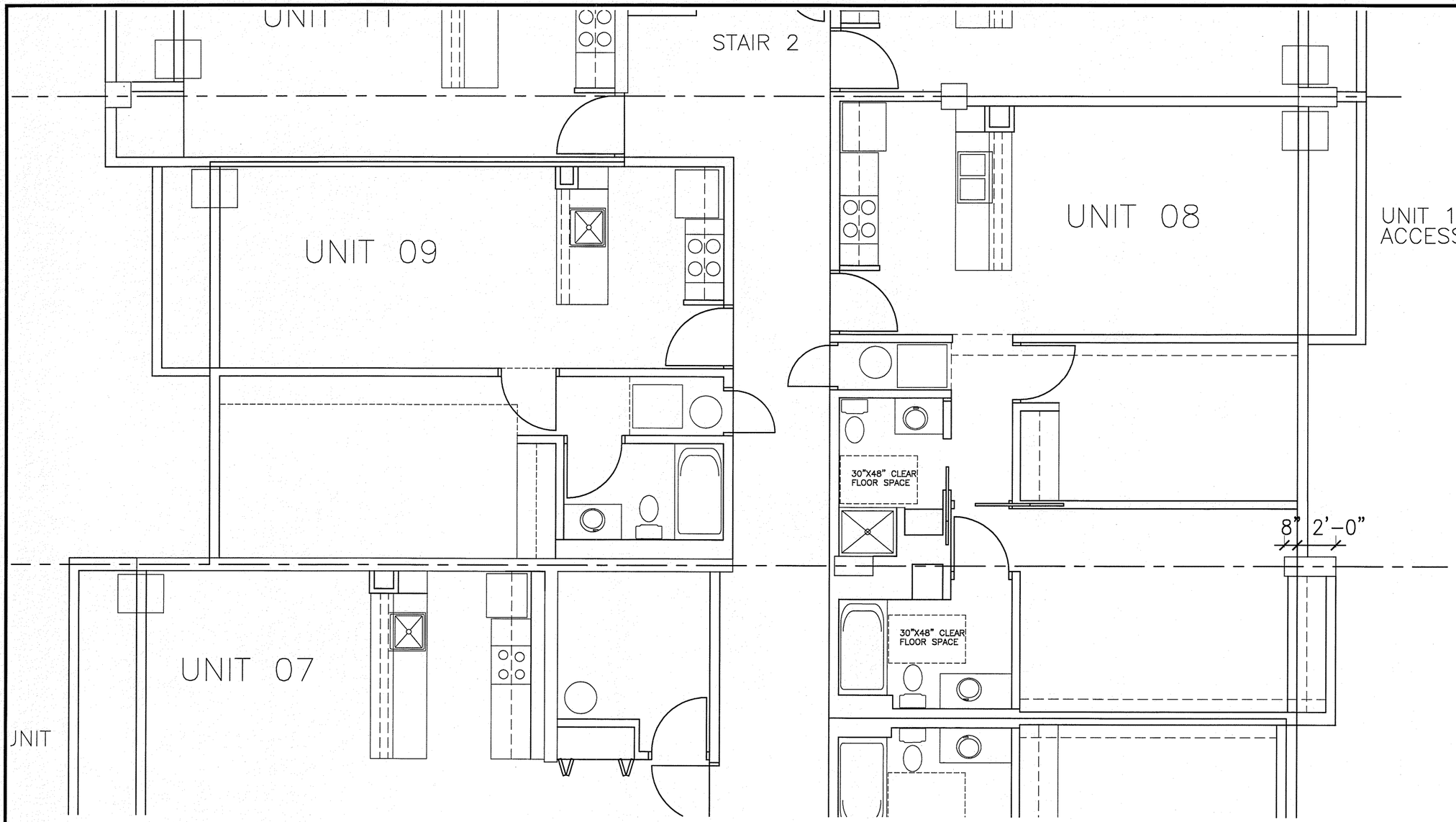


UNIT PLANS– 08 AND 09 UNITS

SCALE: 3/8"=1'-0"

| NO. | DATE | REVISIONS |
|---|---|---|

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HONOLULU, HAWAII

UNIT PLAN–08 AND09

KAZU YATO, AIA & ASSOCIATES
2033 ROBERTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 945-0040
FAX: (808) 955-0002

| DATE | DRAWN | CHECK | FILE |
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SHEET

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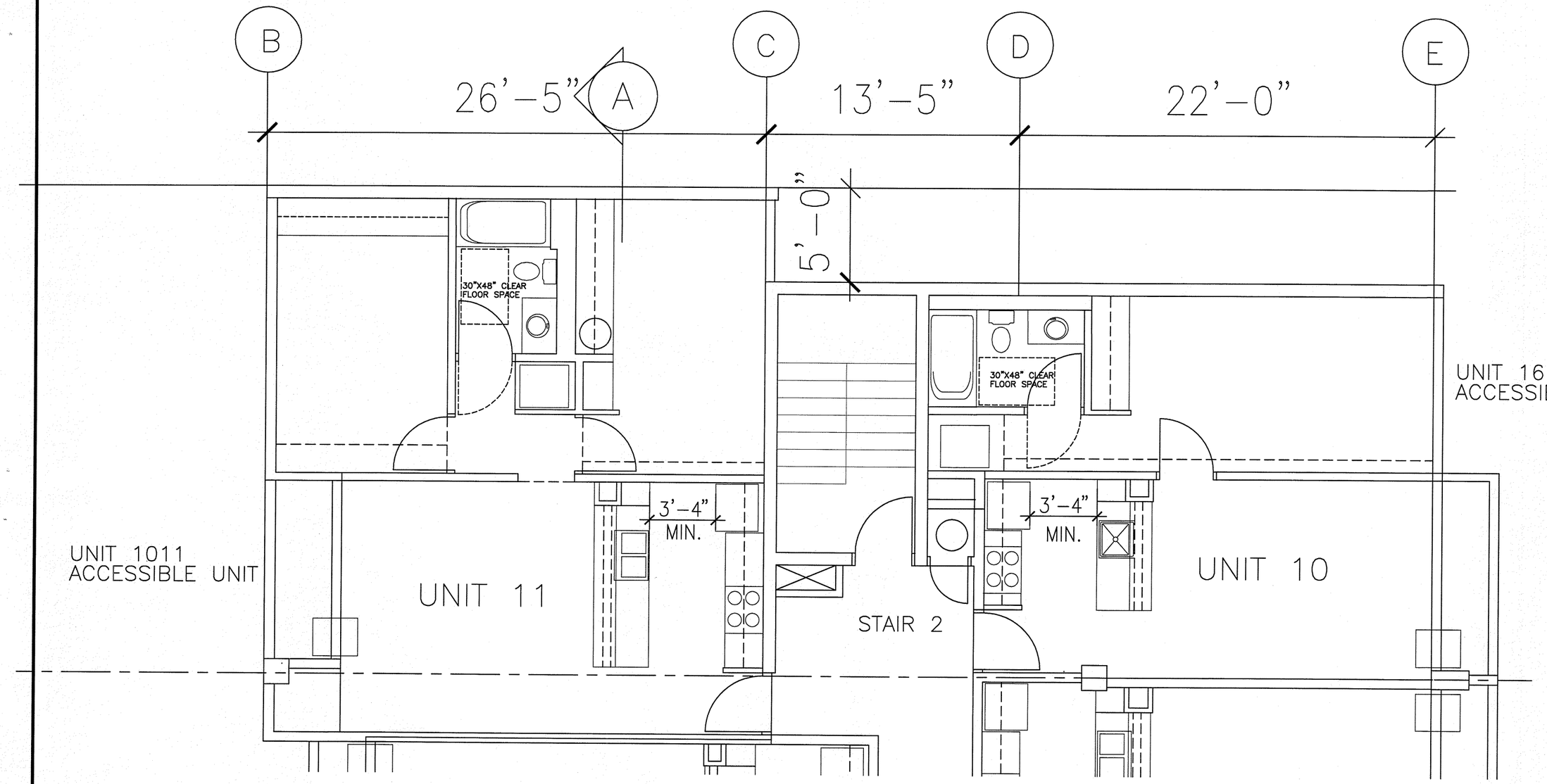


UNIT PLANS– 10 AND 11 UNITS

SCALE: 3/8"=1'-0"

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

UNIT PLAN

KAZU YATO, AIA & ASSOCIATES
2033 ROUNDTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 945-0040
FAX: (808) 955-0202

| DATE | DRAWN | CHECK | FILE |
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| | KY | KY | |

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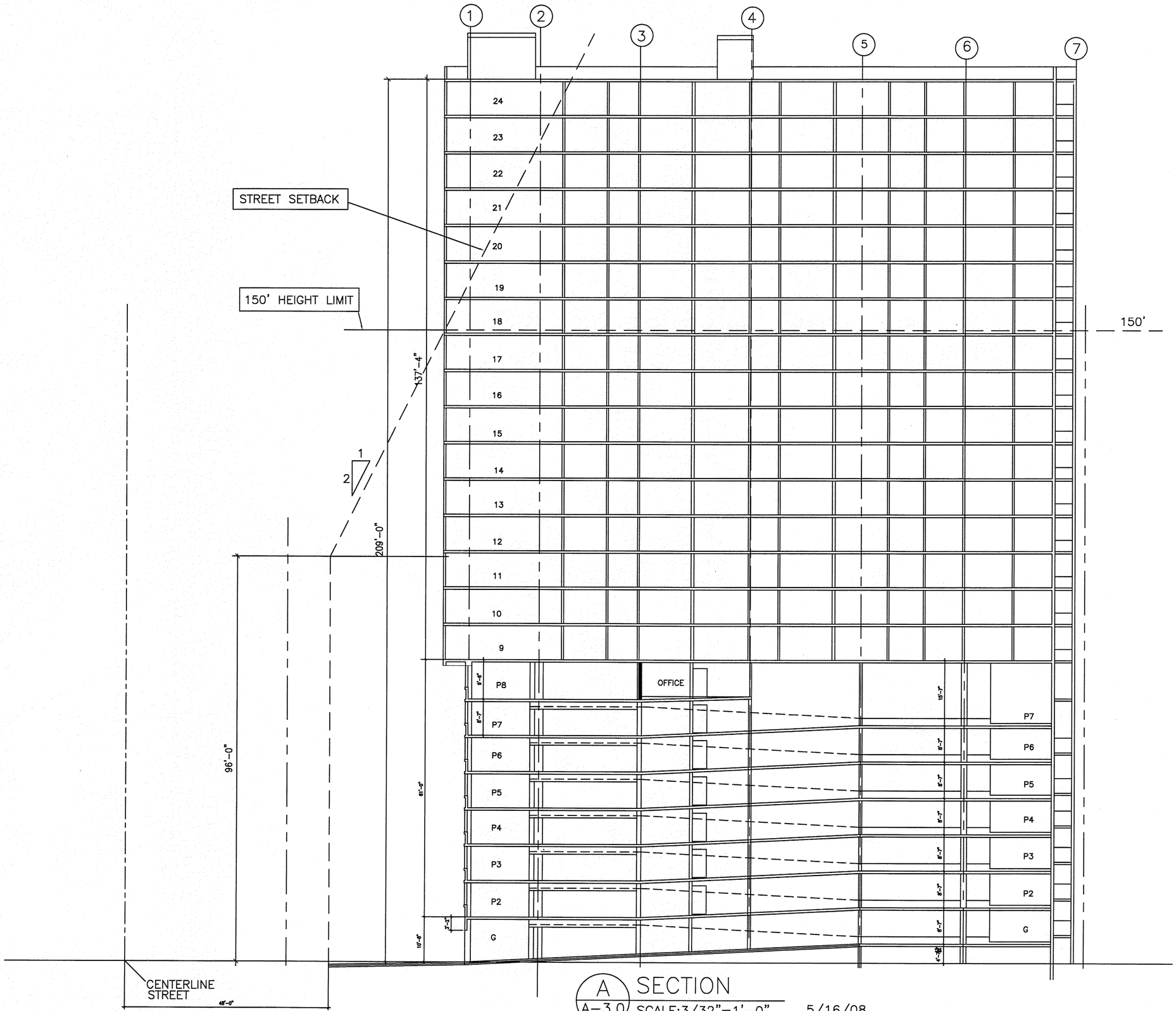


A SECTION
A-3.0 SCALE:3/32"=1'-0" 5/16/08

REVISIONS

| NO. | DATE | |
|---|---|---|
| | | |

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

THIS PROJECT WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION.

HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

BUILDING SECTION

KAZU YATO, AIA & ASSOCIATES
2033 ROUNDTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 945-0040
FAX: (808) 955-0052

| DATE | DRAWN | CHECK | FILE |
|---|---|---|---|
| | KY | KY | |

SHEET

A-3.0

SOUTH ELEVATION
SCALE:3/32"=1'-0"
5/19/08

REVISIONS

| NO. | DATE |
|---|---|
| | |

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

EXTERIOR ELEVATION (SOUTH)

KAZU YATO, AIA & ASSOCIATES
2033 KOHOU STREET
HONOLULU, HI 96822
TEL: (808) 945-0040
FAX: (808) 926-0002

| DATE | DRAWN | CHECK | FILE |
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| | KY | KY | |

SHEET

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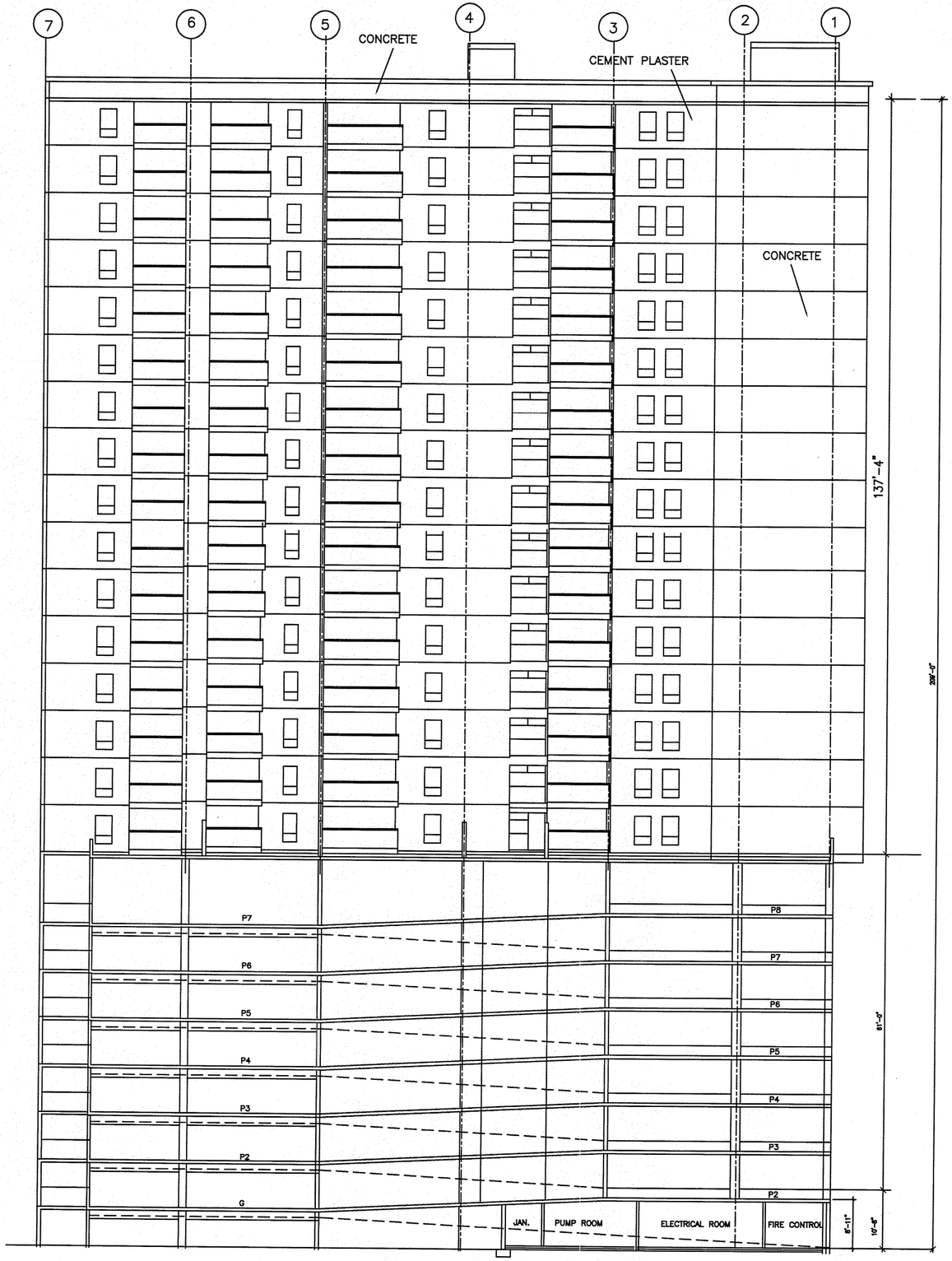


NORTH ELEVATION/SECTION
SCALE:3/32"=1'-0"
5/16/08

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

THIS PROJECT WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONFORMS TO STATE LAWS. PROJECT WILL BE UNDER MY SUPERVISION.

HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

EXTERIOR ELEVATION (SOUTH)

KAZU YATO, AIA & ASSOCIATES
2033 ROUNDTOP TERRACE
HONOLULU, HI 96822
TEL: (808) 946-0040
FAX: (808) 955-0002

| DATE | DRAWN | CHECK | FILE |
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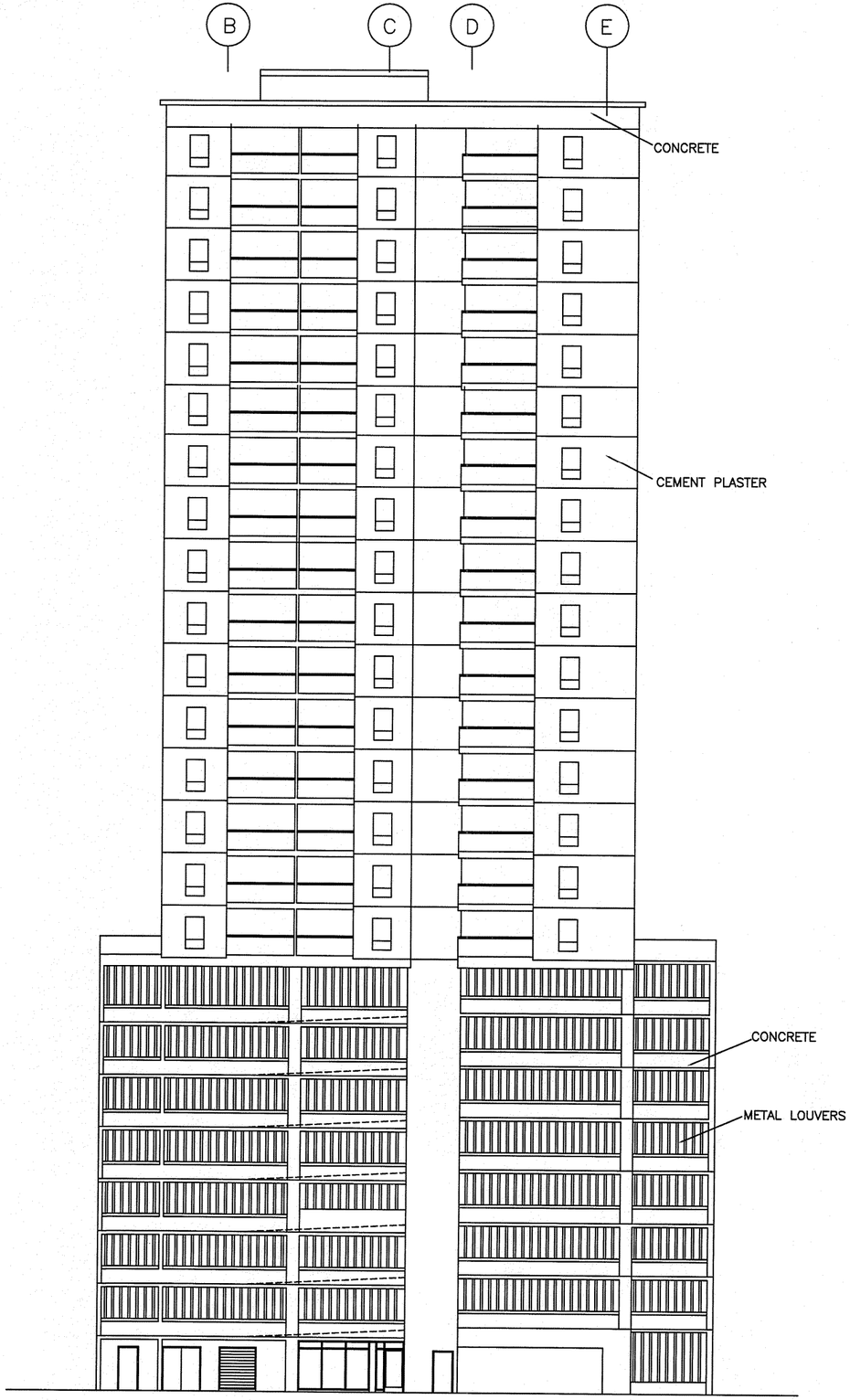
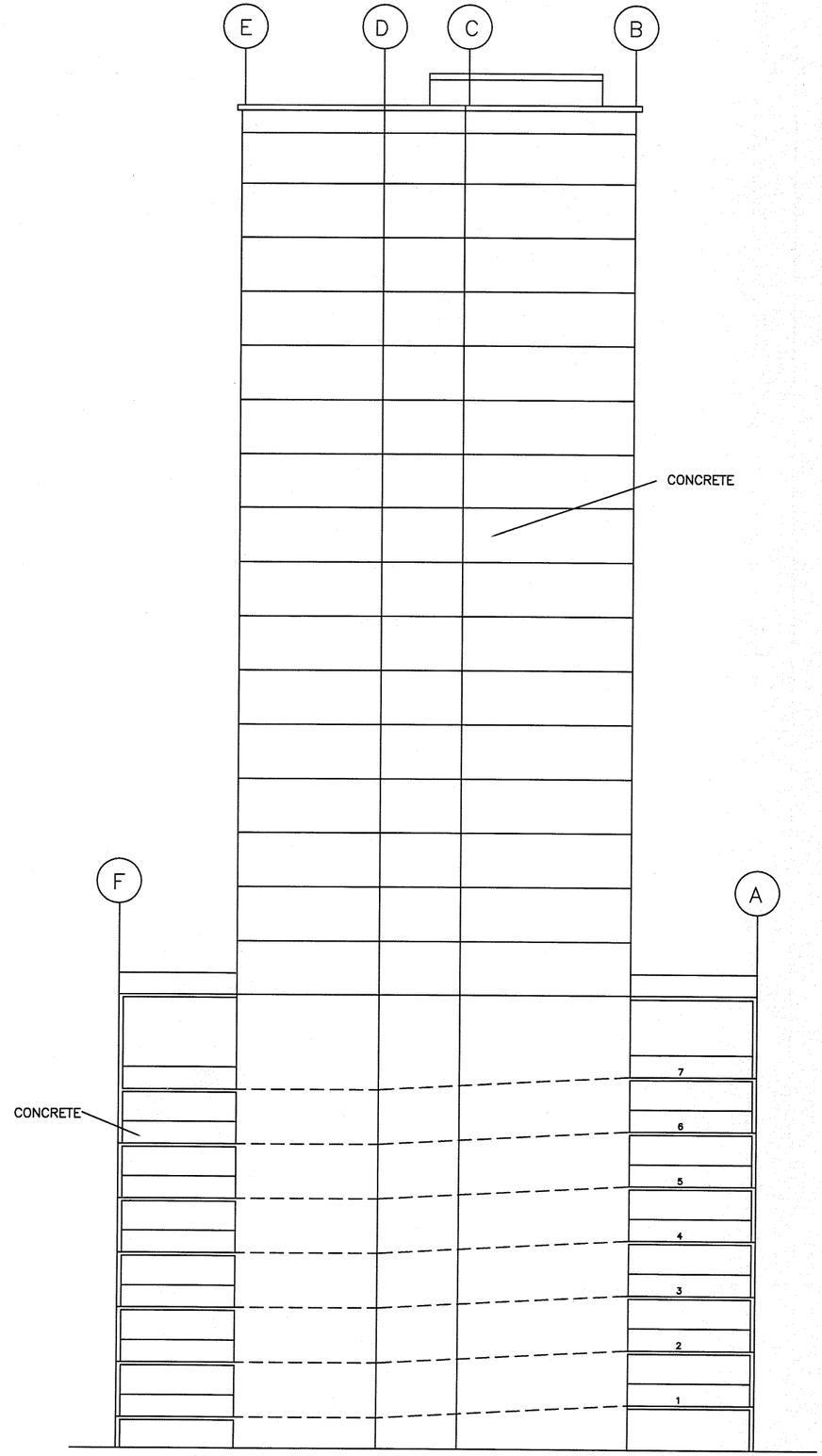
| | KY | KY | |

SHEET

A-4.0




WEST ELEVATION
SCALE:3/32"=1'-0"
5/19/08




EAST ELEVATION
SCALE:3/32"=1'-0"
4/16/08

| NO. | DATE | REVISIONS |
|---|---|---|
| | | |

KAZUTOSHI YATO
LICENSED PROFESSIONAL ARCHITECT
No.3271
HAWAII, U.S.A.
Expiration Date: 4/30/2010

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HOLOMUA
1319 KALAKAUA AVENUE
HONOLULU, HAWAII

EXTERIOR ELEVATION (WEST)

KAZU YATO, AIA & ASSOCIATES
2033 ROOMETOP TERRACE
HONOLULU, HI 96822
TEL: (808) 946-0040
FAX: (808) 955-0052

| DATE | DRAWN | KY | CHECK | KY | FILE | . |
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# Appendix E

# Archaeological Assessment

SCS Project number 921-2

# AN ARCHAEOLOGICAL ASSESSMENT REPORT OF 0.4899-ACRES OF LAND IN MAKIKI, ILI OF PAWA`A, MAKIKI AHUPUA`A, HONOLULU DISTRICT, ISLAND OF O`AHU, HAWAI`I [TMK (1) 2-4-006: 017 AND 018]


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## ABSTRACT

An archaeological Study, including subsurface testing, was conducted on 0.4899-acres of land in Makiki, O`ahu [TMK**:** (1) 2-4-006: 017 and 018]. The Holomua condominiums, which is located on lands recently utilized for commercial purposes, is slated for a single structure residential condominium on these adjoined tax map keys. No Historic properties were present on the surface of the parcel. Representative subsurface testing revealed that all of the excavated trenches were composed of two strata: the lower stratum was partially impacted by past excavations, possibly related to the construction of the structures previously located on the Property, while the upper stratum was composed of imported fill matrices. With the exception of a few pieces of Historic-type debris (glass and ceramic sherds; combined total N=7) recovered from disturbed subterranean contexts and structural demolition debris observed, no archaeological sites were identified. Adequate documentation of the Property has been completed and no further archaeological work is deemed necessary.

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## INTRODUCTION

At the request of Mr. Serge Krivatsy of THM Partners, LLC., Scientific Consultant Services, Inc. (SCS) performed an Archaeological Inventory Survey on 0.4899-acres of land within the *ahupua`a* of Makiki, *`ili* of Pāwa`a, Honolulu District (formerly Kona District), Island of O`ahu, Hawai`i [Tax Map Keys (1) 2-4-006: 017 and 018 (the Property)] (Figures 1 and 2). Fieldwork was conducted on February 7 and 8, 2008 by SCS archaeologists Trisha Drennan, M.Sc., and Guerin Tome, B.A., under the direction of the Principal Investigator Robert L. Spear, Ph.D. Archaeological work was performed in order to investigate the presence or absence of archaeological features and subsurface midden deposits, and to assess the function, age, and construction methods of any features or deposits. Initially, this project was conducted as an Archaeological Inventory Survey; however, because the results of the survey were negative for archaeological sites, the results are being presented in this report as an Archaeological Assessment.

According to the City and County of Honolulu's Real Property Assessment and Tax Billing Information website, the Property is comprised of two tax map key parcels: TMK: (1) 2-4-006: 017 (0.2308-acres) and TMK (1) 2-4-006: 018 (0.2591-acres). The development of the Property has been named as the Holomua condominiums and is comprised of a single structure, high-rise condominium that will contain a minimum of 168 residential units. Utilizing heavy equipment, construction will impact the current ground surface ranging to depths of 1.52 meters (5 feet) to 2.44 meters (8 feet) below surface.

## GEOGRAPHIC SETTING

The Property occurs between 10 and 30 feet above mean sea level along the leeward coast of south Oahu. The main body of the Property is bordered by a combination of a major thoroughfare, commercial and residential lands (Figure 3). Kalakaua Avenue, a frequently trafficked road, is located on the Property's western flank. A 7-Eleven store is located on the southern side [TMK: (1) 2-4-006: 016] of the Property while other commercial entities occupy the east [TMK: (1) 2-4-006: 006 and 004] and north [TMK: (1) 2-4-006: 005] flanks. The north flank of the Property is also shared by a large residential condominium identified as the Kulana Hale. Both tax map keys have a narrow easement that provides access to the main body of the Property from Beretania and Young Streets (see Figure 2).

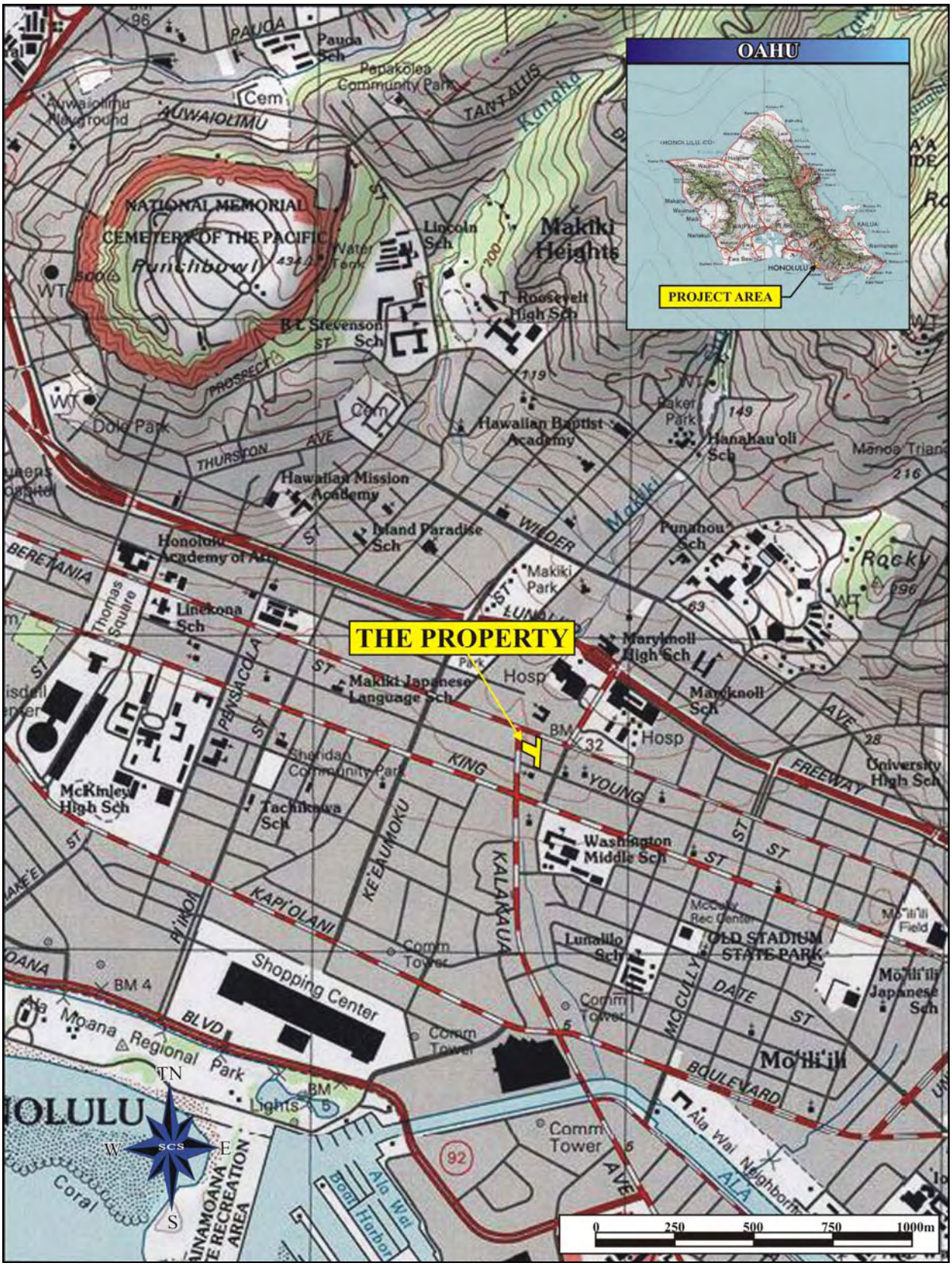


**Figure 1: USGS Honolulu Quadrangle Map Showing Property Location.**

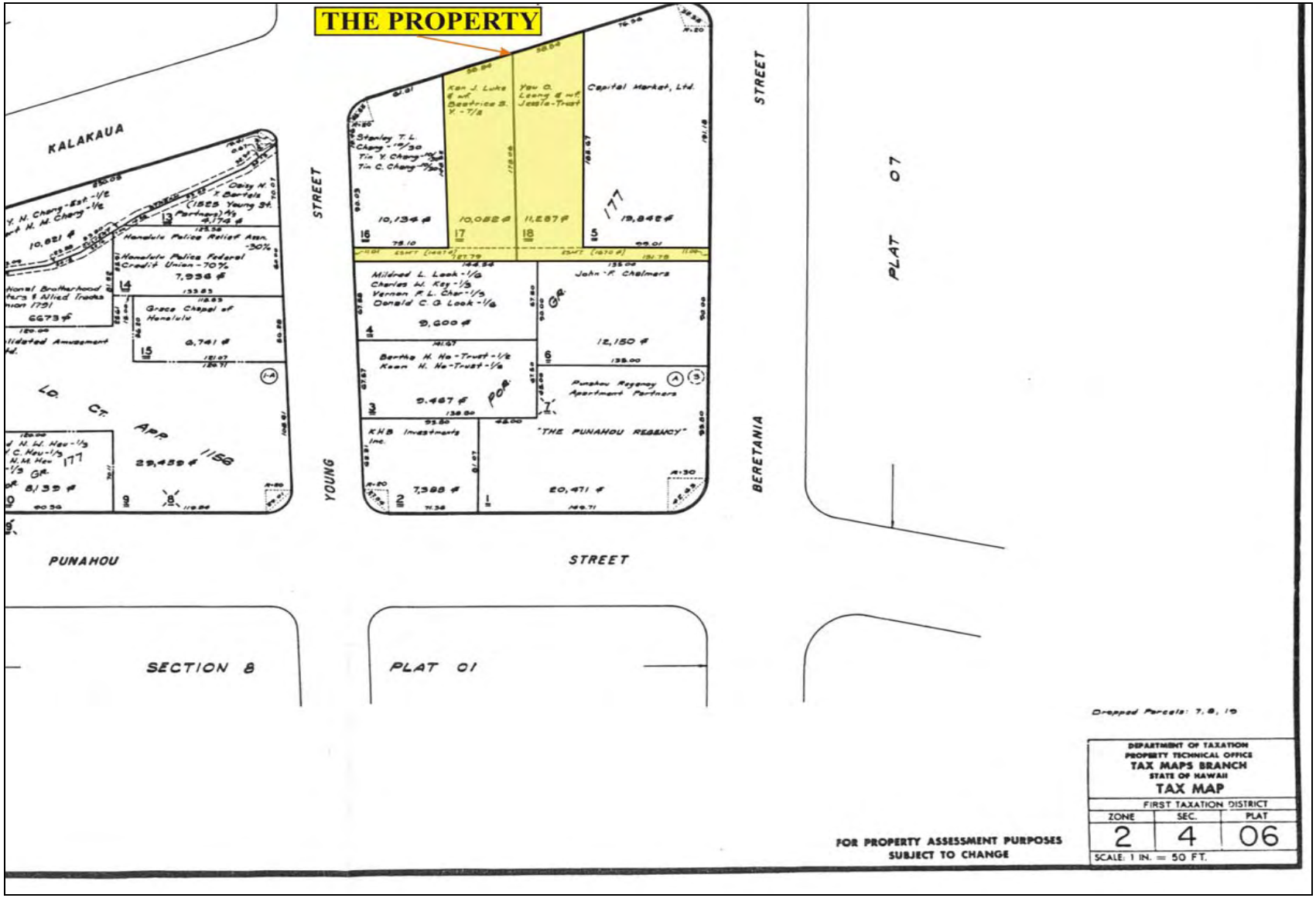


**Figure 2**: **Tax Map Key [TMK] (1) 2-4-006 Showing the Property Location.**

**Figure 3: Google Earth Satellite Image Showing Property Location.**

No natural features exist on the Property as extensive alteration occurred during the demolition process of the commercial structures that occupied the Property prior to being subjected to the current archaeological work. Currently, shrubs and low vegetation cover portions of the Property while other portions are occupied by Jas W. Glover (a local general contracting company) heavy equipment associated with piles of used and unused asphalt—some of which were relocated so the Archaeological Assessment could be conducted (Figure 4).

## PROPERTY SOILS

According to Foote *et al.* (1972:62), the Property is situated within the matrix described as Makiki clay loam (MkA). Makiki clay loam with 0 to 2 percent slopes exists on smooth fans and terraces are also found with rock (basalt) fragments and cinders. Permeability of these soils is moderately rapid with slow runoff and is considered to pose a slight erosional hazard. The acidity of MkA soils is considered medium to strong. Roots in this type of soil can reach to depths of greater than 5 feet.

Subsurface testing of MkA soils within the Property revealed similar but different soil layers (N=2) interpreted as imported matrices (Layer I) with man-made debris (*e.g*., trash) and disturbed *in situ* (Layer II) mixed with non-local material (*i.e.*, calcareous sand). Roots extending into the Property from trees located outside of the Property's west flank were observed, as stated by Foote *et al.* (1972). Unlike the profile done by Foote *et al*. (1972), excavations during the current survey revealed a lack of cinder; only basalt fragments were observed.

## PROPERTY VEGETATION

Displayed on the Property were mainly non-native vegetation that included spiny amaranth (*Amaranthus spinosus*), false mallow (*Malvastrum coromandelianum*), hairy abutilon (*Abutilon grandifolium*), prickly sida (*Sida spinosa*), swollen fingergrass (*Chloris barbata*), sandbur (*Cenchrus echinatus*), little ironweed (*Vernonia cinerea*), coat buttons (*Tridax procumbens*), Flora's paintbrush (*Emilia fosbergii*), garden spurge (*Chamaesyce hirta*), ivy gourd (*Coccinia grandis*), *kili`o`opu* (*Kyllinga nemoralis*), *`uhaloa* (*Waltheria indica*), purslane (*Portulaca oleracea*), *Boerhavia coccinea*, and various other vegetation species. Just outside of the western boundary of the Property, next to Kalakaua Avenue, a tree root system has penetrated the Property and was observed in a few of the excavations that were conducted during the current survey.

**Figure 4: Merged Photographs Showing the Property Over View.**

## CLIMATE

The area in which the Property lies is the dry region of O`ahu's southern area. Rainfall indicators, according to Price (1983:62), relayed that the Property usually receives about 5 inches a year during December and January. Higher elevations within the Makiki Ahupua`a are prone to receive more precipitation due to fog drip and lower temperature climates. Currently, the Property does not receive large amounts of upland wash as the Makiki Stream has been confined to a subterranean contexts—at least where the Property is located. The closest portion of the Makiki Stream that is open-air is located approximately 250 feet to the north. Maps of the late nineteenth century indicate that the Makiki Stream was once open-air and passed where Kalakaua Avenue now lies on the western side of the Property (Figure 5).

## SETTLEMENT PATTERN AND LAND USE PERIOD

The presentation of general *ahupua`a* settlement patterns is varied given that many theories suggested in Hawaiian archaeology have geographic and topographic aspects taken into consideration when determining *ahupua`a* settlement patterns. *Ahupua`a* land divisions vary in size but generally encompass land from the mountain to the sea, thereby allowing access to marine and mountain resources. For more discussions regarding general *ahupua`a* settlement patterns, please consult Kirch (1985) and Cordy (1974a; 2002:8). In lieu of a presenting a general *ahupua`a* settlement pattern, a settlement pattern—one that utilizes historical (*i.e.*, post-1778 Western Contact) and oral documentation with archaeological documentation—is compiled in this report with regards to the *ahupua`a* of Makiki within which the Property is situated.

The settlement pattern, and timing of land utilization, may be conveniently (and arbitrarily) divided into several general periods: pre-Contact settlement, the early Historic period/early post-Contact, the recent Historic, and present land use. Together, these periods create a synthesis of land use in and near the Property as well as provide a basis on which researchers explored succinct research questions during reconnaissance and sampling work.

## ORAL HISTORY

In *Place Names of Hawaii*, Pukui *et al.* (1974: 182) offer the following: Pāwa`a, the *`ili* (smaller than *ahupua`a* land division), translates literally as "canoe enclosure". Although there are many interpretations regarding the meaning of the name for the area in which the Property is situated, none could be more substantiated than another. Drennan (2007) suggests that "One interpretation of this name is that canoes were brought from the sea by canal up to this area." Makiki, the *ahupua`a,* may refer to "a type of stone used as weights for octopus lures" (*ibid.*142). The oral interpretations of Pāwa`a and Makiki obtained from Pukui *et al.* (1974)

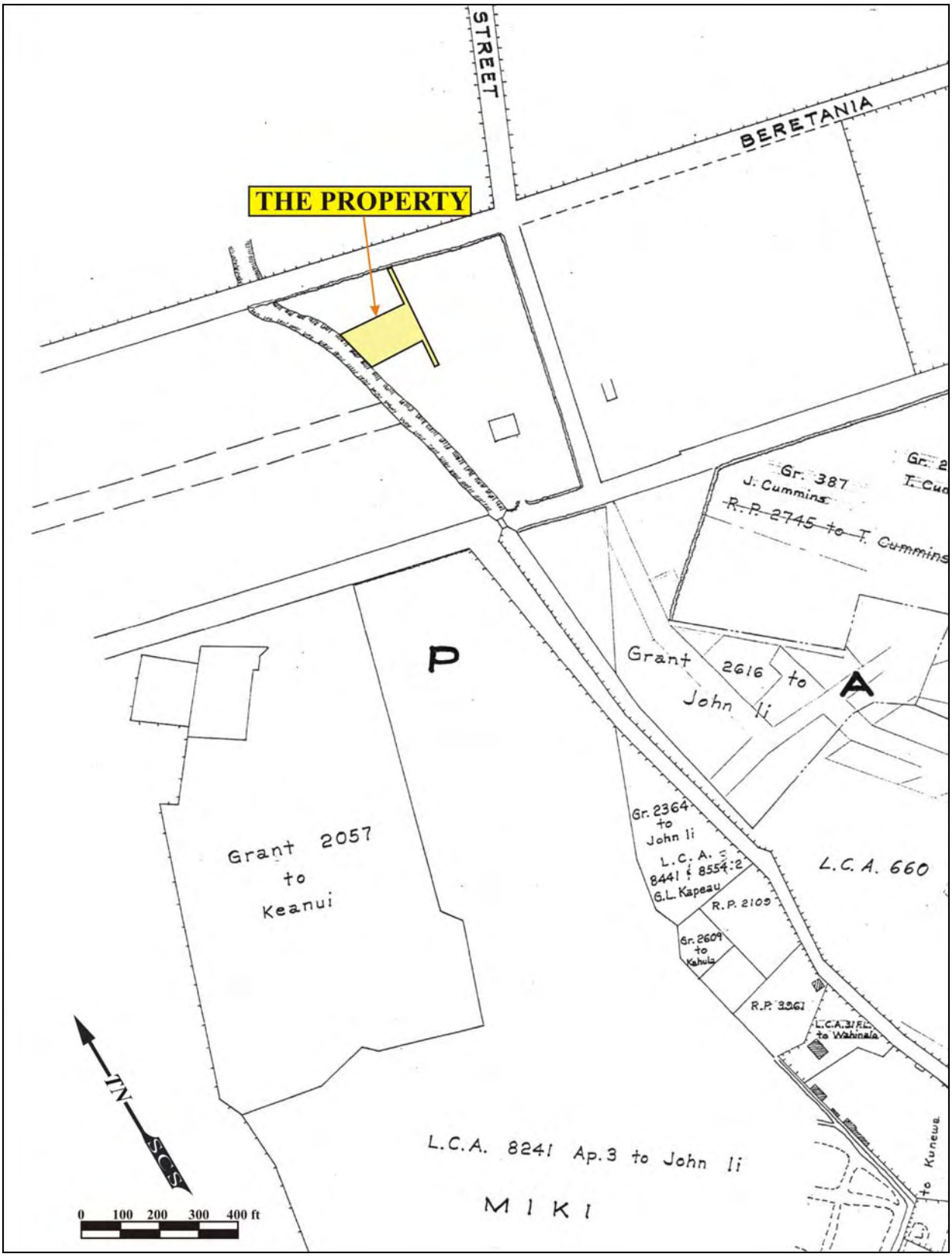


**Figure 5: Ca. 1881 Map of Waikiki Showing Open-Air Makiki Stream Near the Property.**

remain consistent with seafaring and water dependent subsistence strategies, and further suggest that the area in which the Property is located might have had some type of connection with such water-type activities. However, given the geographic location of Pāwa`a and Makiki, it would seem unlikely that such activities associated with seafaring and associated subsistence strategies (*e.g.*, fishing and seafood collecting) were conducted. The more likely reason for such translations could be attributed to folks of those communities that conducted such activities rather than brought those activities to the area specific.

In *Sites of Oahu*, Sterling and Summers (1978) offer a compendium of Traditional archaeological sites, place names, legends, and oral history from pre-Contact to early Historic times, and list three brief stories regarding use of areas *mauka* of the Property (Papakolea, Mauna-laha, and Pauoa) (*ibid*:290). Two of these three stories include geological features (*i.e.*, stones) which are unknown today if they were included into the Hawaiian archaeological record as archaeological sites. Excluding the single landmark (Pohaku-o-Papakolea), two of these stories are located in named, but vague locations.

**EARLY TO MID-HISTORIC PERIOD**

Initial research utilizing the Property tax map did not reveal the presence of Land Commission Awards (LCA) within the Property. However, the Property is a part of Land Grant 177 (see Figure 2 and Appendix A). According to Waihona `Aina, an on-line database of Hawaiian landholdings, Land Grant 177 was purchased by Peter J. Gulick in 1849 for $61.50. Oddly, documentation for Land Grant 177 includes only 3 tax map keys (TMK 1-2-8-02, 1-2-8-03, and 1-2-4), none of which correspond with the location of the Property. However, there is mention in the grant document that states “King & Beretania sts” which partially corresponds with the Property location. TMK (1) 2-4-006 relays that 2 portions of Land Grant 177 exist; one is located at the northwest corner of the King and Punahou Street intersection, while the other portion is bounded by Kalakaua Avenue, Beretania, Punahou, and Young Streets. In any case, the grant document did not give insight as to what type of activities occurred on the land (*i.e.*, where the Property is situated) at the time of the purchase by Mr. Gulick.

Land Grant 177 aside, there are at least six LCA within a quarter-mile radius of the Property (Table 1). The utilization of these particular LCA was identified as house lots (some with auxiliary type features such as travel paths, walls/fences and mammals) rather than the agricultural-type subsistence (*e.g.*, the growing of sweet potato and taro) that Handy and Handy (1972) had gleaned from various resources that include observers such as Otto von Kotzebue and Abraham Fornander who documented the landscapes of the greater Honolulu area during the 1800s and the early 1900s.

**Table 1: Land Commission Awards within a Quarter-mile of TMK (1) 2-4-006: 017 and 018.**

| GENERAL TMK | LCA NUMBER | CLAIMANT NAME | LCA UTILIZATION |
|---|---|---|---|
| (1) 2-3-026 | 264 | Thomas Cummings | House Lot |
| (1) 2-8-011 | 387 | American Board of Commissioners for Foreign Missions | Unknown; not stated |
| (1) 2-4-005 | 529 | George Hyatt | House Lot |
| (1) 2-3-018 | 3134 | William Hodge | House Lot |
| (1) 2-4-005 | 3135 | James Walker | House Lot, Road/Path, Wall/Fence |
| (1) 2-4-005 | 3727 | Manuwai | House Lot, Road/Path, Mammals |

The type of agriculture that took place in the greater plains of Honolulu was predominantly identified as taro where land conditions (*i.e.*, alluvial fans) were ideal for such a crop relays F.J.F Meyen in Handy and Handy (1972:479). Kotzebue in Handy and Handy (1972) also commented on the valleys upslope of the plains stating that:

> Woajoo is the most fertile of the Sandwich Islands, from which Owhyee receives a part of the taro necessary for its consumption. The cultivation of the valleys behind Hanarura is remarkable; artificial ponds support, even on the mountains, the taro plantations, which are at the same time fish ponds; and all kinds of useful plants are cultivated on the intervening dams.

Handy and Handy (1972) also contributes by commenting on the sweet potato cultivation upslope of the Property.

> The steep cinder-covered sides of Round Top and Makiki Heights were famous for their sweet-potato plantations. The old Hawaiian name for this area was `Ulalaka`a meaning 'Rolling-sweet-potato'....Kamehameha revived the use of this locality for sweet-potato cultivation….Sweet potatoes flourish in volcanic cinders, with a little infiltration of humus, and in crumbling lava.

The documentation of oral history provided by several nineteenth observers suggests that taro and similar crops could have been cultivated in the Property given the close proximity to Makiki Stream. Although the presence of nearby LCAs suggests that houses dotted the area during the mid-1800s, it seems the dominant, at least the most visible, activity surrounding and including the Property would be agriculture.

## TWENTIETH CENTURY AND CURRENT LAND USE

Post-purchase of the Land Grant 177 in 1849, no documents were found regarding land transfer of TMKs (1) 2-4-006: 017 and 018 until those created during the mid-twentieth Century (Appendix B). According to documents found in the Tax Maps Branch of the State of Hawaii Department of Taxation Property Assessment Division, TMK (1) 2-4-006: 017 (10,052 square feett) was owned by Yau King Kau who sold it in 1946 to Kan Jung Luke and his wife Beatrice Sung Yee. No further transactions are listed until 1968, when Chinn Ho and his spouse Betty Ching had a quitclaim deed and relinquished their Property rights to the same people who bought the Property from Yau King Kau (*i.e.*, Kan Jung Luke and his wife Beatrice Sung Yee). The tax maps branch history sheet did not previously identify Chinn Ho and his spouse being owners of TMK (1) 2-4-006: 017. In any case, the 1968 land transaction seemed to be the last transaction found in the Tax Maps Branch of the Property Assessment Division. According to the City and County of Honolulu's Real Property Assessment and Tax Billing Information website, the current land owner of TMK: (1) 2-4-006: 017 is Geneva Commons LLC of Santa Ana, California.

Like TMK (1) 2-4-006: 017, TMK (1) 2-4-006: 018 had a similar situation regarding documentation of land transfer ownership; no documentation was available regarding the transfer of land from P. Gulick to the second documented owner identified as Yau On Leong and his wife Jessie S. During the 1960s, Yau On Leong and his wife Jessie S. conducted several transactions with Cooke Trust Company LTD, *et al*. Chinn Ho and his wife in 1968 had a quitclaim deed and relinquished their Property rights to Yau On Leong and spouse Jessie. Again, the tax maps branch history sheet did not previously identify Chinn Ho and his spouse being owners of the TMK (1) 2-4-006: 018. At an unknown point in time following the 1968 transaction by Chinn Ho, Geneva Commons LLC acquired the 11,287 square foot TMK.

## PREVIOUS ARCHAEOLOGY

As stated, no previous archaeological studies have been conducted on the Property. However, the following is a sample of archaeological studies conducted within the *ahupua`a* of Makiki. Figure 6 shows the location of these studies discussed below.

McAllister (1933), who conducted one of the earliest O`ahu archaeological surveys utilizing resources such as T.G. Thrum, J.F.G. Stokes, A. Fornander, and W.D. Westervelt, recorded no archaeological sites in or in the immediate vicinity of the Property. His sources, however, did relay abundant information regarding various locations *mauka* and *makai* of the Property. Kirch (1985), in his classic study of Hawaiian archaeology, also had no specific mention to the Property locale.

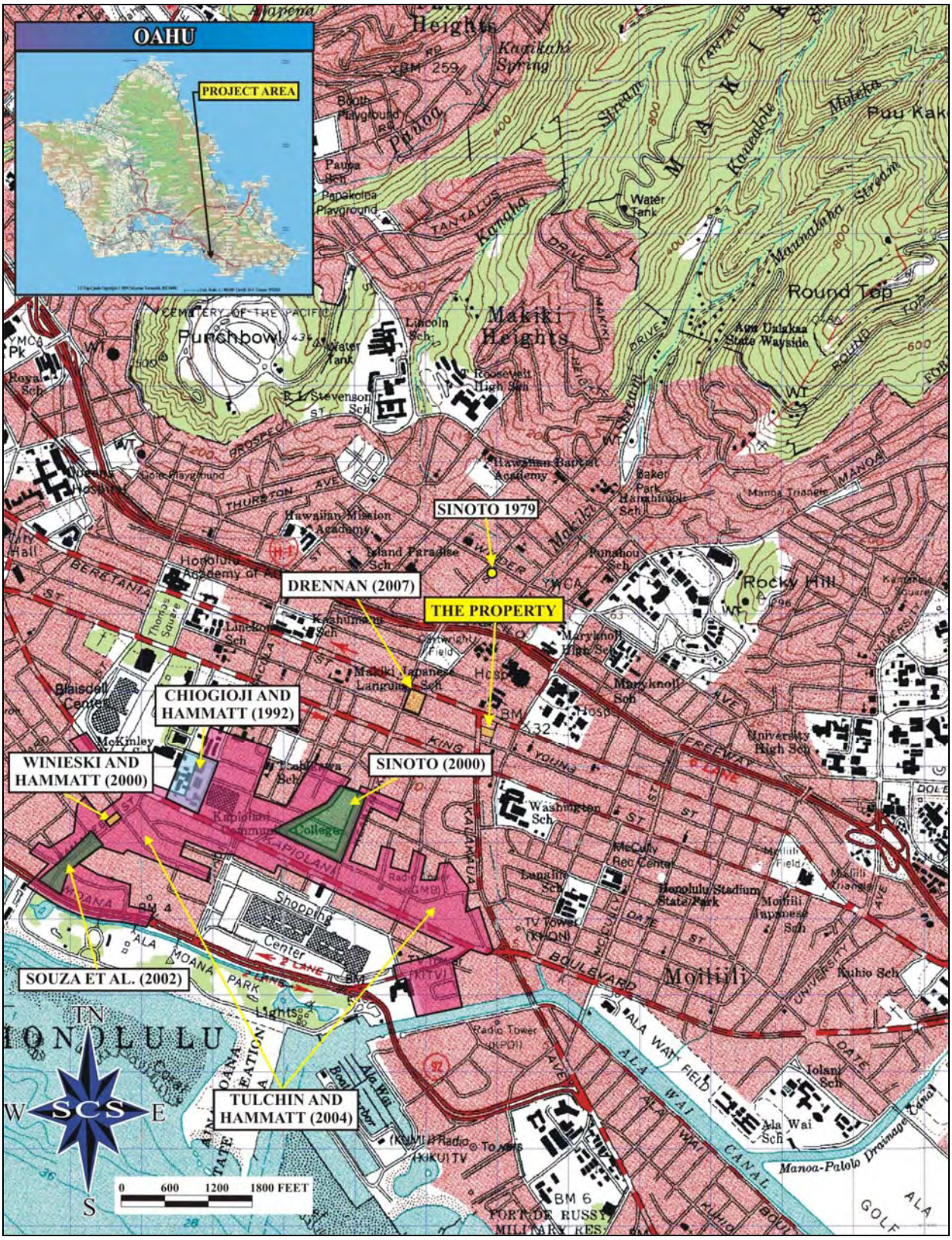


**Figure 6: USGS Honolulu Quadrangle Showing Locations of Selected Archaeological Sites**.

Tulchin and Hammatt (2004) conducted background research and a field inspection of multiple parcels bounded by Ala Moana Beach Park to the south, Ward Avenue to the northwest, Kalakaua Avenue to the east, and King Street to the north. Their research suggests this general area was an extensive wetland in Traditional times, utilized by Native Hawaiians for fishponds and wetland agriculture. Rice farming was introduced in the later nineteenth century. Dredging and filling of this area was conducted in the early twentieth century. Traditional Period native Hawaiian burials have been documented within Tulchin and Hammatt's study area.

Drennan (2007) conducted an Archaeological Inventory Survey on TMK: (1) 2-4-005: 026 and 027, approximately 300 meters to the west of the Property. The results of that study revealed a single Historic site (State Site 50-80-14-6909) that was relatively dated via glass artifacts (primarily bottles and jars) from the late nineteenth to the mid-twentieth centuries.

Human remains and burials have been documented in several other nearby studies, including the following:

- Sinoto (1979) reported on two burials discovered inadvertently in trenching operations at TMK: (1) 2-4-022: 001 labeled the "Makiki Hawaiian Sugar Planters' Association Experiment Station Burials". Two individuals were found buried in an early Historic context, in dark brown clay loam. The site was designated State Inventory of Historic Places No. 50-80-14-2298 (also known as '50-Oa-A5-7' in the B.P. Bishop Museum's numbering system). Site -2298 is located just *mauka* of the H-1 Interstate Highway, between Keeaumoku Street, the H-1, Makiki Street, and Wilder Avenue, and is north of the Property.

- Jourdane (1997) documented several burials located in the vicinity of TMK: (1) 2-5-004: 010 in Mānoa.

- Sinoto's (2000) Archaeological Assessment of the 10.5-acre proposed Wal-Mart/Sam's Club Development Area along Keaaumoku Street (TMK: (1) 2-3-16: 009, 012, and 042) included background research and field inspection, but no subsurface testing. Subsequent Archaeological Monitoring resulted in the recovery of several dozen Traditional Period native Hawaiian burials. The results of this on-going project have not been finalized.

- Winieski and Hammatt (2000) documented two Historic Period coffin burials (State Sites 50-80-14-5598) on Kamakee Street between the intersections of Kawaiahao and Waimanu Streets. These adjacent burials were found in a natural (undisturbed) beach sand deposit, which was located under an old ground surface 'A' horizon, and construction fill and pavement.

- Souza *et al*. (2002) documented three burials in Kaka`ako (State Sites 50-80-14-6376, -6377, and -6378).

The historical documentations of the nineteenth and early twentieth centuries, combined with sampled archaeological studies, provide much some insight into the nature of Traditional and historical activities occurring within and near the Property. Through past archaeological research, oral traditions, and historical records, the chronology and settlement pattern of the Makiki *ahupua`a* may be brought into focus.

Generally speaking, the Property is situated in the mid-section of the Makiki *ahupua`a*, where agricultural-type activities (Traditional to early Historic times) would have likely been pursued. Although sporadic, the presence of residential houses in Historic times marked the transition of the area from such activities to urbanization while simultaneously establishing random loci of human burial plots. Previously intact Traditional-type archaeological features (*i.e.*, *heiau*, enclosures, platforms, walls, and including forgotten burial locations) would likely have been adversely impacted during the urbanization thereby giving way to the irrevocable loss of such cultural resources.

**EXPECTED FINDINGS**

The Property was expected to be dominated by introduced fill layers, especially in the upper portions of the stratigraphy given the presence of above ground structures shown in Google Earth (2008) aerial photographs taken prior to the current archaeological study. Below these fill layers, late nineteenth century maps that provided documentation of the once open-aired Makiki Stream on the western flank of the Property suggested natural deposits could be intact in the form of stream-type debris (basalt cobbles and pebbles). Documentation of oral history provided by several nineteenth observers relayed that taro and similar crops could have been cultivated in the Property given the close proximity to the Makiki Stream. Human burials were not expected to be found during the current archaeological study also based on the same presumption. Land Commission Awards in the vicinity of the Property also relayed use of various land plots as house lots. The presence of such cultivation practices may have remained in the form of agricultural-type soils (*i.e.*, soils that retain charcoal remnants). Historic artifacts (*e.g.*, ceramic and bottle glass sherds) are also expected during excavation of the Property due to the various change of ownership during the mid-twentieth century.

# METHODOLOGY

## FIELD METHODOLOGY

Fieldwork was conducted on February 7 and 8, 2008 by SCS archaeologists Trisha Drennan, M.Sc., and Guerin Tome, B.A., under the direction of the Principal Investigator Robert L. Spear, Ph.D.

Multiple field tasks were completed during the field survey. First, a pedestrian survey was conducted in order to identify archaeological sites and assess Property geographical features. Second, vegetation within the Property was identified using Whistler (1995). Interval spacing of five meters between SCS personnel was employed to ensure adequate coverage of the Property during the survey. Finally, mechanically excavated stratigraphic trenches (ST) were placed in order to locate and subsurface archaeological deposits. These stratigraphic trenches were placed on a contractor provided plan view map showing the sampled horizontal area within the Property confines. Soil stratigraphy encountered during excavation was documented utilizing metric graph paper and United States Department of Agriculture (USDA) *Munsell Soil Color Charts*. All measurements were recorded in metric. If found, portable archaeological materials—soils sampled included—were collected and recorded with applicable provenience and placed in plastic and paper bags for laboratory analysis.

## LABORATORY METHODOLOGY

All field notes, digital photographs, and collected archaeological materials (including those materials suspected of being archaeological in nature) were curated at the SCS laboratory in Honolulu. All stratigraphic profiles have been drafted for presentation within this report. Representative plan view sketches showing location and morphology of identified sites/features/deposits were illustrated. All retrieved artifacts were cleaned, sorted, and analyzed. All metric measurements and weights were also recorded for quantitative analysis. All data were clearly recorded on standard laboratory forms.

# FIELDWORK RESULTS

The current archaeological investigation did not identify any archaeological sites through pedestrian survey or subsurface testing. The two areas that were unable to be excavated were the two asphalt alleys that are currently utilized as driveways and are considered crucial to the current operation of the Property and nearby businesses. The presence of used and new asphalt piles and heavy equipment on the Property did not hamper archaeological investigations. Nine stratigraphic trenches were strategically placed in order to investigate the subsurface deposits of the Property. The trenches revealed two stratigraphic layers. Demolition debris from previous

commercial structures was present within Layer I for all stratigraphic trenches placed throughout the Property (Figure 7).

Layer II, with some variation, was generally the same throughout the sampled Property which suggests the disturbance of the *in situ* soil was selective (*i.e.*, excavation for the Property's previous above structures occurred at pre-selected areas rather than the entire Property being excavated down to grade). Layer II provided no cultural material (modern debris included). Thus, excavation terminated. A total of seven Historic-type artifacts (six ceramic sherds and 1 glass sherd) were recovered from trench backfill piles. These artifacts were analyzed, digitally photographed and are displayed in this report within Appendix C. Table 2 summarizes the general results of the nine stratigraphic trench excavations below followed by detailed excavation matrix descriptions. Since the nine stratigraphic trenches contained relatively similar strata, only one representative photograph and stratigraphic profile (ST-9) will be utilized in this report to portray strata found in the Property.

**STRATIGRAPHIC TRENCH 1 (ST-1)**

ST-1 was placed in the northwest quadrant of the Property on an area that was relatively level. The ground surface, which has been altered via mechanical means as a result of demolition activities, is partially covered by low vegetation and basalt gravel. The excavation of ST-1 revealed a total of two strata. Layer I (0–125 cmbs) was a semi-compact, very fine to very coarse crumbly structured, dark brown (10YR 3/3, moist) silty clay loam with approximately 20 percent of its matrix composed of imported basalt gravel and cobble fill. Modern debris such as metal, glass, and a red clay pipe fragment (probable pottery sherd) was observed coming from the excavation of Layer I. A sampled stratigraphic profile of the trench's west wall suggested that Layer I was the most impacted of the two strata within the trench due to the presence of imported material (*i.e.*, basalt gravel) and modern debris. Layer II (125–191 cmbs) was a compact, very fine to coarse crumbly structured, dark yellowish brown (10YR 3/4, moist) silty clay with approximately 10 percent of its matrix comprised of imported basalt cobbles. The lack of cultural material (modern debris included) suggests that Layer II had not been impacted and could therefore be considered as having not been disturbed. Thus, excavation was terminated.

**STRATIGRAPHIC TRENCH 2 (ST-2)**

Like ST-1, ST-2 was placed on the Property's northwest quadrant slightly perpendicular to the south of ST-1, in an area that was considered relatively level and covered by imported basalt gravel. The excavation of ST-2 revealed a total of two strata. Layer I (0–87 cmbs) was a semi-compact, very fine to very coarse crumbly structured, mottled dark brown (7.5YR 3/2, moist)

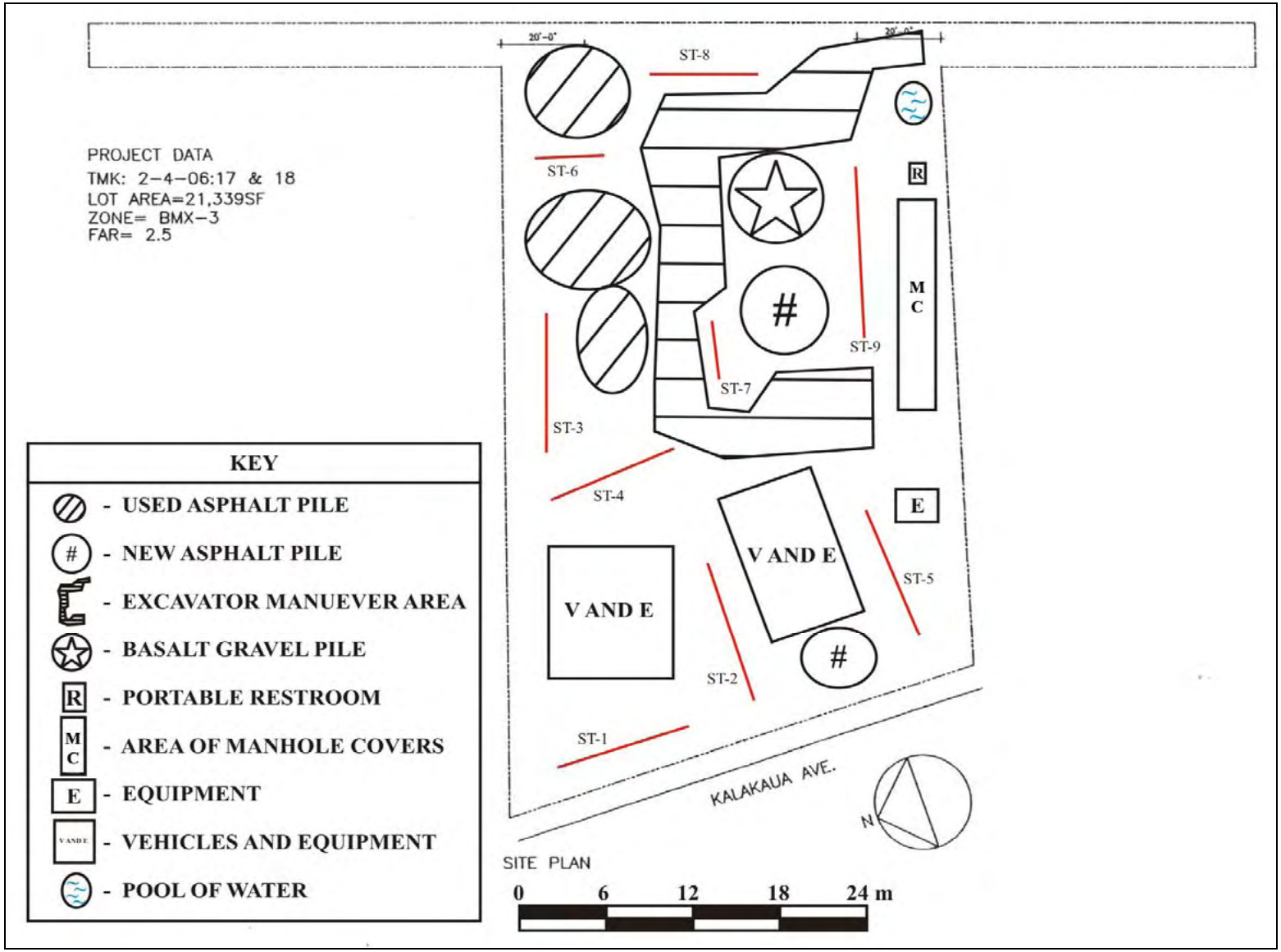


**Figure 7: Property Plan View Map Showing Locations of Stratigraphic Trenches and Various Obstacles.**

**Table 2: Summary of Stratigraphic Trenches Excavated on TMK: (1) 2-4-006: 017 and 018.**

| Unit | Orientation (magnetic) | Horizontal Dimensions (m) | Maximum Depth (m) | Strata Amount | Archaeological Material Observed | Additional Comments |
|---|---|---|---|---|---|---|
| ST-1 | 170/350° | 9.4 x 0.45 | 1.87 | 2 | None | Layer I contains modern debris, Layer II not disturbed |
| ST-2 | 88/268° | 10.0 x 0.45 | 1.50 | 2 | None | Layer I contains modern debris, Layer II not disturbed |
| ST-3 | 106/286° | 10.5 x 0.45 | 1.55 | 2 | None | Layer I contains modern debris, Layer II not disturbed |
| ST-4 | 151/331° | 9.5 x 0.45 | 2.00 | 2 | 3 Porcelain cup sherds | Layer I contains modern debris, Layer II not disturbed |
| ST-5 | 78/258° | 10.1 x 0.45 | 1.70 | 2 | 3 Porcelain bowl sherds | Layer I contains modern debris, Layer II contains calcareous sand inclusions |
| ST-6 | 175/355° | 5.1 x 0.45 | 1.55 | 2 | None | Layer I contains modern debris, Layer II not disturbed |
| ST-7 | 81/261° | 5.0 x 0.45 | 1.43 | 2 | None | Layer I contains modern debris, Layer II not disturbed |
| ST-8 | 10/190° | 8.0 x 0.45 | 1.60 | 2 | None | Layer I contains modern debris, Layer II not disturbed |
| ST-9 | 99/279° | 12.0 x 0.45 | 1.60 | 2 | 1 Bottle Glass Sherd | Layer I contains modern debris, Layer II contains calcareous sand inclusions |

silty clay loam and dark brown (10YR 3/3, moist) clay silt with sub-rounded basalt pebble pockets and vegetative roots (< 2 mm diameter). Layer I also contained modern debris such as glass, metal (*e.g.*, subsurface utility pipes, copper wire), and white tile. A few sub-rounded basalt cobbles were also observed within Layer I. Mirroring the stratigraphic profile of ST-1, the sampled stratigraphic profile of the trench's north wall suggested that again, Layer I was the more impacted of the two exposed strata due to the presence of imported material and modern debris. Layer II (87–163 cmbs) was a compact, very fine to coarse crumbly structured, dark brown (10YR 3/3, dry) clay silt. The lack of cultural material (modern debris included) suggests that Layer II had not been impacted and could therefore be considered as having not been disturbed. Thus, excavation was terminated.

**STRATIGRAPHIC TRENCH 3 (ST-3)**

ST-3 was placed in the north-half of the Property, near the Property's north boundary specifically in an area that was considered relatively level and covered by imported basalt gravel. The excavation of ST-3 revealed a total of two strata. Layer I (0–85 cmbs) was a semi-compact, very fine to very coarse crumbly structured, mottled dark brown (7.5YR 3/2, moist) silty clay loam and dark brown (10YR 3/3, moist) clay silt with sub-rounded basalt pebble pockets and vegetative roots (< 2 mm diameter). Layer I also contained a piece of copper wire and a few sub-rounded basalt cobbles. The sampled stratigraphic profile of the trench's south wall suggested that Layer I was the more impacted of the two exposed strata due to the presence of imported material and modern debris. Layer II (85–155 cmbs) was a compact, very fine to coarse crumbly structured, dark brown (10YR 3/3, dry) clay silt. The lack of cultural material (modern debris included) suggests that Layer II had not been impacted and could therefore be considered as having not been disturbed. Thus, excavation was terminated.

**STRATIGRAPHIC TRENCH 4 (ST-4)**

ST-4 was placed on the Property's northwest quadrant west of ST-3 specifically in an area that was considered relatively level and covered by imported basalt gravel. The excavation of ST-4 revealed a total of two strata. Layer I (0–100 cmbs) was a semi-compact, very fine to very coarse crumbly structured, mottled dark brown (7.5YR 3/2, moist) silty clay loam and dark brown (10YR 3/3, moist) clay silt with sub-rounded basalt pebble pockets and vegetative roots (< 2 mm diameter). Layer I also contained metal (*e.g.*, iron/steel pipe, wire for concrete, a modern spoon and fork) and a few sub-rounded basalt cobbles. The sampled stratigraphic profile of the trench's north wall suggested that Layer I was the more impacted of the two exposed strata due to the presence of imported material and modern debris. Layer II (100–180 cmbs) was a compact, very fine to coarse crumbly structured, dark brown (10YR 3/3, dry) clay silt. The lack

of cultural material (modern debris included) suggests that Layer II had not been impacted and could therefore be considered as having not been disturbed. Thus, excavation was terminated. Three porcelain cup sherds were recovered from the trench backfill, unfortunately from unknown proveniences within ST-4. A definitive conclusion by the SCS Laboratory analysis regarding if these ceramic sherds were indeed archaeological in nature (*i.e.*, greater than 50 years old) could not be reached as these type of sherds can be found in modern trash contexts.

**STRATIGRAPHIC TRENCH 5 (ST-5)**

ST-5 was placed on the Property's southwest quadrant specifically on an area that was considered relatively level and covered by imported basalt gravel. The excavation of ST-5 revealed a total of two strata. Layer I (0–120 cmbs) was a semi-compact, very fine to very coarse crumbly structured, mottled dark brown (7.5YR 3/2, moist) silty clay loam and dark brown (10YR 3/3, moist) clay silt with sub-rounded basalt pebble pockets and vegetative roots (< 2 mm diameter). Layer I produced a piece of concrete with rebar, likely a piece of foundation from the structure that was previously on the Property prior to the Archaeological Inventory Survey. The sampled stratigraphic profile of the trench's south wall suggested that Layer I was the more impacted of the two exposed strata due to the presence of imported material and modern debris. Layer II (120–170 cmbs) was a compact, very fine to coarse crumbly structured, dark yellowish brown (10YR 3/4, moist) sandy clay silt. The presence of the sand (calcareous-type) inclusions suggests that Layer II was affected by excavation for structures previously located on the Property. Due to the lack of cultural material within Layer II, excavation terminated. Like ST-4, three porcelain cup sherds were recovered from the trench backfill, unfortunately from unknown proveniences within ST-5. A definitive conclusion by the SCS Laboratory analysis regarding if these ceramic sherds were indeed archaeological in nature (*i.e.*, from the Historic Period) could not be reached as these type of sherds can be found in modern trash contexts. However, the various designs and colors of these particular artifacts suggest a Chinese theme and as such, are suspected of being archaeological in nature rather than those ceramic sherds found in ST-4.

**STRATIGRAPHIC TRENCH 6 (ST-6)**

ST-6 was placed on the Property's northeast quadrant specifically in an area that was considered relatively level and covered by waste asphalt removed from Young Street and placed on the Property. The excavation of ST-6 revealed a total of two strata. Layer I (0–82 cmbs) was a semi-compact, very fine to very coarse crumbly structured, mottled dark brown (7.5YR 3/2, moist) silty clay loam and dark brown (10YR 3/3, moist) clay silt with sub-rounded basalt pebble pockets and vegetative roots (< 2 mm diameter). Other than the demolition debris on the surface

of ST-6, Layer I produced no cultural material. The sampled stratigraphic profile of the trench's west wall suggested that Layer I was the more impacted of the two exposed strata, due to the presence of imported material. Layer II (82–155 cmbs) was a compact, very fine to coarse crumbly structured, dark brown (10YR 3/3, dry) clay silt. The lack of cultural material (modern debris included) suggests that Layer II had not been impacted and could therefore be considered as having not been disturbed. Thus, excavation was terminated.

**STRATIGRAPHIC TRENCH 7 (ST-7)**

ST-7 was placed on the middle portion of Property next to two piles of basalt gravel and new asphalt in an area that was considered relatively level and covered by imported basalt gravel. The excavation of ST-7 revealed a total of two strata. Layer I (0–80 cmbs) was a semi-compact, very fine to very coarse crumbly structured, mottled dark brown (7.5YR 3/2, moist) silty clay loam and dark brown (10YR 3/3, moist) clay silt with sub-rounded basalt pebble pockets and vegetative roots (< 2 mm diameter). Layer I produced a piece of copper wire, plastic, glass, aluminum foil and basalt gravel and mixed matrices. The sampled stratigraphic profile of the trench's south wall suggested that Layer I was the more impacted of the two exposed strata, due to the presence of imported material. Layer II (80–153 cmbs) was a compact, very fine to coarse crumbly structured, dark brown (10YR 3/3, dry) clay silt. The lack of cultural material (modern debris included) suggests that Layer II had not been impacted and could therefore be considered as having not been disturbed. Thus, excavation was terminated.

**STRATIGRAPHIC TRENCH 8 (ST-8)**

ST-8 was placed in the eastern half of the Property, south of the waste asphalt pile located near the northeast corner in an area that was considered relatively level and covered by a degrading asphalt surface. The excavation of ST-8 revealed a total of two strata. Layer I (0–62 cmbs) was a semi-compact, very fine to very coarse crumbly structured, mottled dark brown (7.5YR 3/2, moist) silty clay loam and dark brown (10YR 3/3, moist) clay silt with sub-rounded basalt pebble pockets and vegetative roots (< 2 mm diameter). The excavation of Layer I revealed that an intermittent layer of crushed coral was laid under the current asphalt surface. In addition to the crushed coral, modern debris (*e.g.*, metal) was also observed coming from Layer I contexts. The sampled stratigraphic profile of the trench's east wall suggested that Layer I was the more impacted of the two exposed strata due to the presence of imported material. Layer II (62–145 cmbs) was a compact, very fine to coarse crumbly structured, dark brown (10YR 3/3, dry) clay silt. The lack of cultural material (modern debris included) suggests that Layer II had not been impacted and could therefore be considered as having not been disturbed. Thus, excavation was terminated.

**STRATIGRAPHIC TRENCH 9 (ST-9)**

ST-9 was placed on the southeast quadrant of the Property just south of the new asphalt and gravel piles in an area that was considered relatively level and covered by imported basalt gravel. The excavation of ST-9 revealed a total of two strata (Figures 8 and 9).

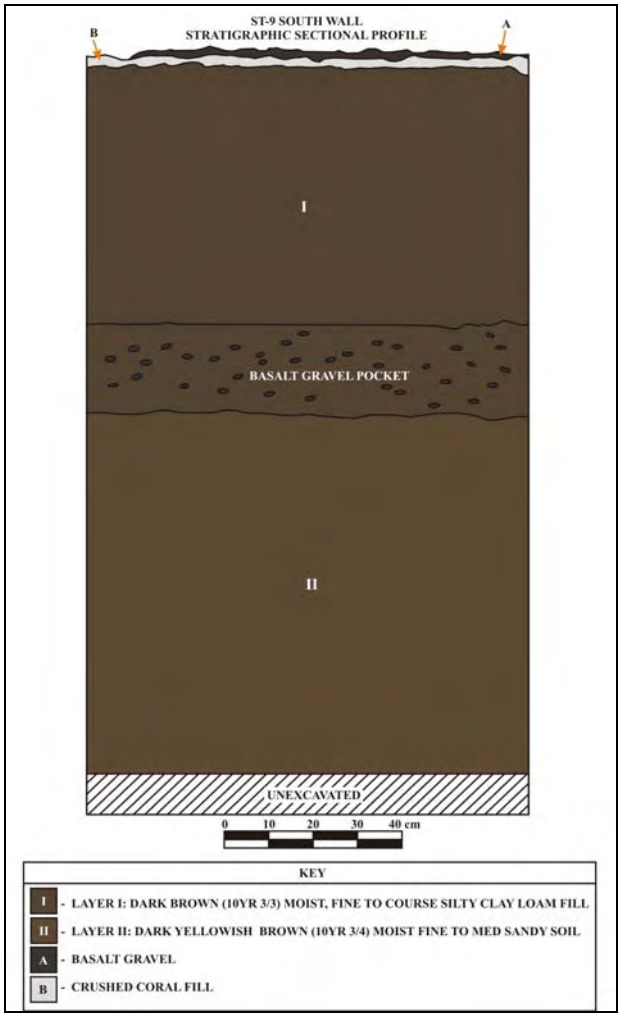


**Figure 8: ST-9 South Wall Stratigraphic Sectional Profile Drawing.**

Layer I (0–80 cmbs) was a semi-compact, very fine to coarse crumbly structured, dark brown (10YR 3/3, moist) silty clay loam that contained pockets of imported basalt gravel. The excavation of Layer I revealed the presence of modern debris such as metal (*e.g.*, wire, a pipe), glass, and a 10 percent composition of small-to-medium sized sub-rounded basalt cobbles. The excavation of Layer I also revealed that an intermittent layer of crushed coral was laid under the current surface the old asphalt was probably removed during the partial removal of the parking

**Figure 9: Photograph of ST-9 South Wall Stratigraphic Sectional Profile Drawing.**

lot that once occupied the southeast quadrant of the Property. The sampled stratigraphic profile of the trench's south wall suggested that Layer I was the more impacted of the two exposed strata due to the presence of imported material. Layer II (80–169 cmbs) was a compact, very fine to coarse crumbly structured, dark yellowish brown (10YR 3/4, moist) sand clay silt. The lack of cultural material (modern debris included) suggests that Layer II had not been impacted and could therefore be considered as having not been disturbed. Thus, excavation terminated. A ferrous metal pipe fragment and a Historic bottle glass sherd were observed in ST-9's backfill pile of ST-9. The bottle glass sherd was recovered for laboratory analysis for relative dating purposes, and based on the artifact's embossing, SCS Laboratory analysis of the single bottle glass base sherd indicated that the artifact was part of a bottle manufactured between 1940 and 1954.

## DISCUSSION AND CONCLUSION

Through the pedestrian survey and subsurface testing, the archaeological investigation of the 0.4899-acre Property yielded no archaeological sites. Nine stratigraphic trenches (ST-1 through ST-9) of various lengths and depths were placed at various points throughout the Property to provide sampling of subsurface contexts and to test subsurface soil deposits for human alteration and influence. Excavation results revealed the presence two layers: a disturbed Layer I that consisted of imported matrices and demolition debris; and a minimally disturbed, but mostly intact, Layer II. The presence of calcareous sand, a non-local matrix, in Layer II within Stratigraphic Trenches 5 and 9 suggests the matrix in this stratum was minimally disturbed/ impacted by former excavation activities in the southern half of the Property, specifically in TMK (1) 2-4-006: 017. The nine stratigraphic trenches also revealed the dearth of datable organic material (*e.g.*, charcoal, vertebrate and invertebrate remains) necessary for relative dating an archaeological site (given one was identified). The few collected artifacts (N=7; see Table 2) from the backfill of Stratigraphic Trenches 4, 5, and 9 suggests the lack of *in situ* subsurface features containing artifacts—in this case Historic-type (*i.e.*, greater than 50 years old) artifacts combined with the depth of the stratigraphic trenches—failed to support the presence of intact archaeological sites (Traditional or Historic) within the Property.

Based upon previous archaeological research, LCA information, and other limited archival research of historical and oral documentation, several classes of archaeological features were thought to occur within the Property. The location of the Property on the plains of *mauka* Honolulu, in this case bordering the Makiki Stream, was suggestive that the project was likely utilized for the cultivation of *taro* and like-crops from the early Historic times probably extending from Traditional times. Available archaeological data relating to this agricultural practice would include, but not be limited to, stone and earthen terraces, alignments, free-standing walls, and water irrigation ditches (*`auwai*). Artifacts suggested to accompany *taro* production may include lithic artifacts such as basalt cores, adzes, flakes, and, as has been recovered previously, food (*e.g.*, *poi*) pounders. Potentially, agricultural layers from Traditional times through the present would possibly be amenable to observation through the presence of oxidation and reduction layers as well as charcoal layers depicting burning or clearing episodes prior to, or after, cultivation.

As suggested by past research in the area of Makiki, the Property could have contained evidence for agriculture possibly accompanied by temporary, small scale habitation from Traditional through early Historic times. Archaeological remains associated with these activities

could include Traditional lithic remains (adzes, flakes, *etc*.), faunal remains (subsistence), and charcoal denoting hearths (temporary campsites, *etc*.). Later period occupation could be reflected not only by the preceding artifacts, but also by structures associated with small-scale *taro* production (*e.g.*, walls) and Historic artifacts such as metal, ceramic, and glass assemblages.

LCA information gleaned from a small sample of LCAs surrounding the Property indicated that those LCAs were primarily utilized as house lots. Thus, archaeological available data reflecting this land use could include stone alignments, pavements, and walls, composed of Traditional and Historic artifacts such as those previously mentioned. Agricultural soils, although small scale for household purposes, would be represented by charcoal layers and/or oxidation and reduction layers, these depicting specific agricultural use of the area over time. However, the acid intensity of the Makiki clay loam suggests an effect could be the opposite (*i.e.*, not observed at all).

However, none of the archaeological, structural, and artifactual classes listed above were identified within the Property. Three possible scenarios may have attributed to the absence of intact archaeological features or associated midden and artifacts (charcoal included) within the strategically place stratigraphic trenches: (1) the Property contained agriculturally affected soils that resided in Layer I and have since been intensely disturbed by mechanical means via past construction and previous demolition and subsequent exportation of such materials; (2) the acid intensity of the soils within the Property as described by Foote *et al.* (1972) may have degraded the datable organic materials enough so that none could be observed, and if organic materials were present, then those materials were probably not mixed in with the soil for a long period of time; or (3) no Traditional-style (pre- and circa-1778) cultural activities (*e.g.*, agriculture, fire making, food consumption) occurred on the Property.

## RECOMMENDATIONS

Excavation suggested for the Holomua condominiums is to be conducted to depths between 1.52 meters (5 feet) and 2.44 meters (8 feet)—the same type of matrix identified as the slightly disturbed and culturally sterile Layer II—should be found at the same depth and condition as that found in the current archaeological work. Layer I throughout the Property was established as disturbed and interpreted as containing imported fill and demolition debris. Based primarily on the negative results of the Archaeological Assessment, no further archaeological work regarding TMK: (1) 2-4-006: 017 and 018 is recommended.

## REFERENCES


City and County of Honolulu Real Property Assessment and Tax Billing Information
2008 Property Search of Parcel ID TMK (1) 2-4-006:017 and 018. 2/24/2008. Akanda Group, LLC. Accessed on 2/11/2008.

Cordy, R.
1974a Cultural Adaptation and Evolution in Hawaii: A Suggested New Sequence. Journal of the Polynesian Society, 83: 180–91.

2002 The Rise and Fall of the O`ahu Kingdom. A Brief Overview of O`ahu's History. Mutual Publishing, Honolulu.

Drennan, T.D.
2007 *An Archaeological Inventory Survey of Two Parcels Measuring Approximately 4930 M² in Pawa`a Ahupua`a, `Ili of Kewalo, Kona (Honolulu) District, Island of Oahu, Hawaii [TMK: (1) 2-4-05: 26 and 27]*. Scientific Consultant Services, Inc., Honolulu.

Foote, D.E., E. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of the Islands of Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Department of Agriculture Soil Conservation Service, Washington, D.C.

Google Earth
2008 Satellite Image of TMK (1) 2-4-06: 017 and 018. 2008. Accessed on 22 February 2008.

Handy, E.S.C., and E.G. Handy
1972 *Native Planters of Old Hawai`i.* Bishop Museum Bulletin 233. B.P. Bishop Museum Press, Honolulu, HI.

Hawaiian Government Survey
1881 Map of Waikiki. 1:2400. S.E. Bishop.

Jourdane, M.
1997 *Inadvertent Discovery of Skeletal Remains at Wo/Sullivan House Construction Judd-Hillside. TMK 2-5.* SHPD Report No. O-1685. On file at SHPD, Kapolei, HI.

Kirch, P.V.
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.

McAllister, J.G.
1933 *Archaeology of Oahu.* Bernice P. Bishop Museum Bulletin 104. B.P. Bishop Museum, Honolulu, HI.

Price, S.
1983 Climate. In *Atlas of Hawaii* (2nd edition), ed. By R.W. Armstrong. University of Hawaii Press, Honolulu.

Pukui, M.K., S.H. Elbert, and E.T. Mookini
1974 *Place Names of Hawaii.* University of Hawaii Press, Honolulu, HI.

Sinoto, A.
2000 *Archaeological Assessment of the Proposed Wal-Mart/Sam's Club Development Area, Kalia, Makiki, Kona, O`ahu, TMK: (1) 2-3-016:009,012, & 042.* Aki Sinoto Consulting, Honolulu, HI.

Sinoto, Y.
1979 *Makiki Hawaiian Sugar Planters' Association Experiment Station Burials, TMK 2-4-22: 01.* On file at SHPD, Kapolei, HI.

Souza, K., M. Perzinski, and H.H. Hammatt
2002 *An Archaeological Monitoring Report for the Kaka`ako Improvement District 7 Project (TMK: 2-1-58, 2-3-01 thru* [sic] *05).* Cultural Surveys Hawai`i, Inc., Kailua, HI.

State of Hawaii Administrative Rules
2002 *Rules Governing Archaeological Assessments*. Department of Land and Natural Resources/ State of Hawaii Preservation Division, Kapolei.

State of Hawaii Department of Taxation
1992 TMK (1) 2-4-06. First Tax Division. City and County of Honolulu. Map Vol. Zone 2. REDI Real Estate Information Service.

Sterling, E.P. and C.C. Summers
1978 *Sites of Oahu.* Department of Anthropology, Department of Education, B.P. Bishop Museum, Honolulu, HI.

Toulouse, Julian
1971 *Bottle Makers and Their Marks.* Thomas Nelson Inc., Camden, New Jersey.

Tulchin, J., and H.H. Hammatt
2004 *Literature Review and Field Check for the Kapi`olani Area Revised Sewer System, Honolulu* Ahupua`a, *Kona District, Island of O`ahu (TMK: 2-3-04, 05, 07, 09, 10, 13, 14, 17, 18, 22, 35, 36, & 38).* Cultural Surveys Hawai`i, Inc., Kailua, HI.

United States Department of Agriculture
2000 *Munsell Soil Color Charts.* Macbeth Division of Kollmorgen Instruments Corporation, Baltimore, MD.

United States Geological Survey
1983 *Honolulu Quadrangle*, Hawaii. 1:24,000. 7.5 Minute Series. Washington D.C.

Waihona `Aina Corporation
2008 *Māhele* and *Land Grant Database*. Honolulu, Hawaii. Accessed February 2008.

Whistler, A.W.
1995 *Wayside Plants of the Islands: A Guide to the Lowland Flora of the Pacific Islands*. Isle Botanica, Honolulu.

Winieski, J., and H.H. Hammatt
2000 *A Report on Archaeological Monitoring of the Kaka`ako Improvement District 4 Construction Project (TMK 2-3-02 thru* [sic] *05).* Cultural Surveys Hawaii, Inc., Kailua, HI.

# APPENDIX A : LAND GRANT DOCUMENT

## Land Grants Documents

| | | | |
|---|---|---|---|
| Grant Number (LG) | **177** | Source Book: | **1** |
| Grantee: | **Gulick, Peter J.** | Acreage:: | **61.5** Acs |
| Ahupua`a | **Waikiki, King & Beretania sts, Honolulu** | Year | **1849** |
| District: | **Kona** | Cancelled | |
| Island | **Oahu** | TMK | **1-2-8-02, -03, 1-2-4** |

Miscellaneous

**No. 177, Gulick, Peter J., Pawaa Ili, Waikiki Ahupuaa, District of Kona, Island of Oahu, Vol. 1, pps. 336-337** [LG Reel 1, 00388-00389.tif]

No. 177
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Peter J. Gulick, his faithful and loyally disposed subject for the consideration of Sixty one dollars & fifty Cents ($61.50), paid into the Royal Exchequer, all that certain piece of Land situated at Pawaa, Waikiki in the Island of Oahu and described as follows:

Commencing at stream at mauka bridge, and running along 6 feet makai of makai ditch of Marika road 78 6/10 Chains to East corner (25 Chains beyond Mr. Clark's South corner) then from stream at lower bridge, and running along 6 feet mauka of mauka ditch of makai road 73 2/10 Chains to South corner of this, then direct to East corner above mentioned, including all between this line and the Pawaa stream.

Road Reserved

Containing 61 1/2 Acres, more or less, excepting and reserving to the Hawaiian Government, all mineral or metallic mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Peter J. Gulick his Hawaiian, Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this 29 day of November, 1849

Received of P. J. Gulick $61.50 for Land as per Patent No. 177.
Treasury Office, December 8th, 1849
For The Minister of Finance, William Jarrett

[Page 337]

Helu 177
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Peter J. Gulick i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Pawaa, Waikiki ma ka Mokupuni o Oahu, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ma ke kahawai ma ke Alahaka mauka, a e holo ana 6 kapuai makai o ka auwaha eliia makai o ke alanui mauka he 78 6/10 Kaulahao a hiki i ke kihi Hikina (he 25 Kaulahao ma o aku o ke kihi Hema o ko Mr. Clark), Alaila mai ke kahawai ma ke alahaka makai, a e holo ana 6 kapuai mauka o ka auwaha eliia mauka o ke alanui makai he 70 2/10 Kaulahao a hiki i ke kihi Hema o keia, Alaila holo pololei a hiki i ke kihi Hikina i oleloia maluna, e hoopuni ana i keia aina mawaena, mai keia palena a hiki i ke kahawai o Pawaa.

Ua hookoe ia kahi o ke alanui i hele ai mamua

A maloko o ia Apana 61 1/2 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he Kanaonokumamakahi me Hapalua. Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Peter J. Gulick, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a me ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 29 o Novemaba, 1849

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Land Patent Grant 177, Gulick, Peter J., Pawaa Ili, Waikiki Ahupuaa, District of Kona, Island of Oahu, 61.5 Acre, 1849]

# APPENDIX B: 20TH CENTURY DOCUMENTATION OF LAND TRANSFER FOR TAX MAP KEYS (1) 2-4-006: 017 AND 018

STATE OF HAWAII DEPARTMENT OF TAXATION
PROPERTY ASSESSMENT DIVISION
TAX MAPS BRANCH

FORM P-19 HISTORY SHEET

**TAX MAPS BRANCH HISTORY SHEET**

DATE: 1/15/68

LOCATION:

TITLE:

| DIV. Z | S | PLAT | PAR |
|---|---|---|---|
| 2 | 4 | 06 | 17 |

| NO. | GRANTOR, ETC. | AREA OF PARCEL | GRANTEE, ETC. |
|---|---|---|---|
| 1. | D: Yau King Kau (S) Bk 1977 p-153 | 10,052 | Kan Jung Luke &wf |
| | RS-$44.55 7/23/46 8/12/46 DES Tog/E | | Beatrice Sung Yee -T/E |
| | Subj: Esmt of R/W DES | | |
| 2. | TMB 430'68 WD/jo 1/15/68 | | |
| | D: Chinn Ho &wf Betty Ching,etal Bk 5929 | do | To: Kan Jung Luke &wf |
| | p-54 12/28/67 1/9/68 Correction of one | | Beatrice S Y Luke -T/E |
| | course fr 167.06 to 178.06; quitclaim; | | |
| | Tog/E Subj/E of R/W DES | | |

NOTE: INFORMATION ON THIS SHEET IS SUBJECT TO CHANGE

STATE OF HAWAII DEPARTMENT OF TAXATION
PROPERTY ASSESSMENT DIVISION
TAX MAPS BRANCH

FORM P-19 HISTORY SHEET

**TAX MAPS BRANCH HISTORY SHEET**

DATE: 1/14/64

LOCATION: Waikiki

TITLE: Por Gr 177

| DIV. Z | S | PLAT | PAR |
|---|---|---|---|
| 2 | 4 | 06 | 18 |

| NO. | GRANTOR, ETC. | AREA OF PARCEL | GRANTEE, ETC. |
|---|---|---|---|
| 1. | As shown on Tax Maps | 11,287 ¢ | Yau On Leong &wf Jessie S - T/E |
| 2. | TMB 11834'63 RB/sy 1/14/64 | | |
| | D: Yau On Leong &wf Jessie S To: Cooke | 11,287 ¢ | Yau On Leong &wf Jessie - T/E- |
| | Trust Co Ltd etal, Trustees. Bk 4646 | | 1/2 |
| | p 284 Cons-$1 12/10/63 12/12/63 | | Yau On Leong &wf Jessie Trust- |
| | DES Tog/E, Subj/E of R/W, Und 1/2 int. | | 1/2 |
| | F/D: 2406-18; Ownership & Int | | |
| 3. | TMB 139'64 PL/sy 1/30/64 | | |
| | D: Yau On Leong &wf Jessie S L To: Cooke | 11,287 ¢ | Yau On Leong &wf Jessie Trust |
| | Trust Co etal, Trustees Bk 4664 p 465 | | |
| | Cons-$1 1/3/64 1/9/64 All of the und 1/2 | | |
| | int of grantors in. DES Tog/E, Subj/E | | |
| | of R/W | | |
| 4 | TMB 1040'68 = WD/jol/24/68 | | |
| | Corr/D: Chinn Ho &wf,etal To: Yau On | do | do |
| | Leong &wf Jessie Trust Bk 5938 p-437 | | |
| | 1/4/68 1/19/68 quitclaimed Tog/E | | |
| | Subj/E of R/W DES KEYED ONLY | | |

NOTE: INFORMATION ON THIS SHEET IS SUBJECT TO CHANGE

# APPENDIX C: ARTIFACT DESCRIPTION AND PHOTO

# SCS PROJECT 921 ARTIFACT ANALYSES

ST-4 Backfill

1) Two porcelain cup rim sherds (fitted) with handle attachment, glazed, exterior decorated with blue strip paralleling rim under glaze.
2) One porcelain cup base sherd, glazed, partial manufacturer's stamp (blue color) under glaze of base exterior

ST-5 Backfill

1) One porcelain bowl rim sherd, glazed, exterior decorated with orange/ red transfer print and yellowish paint over glaze, interior decorated with gray vegetation (grass) patterns over glaze.
2) One porcelain bowl body sherd (fits with above rim sherd), glazed, exterior decorated with orange/ red transfer print and yellowish paint over glaze, interior decorated with gray vegetation (grass) patterns over glaze.
3) One porcelain bowl rim/body/base sherd, glazed, exterior decorated with orange/ red transfer print and yellowish paint over glaze, interior decorated with gray vegetation (grass) patterns over glaze.

ST-9 Backfill

1) One clear glass bottle base sherd, embossed. Base embossment: 1st line (arched): 23 manufacturer's stamp 5, 2nd line (cursive, horizontal): Duraglas. Bottle manufacturer: Owen Illinois Glass Company of Toledo, Ohio. Bottle manufacturer date (based on manufacturer's stamp and the utilization of the word Duraglas): post 1940 to 1954.

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# Appendix F

# Transportation Impact Analysis Report

*Draft Report*

# Holomua Transportation Impact Analysis

TRANSPORTATION

&PLANNING


FEHR & PEERS
TRANSPORTATION CONSULTANTS

*160 W. Santa Clara St., Ste. 675*
*San Jose, CA 95113*


*April 2008*

*Project LA08-2243*

**Draft Report**

# Holomua
# Transportation Impact Analysis

Prepared for:

**KRC Partners LLC**

Prepared by:

**Fehr & Peers**

April 2008

LA08-2243

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# EXECUTIVE SUMMARY

This report presents the results of the transportation impact analysis (TIA) for the proposed development of the 21,000+ square feet (s.f.) vacant site at 1315 Kalakaua Avenue located between Beretania Street and Young Street in the City and County Honolulu on the island of Oahu. The Holomua condominiums (Holomua) will provide 176 moderately-priced residential condominiums.

The analysis was conducted to identify any potential significant adverse impacts of the project on the surrounding transportation system and to recommend mitigation measures, if needed. Project transportation impacts were evaluated following the guidelines of the City and County of Honolulu and standard traffic engineering practice. Eleven intersections in the vicinity of the project site were studied under three scenarios: Existing, Background and Project Conditions. Background Conditions include traffic from approved but not yet constructed developments plus other regional growth and forms the basis of comparison for determining intersection impacts.

## PROJECT TRAFFIC ESTIMATES

The amount of traffic generated by the project was estimated based on rates published in *Trip Generation, 7th Edition* (Institute of Transportation Engineers, 2002) for the High-Rise Residential Condominium/Townhouse land use (232) category. The project is estimated to generate 736 new daily vehicle trips, 60 new AM peak-hour vehicle trips, and 67 new PM peak-hour vehicle trips. Residents will enjoy multiple opportunities to use non-automobile modes including biking and walking to nearby destinations for shopping and dining, as well as commuting and making recreation trips via transit.

## PROJECT INTERSECTION IMPACTS AND IMPROVEMENTS

Significant intersection impacts were identified by comparing intersection operating levels (i.e., levels of service) and, for those intersections operating unacceptably, the change in average delay and volume-to-capacity ratio. Based on this approach and impact criteria, only one intersection (Beretania Street at Keeaumoku Street) is projected to operate unacceptably, but the project would have a less than significant impact at this location. A subsequent evaluation at this intersection indicates that existing plus project traffic volumes only would result in acceptable operations; this indicates that the deficient operation is caused by traffic from cumulative development and not solely by project traffic.

## SITE ACCESS, ON-SITE CIRCULATION, AND PARKING

Access to the site is provided by two driveways on Kalakaua Avenue, both of which will be restricted to right-in/right-out only operation. While this configuration will result in some circuitous travel for some project residents and guests because of the Beretania/King Street one-way couplet, the number of project-generated vehicles traveling an additional distance due to the driveway configuration is approximately 20 or less during each peak hour, or less than one vehicle every three minutes.

On-site circulation will be provided via an internal drive aisle providing access to parking inside the building. The width of aisles and length of parking stalls will provide adequate circulation. As such, site access and on-site circulation is considered adequate, and no changes are recommended.

Similarly, the proposed project parking supply meets the minimum parking requirement as defined by the Revised Ordinances of Honolulu (ROH). A surplus of three spaces is projected based on current code and a supply of 245 spaces.

## TRANSIT, BICYCLE AND PEDESTRIAN IMPACTS

The project site is within 650 feet of bus stops on three transit corridors within the study area. Given the projected resident demographics and proximity to transit, residents are expected to use the bus to commute and travel to other regional destinations. However, the number of anticipated riders could be accommodated by the existing system capacity and no significant impacts are anticipated.

Implementation of the proposed project will not conflict with any existing or proposed bicycle or pedestrian facility and will not significantly increase demand or hazards for these modes of travel. Cyclists will have direct access to the Young Street bike route, which is more conducive to bicycle travel than either King or Beretania Streets. Thus, no significant impacts are anticipated.

# 1. INTRODUCTION

This report presents the results of the transportation impact analysis (TIA) for the Holomua condominiums project (Holomua) located at 1315 Kalakaua Avenue between Beretania and Young Streets in the City and County of Honolulu, Hawaii. The project will provide 176 moderately-priced residential condominium units. Access to the project site, which is currently vacant, will be provided by a right-in/right-out driveway on Kalakaua Avenue. Construction of the project is expected to be completed by the middle of 2010 and occupied by residents shortly thereafter.

The analysis was conducted to identify potential effects of the proposed project on the surrounding transportation system and to recommend appropriate improvements to mitigate any significant impacts. Figure 1 presents the project location, surrounding roadway system, and study intersections. The site plan is shown on Figure 2.

Project transportation impacts were estimated following the guidelines of the City and County of Honolulu and standard traffic engineering practice. The analysis evaluated the operations of the following 11 key intersections near the site:

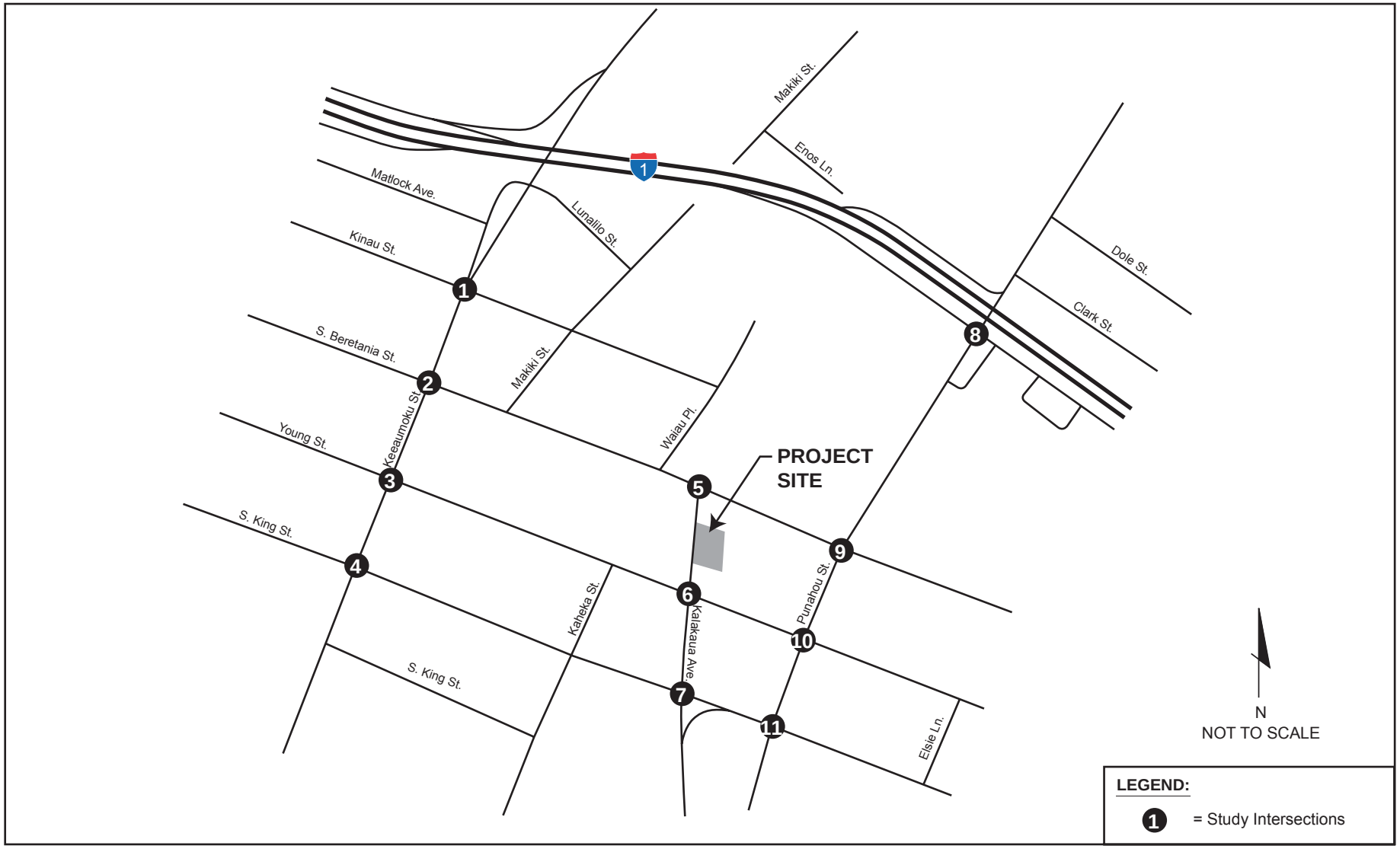
1. Keeaumoku Street and Kinau Street
2. Keeaumoku Street and S. Beretania Street
3. Keeaumoku Street and Young Street
4. Keeaumoku Street and S. King Street
5. Kalakaua Avenue and S. Beretania Street
6. Kalakaua Avenue and Young Street
7. Kalakaua Avenue and S. King Street
8. Punahou Street and Lunalilo Freeway (H-1) Eastbound Off-Ramp
9. Punahou Street and S. Beretania Street
10. Punahou Street and Young Street
11. Punahou Street and S. King Street

The operations of the study intersections were evaluated during the weekday morning (7:00 to 9:00 AM) and afternoon (4:00 to 6:00 PM) peak hours for the following five scenarios:

**Scenario 1:** *Existing Conditions* (2008) – Existing volumes obtained from turning movement counts representing the peak one-hour vehicle flow.

**Scenario 2:** *Opening Year (2010) without Project Conditions* – Existing peak-hour volumes multiplied by a growth factor plus traffic from approved but not yet constructed developments in the area. The traffic growth factor was developed based on historical growth in traffic counts for this area. This scenario is the basis from which project impacts are determined.

**Scenario 3:** *Opening Year (2010) with Project Conditions* – Opening Year (2010) without Project volumes plus the new traffic generated by the proposed project.

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## PROJECT AREA AND STUDY INTERSECTIONS

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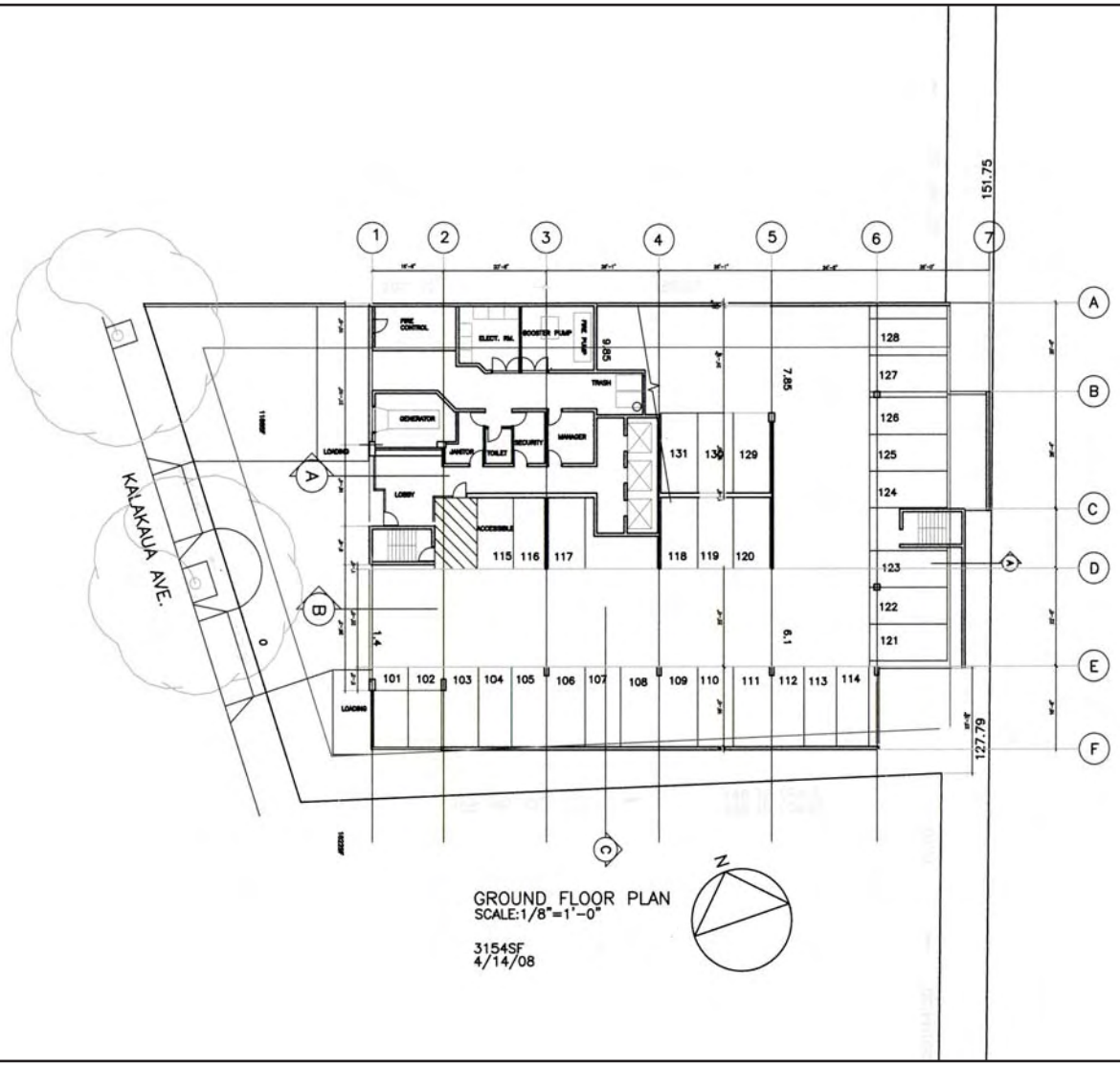
FIGURE 1

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**SITE PLAN**

**FIGURE 2**

On-site vehicle circulation, site access, and parking were reviewed and compared to industry design standards and City code requirements where applicable. The effect of the project on existing and proposed bicycle, pedestrian, and transit facilities and services was also assessed.

The remainder of this report is divided into three chapters. The existing transportation system serving the site and the current operating conditions of the study roadways are described in Chapter 2. Intersection operations under Opening Year (2010) without Project Conditions are discussed in Chapter 3. Chapter 4 describes Opening Year (2010) with Project Conditions, including the method used to estimate the amount of project traffic added to the surrounding roadways and its impact on the transportation system. This chapter also includes a discussion of site access, on-site circulation, and parking, as well as the project's potential impact on non-automobile modes.

# 2. EXISTING CONDITIONS

This chapter describes the existing conditions of the roadway facilities, pedestrian and bicycle facilities, transit service, traffic volumes, and intersection operations. This chapter also includes a discussion of the method used to calculate intersection levels of service and the corresponding results.

## EXISTING ROADWAY NETWORK

Regional access to the project site is provided via H-1, the Lunalilo Freeway. Local access to the site is provided via Keeaumoku Street, Punahou Street, King Street, Beretania Street, Young Street, and Kalakaua Avenue. This section describes the existing roadway network, which is illustrated on Figure 1.

*Lunalilo Freeway (H-1)* extends along the southern edge of Oahu with the Ewa (west) end terminating at Kalaeloa Boulevard in Kapolei and the Diamond Head (east) end terminating at Kilauea Avenue near Kahala Mall. Near the project site, the Lunalilo Freeway includes three mixed-flow lanes in each direction. Partial access between the freeway and the site is provided at Lunalilo Street (via Keeaumoku Street), Piikoi Street, Punahou Street, and Alexander Street.

*Keeaumoku Street* is generally an arterial lane street extending from Kona Street at Ala Moana Center to the mauka side of Nehoa Street. Within the study area, this street includes two through lanes in each direction plus turn lanes. Keeaumoku Street crosses over the Lunalilo Freeway but no direct access to the freeway is provided at the overcrossing.

*Punahou Street,* near the project site*,* is a four-lane mauka-makai arterial street. Punahou Street extends mauka of the Lunalilo Freeway where it becomes Manoa Road at the intersection of Nehoa Street. At the makai end of the street, Punahou Street terminates at Philip Street near Washington Middle School.

*Kalakaua Avenue* is a four-lane street extending from S. Beretania Street near the project site into Waikiki and through Kapiolani Park. Kalakaua Avenue forms the western boundary of the project site and will serve as the only vehicular access point for the site. On-street parking is provided on Kalakaua Avenue in the mauka-bound direction along the project site frontage.

*Beretania Street* is a five-lane, one-way, Ewa-bound street extending from University Avenue and to North King Street near Liliha Street. On-street parking is prohibited in the makai curb lane during the morning commute period.

*King Street* is a five-lane, one-way, Diamond Head-bound street extending from Kapiolani Avenue near Kapahulu Avenue to its Ewa terminus at Middle Street. King and Beretania Street form a one-way couplet that serves substantial cross-town traffic volumes. Similar to Beretania Street, parking is prohibited in the mauka curb lane during the evening commute period.

*Young Street* is a two-lane roadway parallel to and located between King and Beretania Streets linking Isenberg Street and Victoria Street. Young Street provides for two-way travel and includes on-street parking in the immediate vicinity of the project site.

*Kinau Street* is a two-lane, primarily one-way collector street extending between Alapai Street and Waiau Place, and is parallel to Beretania Street. Between Keeaumoku Street and Waiau Place, Kinau Street provides for two-way travel.

## EXISTING PEDESTRIAN AND BICYCLE FACILITIES

### *Pedestrian Facilities*

Pedestrian facilities comprise sidewalks, crosswalks, and off-street paths that are intended to provide safe and convenient routes for pedestrians to access destinations such as institutions, businesses, public transportation, and recreation facilities. Near the project site, a continuous sidewalk is provided on both sides of Kalakaua Avenue and Beretania, Punahou and Young Streets. Crosswalks are located at all of the study intersections.

### *Bicycle Facilities*

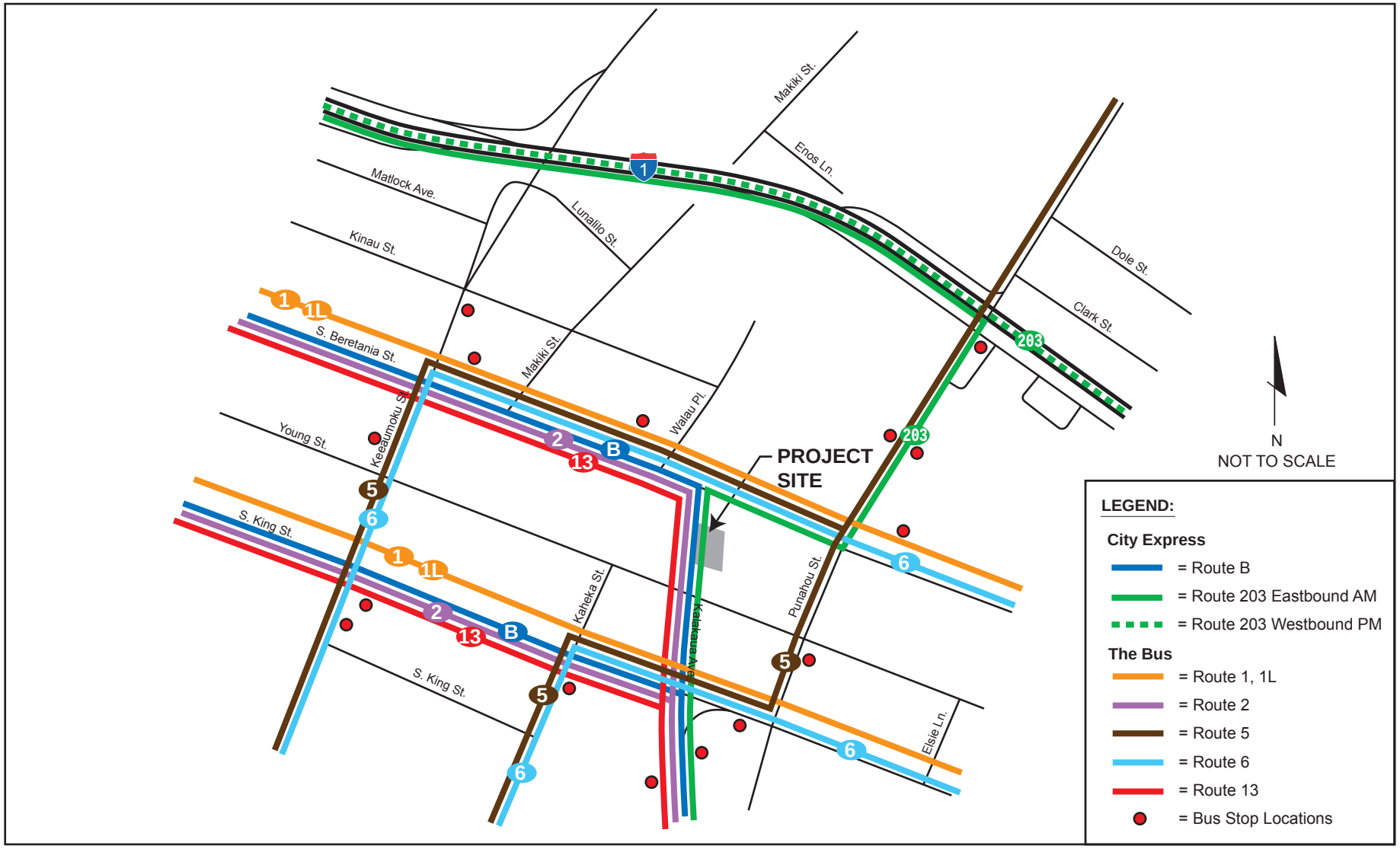
Bicycle facilities comprise paths (Class I), lanes (Class II), and routes (Class III). Bicycle paths are paved trails that are separate from roadways. Bicycle lanes are separate areas on roadways designated for bicycle use by striping, pavement legends, and signs. Bicycle routes are roadways designated for bicycle use by signs only but may not include substantial width for bicycle travel. Currently, Young Street is designated as a bicycle route, but no separate bicycle lanes are provided near the project site.

## EXISTING TRANSIT FACILITIES

The Bus, operated by the City and County of Honolulu, serves the entire Island of Oahu. Routes 1, 2, 5, 6, and 13 provide service near the project site. Figure 3 shows the existing transit facilities in the study area.

Route 1 provides limited stop service. The intersections with service nearest to the project site are S. King/S. Beretania Streets and S. King/Punahou Streets. Routes 2 and 13 provide service along S. Beretania and S. King Streets with stops nearest to the project site located at the S. King Street/Kalakaua Avenue intersection. Route 5 provides service along Keeaumoku and Punahou Streets, and Route 6 provides service along S. Beretania and S. King Streets. The stops located nearest the project site provided by Routes 5 and 6 are the intersections of S. King/Punahou Streets and S. Beretania Street/Kalakaua Avenue. Table 1 summarizes hours of operation and service frequencies for these bus routes.

The City Department of Transportation Services (DTS) is developing a Bus Service Improvement Plan. Included in the plan, the following services were recently implemented: Route A is a 17-mile City Express service connecting Waipahu and Pearlridge with Downtown and the University of Hawaii. Route B is a major limited-stop service between Kalihi and Waikiki. Route C is a 36-mile City Express connecting the Leeward Oahu area with central Honolulu. Of these routes, Route B services the project site with stops at the intersections of S. King Street/Keeaumoku Street, S. Beretania Street/Keeaumoku Street, and S. Beretania Street/Kalakaua Avenue. See Table 1 for hours of operation and service frequencies for all routes within the immediate vicinity of the project site.

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## EXISTING TRANSIT SERVICES

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FIGURE 3

**TABLE 1**
**EXISTING TRANSIT SERVICE**

| Route | Serviced Intersections near Project Site | Weekday Operating Hours | AM and PM Peak-Hour Commute Headway |
|---|---|---|---|
| 1 | S. King Street & S. Beretania Street | 4:20a – 12:15a | 10 |
| 1 | S. King Street & Punahou Street | 4:30a – 12:30a | 10 |
| 2 & 13 | S. King Street & Kalakaua Avenue | 4:40a – 10:30a<br>3:20 p – 12:30a | 5-10<br>5-10 |
| 5 | S. King Street & Punahou Street | 5:35a – 9:25p | 30-60 |
| 5 | S. Beretania Street & Kalakaua Avenue | 6:05a – 9:50p | 30-60 |
| 6 | S. King Street & Punahou Street | 5:45a – 9:35p | 15-30 |
| 6 | S. Beretania Street & Kalakaua Avenue | 6:30a – 10:15p | 15-30 |
| B | S. King Street & Keeaumoku<br>S. Beretania & Keeaumoku<br>S. Beretania & Kalakaua | 5:00a – 9:00p | 15 |

Source: City & County of Honolulu DTS website, March 2008.

## LEVEL OF SERVICE METHOD

The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, with the least congested operating conditions, to LOS F, with the most congested operating conditions. LOS E represents “at-capacity” operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions.

The City and County of Honolulu has not established an officially adopted minimum acceptable level threshold regarding operating conditions of intersections. However, LOS D has been recognized in past studies as the minimum acceptable intersection LOS; therefore, LOS D is considered the minimum acceptable operating LOS for intersections in this TIA.

### *Signalized Intersections*

The level of service method for signalized intersections approved by the City and County of Honolulu analyzes intersection operations based on average control vehicular delay, as described in Chapter 16 of the *2000 Highway Capacity Manual* (*HCM*) by the Transportation Research Board. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections is calculated using Synchro analysis software and is correlated to a LOS designation as shown in Table 2.

**TABLE 2**
**SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS**
**USING AVERAGE CONTROL VEHICULAR DELAY**

| Level of Service | Description | Average Control Delay Per Vehicle (Seconds) |
|---|---|---|
| A | Operations with very low delay occurring with favorable progression and/or short cycle lengths. | ≤ 10.0 |
| B | Operations with low delay occurring with good progression and/or short cycle lengths. | 10.1 to 20.0 |
| C | Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear. | 20.1 to 35.0 |
| D | Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop and individual cycle failures are noticeable. | 35.1 to 55.0 |
| E | Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. | 55.1 to 80.0 |
| F | Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths. | > 80.0 |

Source: *Highway Capacity Manual*, Transportation Research Board, 2000.

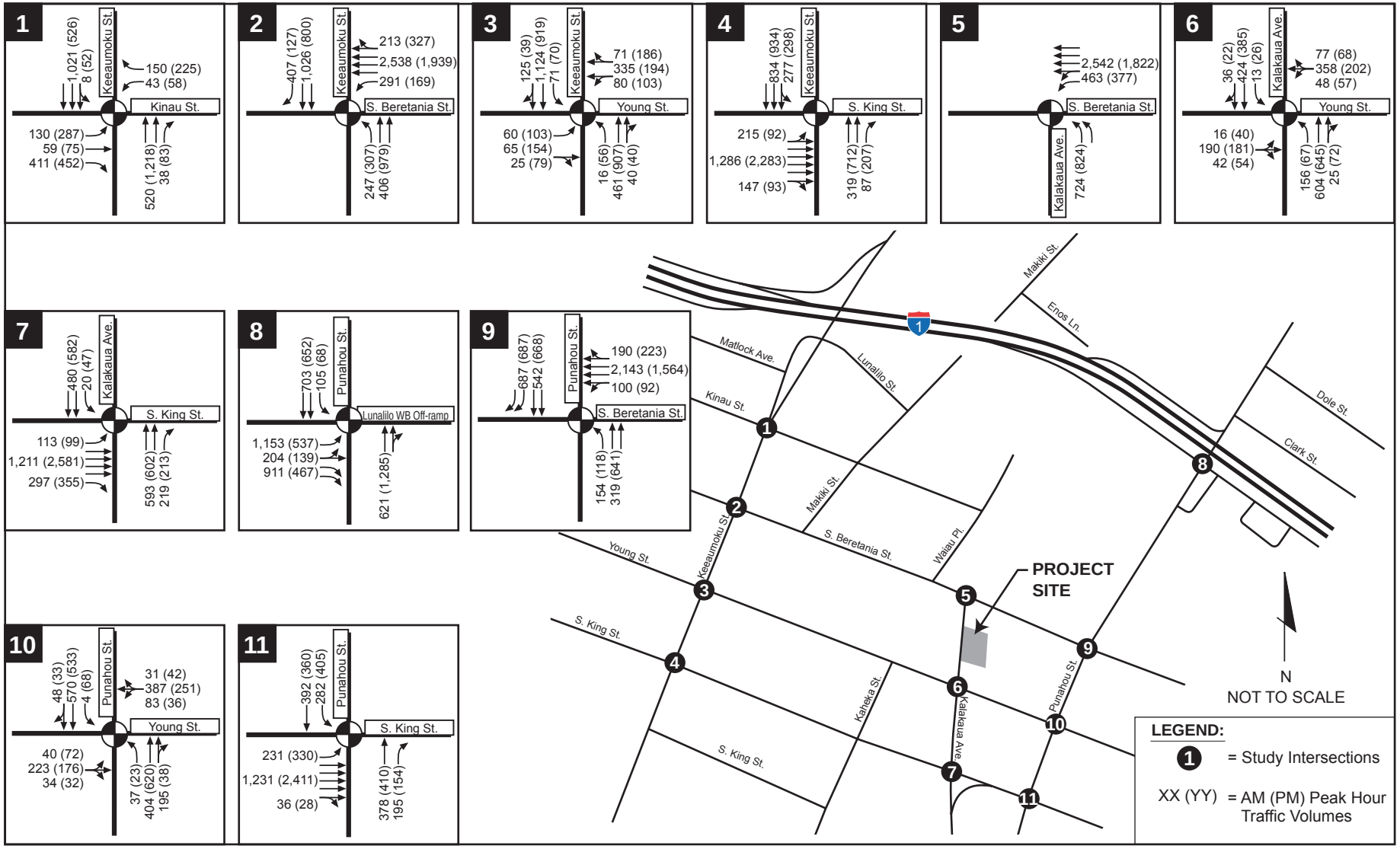
## EXISTING INTERSECTION LEVELS OF SERVICE

The operations of the key intersections were evaluated during the weekday AM and PM peak hours. Intersection operations were evaluated using the highest one-hour volume counted between each of the 7:00 to 9:00 AM and 4:00 to 6:00 PM peak commute periods. Traffic counts were conducted at the 11 study intersections in February and March 2008. The traffic counts are included in Appendix A. Figure 4 presents the existing AM and PM peak-hour turning movement volumes at the study intersections. Figure 4 also includes the existing intersection lane configurations and traffic control devices.

Existing intersection lane configurations, signal timings, and peak-hour turning movement traffic volumes were used to determine the existing levels of service. The results of the LOS analysis are presented in Table 3 and the corresponding LOS calculation sheets are included in Appendix B. The volume-to-capacity (V/C) ratio for each location is presented in addition to delay for informational purposes. As shown in Table 3, all of the study intersections operate at an acceptable LOS D or better during both peak-hours.

## FIELD OBSERVATIONS

Field observations of the key intersections were conducted to verify the calculated operations. In general, observations indicated that most of the study intersections are operating at or near the calculated levels of service. In general, the peak direction of travel is makai-bound (southbound) and Ewa bound (westbound) in the morning, and the opposite directions during the evening peak period. For some turning movements, the directionality is not nearly so pronounced. Also, PM peak hour traffic volumes are generally higher than those during the morning period. Specific descriptions of key intersections or issues are described below.

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# EXISTING PEAK-HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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FIGURE 4

**TABLE 3**
**EXISTING INTERSECTION LEVELS OF SERVICE**

| Intersection | Count Date | Peak Hour | Delay[1] | LOS[2] | V/C[3] |
|---|---|---|---|---|---|
| 1. Keeaumoku Street and Kinau Street | 02/26/08 | AM<br>PM | 10.1<br>11.8 | B<br>B | 0.61<br>0.67 |
| 2. Keeaumoku Street and S. Beretania Street | 03/11/08 | AM<br>PM | 49.8<br>40.3 | D<br>D | 0.99<br>0.94 |
| 3. Keeaumoku Street and Young Street | 03/19/08 | AM<br>PM | 10.0<br>9.7 | A<br>A | 0.65<br>0.57 |
| 4. Keeaumoku Street and S. King Street | 03/12/08 | AM<br>PM | 12.3<br>20.4 | B<br>C | 0.60<br>0.78 |
| 5. Kalakaua Avenue and S. Beretania Street | 03/06/08 | AM<br>PM | 15.5<br>14.4 | B<br>B | 0.75<br>0.66 |
| 6. Kalakaua Avenue and Young Street | 02/28/08 | AM<br>PM | 11.5<br>9.0 | B<br>A | 0.61<br>0.54 |
| 7. Kalakaua Avenue and S. King Street | 03/25/08 | AM<br>PM | 12.6<br>18.3 | B<br>B | 0.52<br>0.75 |
| 8. Punahou Street and Lunalilo Freeway (H-1) EB Off-Ramp | 03/04/08 | AM<br>PM | 17.1<br>14.2 | B<br>B | 0.77<br>0.74 |
| 9. Punahou Street and S. Beretania Street | 03/05/08 | AM<br>PM | 29.2<br>21.9 | C<br>C | 0.90<br>0.72 |
| 10. Punahou Street and Young Street | 03/28/08 | AM<br>PM | 11.5<br>8.7 | B<br>A | 0.62<br>0.52 |
| 11. Punahou Street and S. King Street | 03/27/08 | AM<br>PM | 22.0<br>41.3 | C<br>D | 0.6<br>0.98 |

Notes:

[1] Whole intersection weighted average control delay expressed in seconds per vehicle calculated using methods described in the *2000 HCM*.

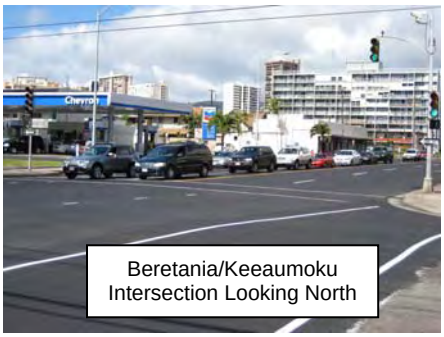
[2] LOS = Level of service. LOS calculations conducted using the Synchro level of service analysis software package.

[3] V/C = Volume-to-Capacity Ratio

Unacceptable operations are shown in **bold** typeface.

Source: Fehr & Peers, April 2008.

Based on our observations, vehicle queues were longer on Beretania Street during the AM peak hour as vehicles traveled towards downtown. At Keeaumoku Street, Ewa-bound queues periodically extended back past Makiki Street, and in some cases nearly to Kalakaua Avenue during the morning commute period. Queues also extended back from Punahou Street but did not affect any upstream intersections.



Beretania/Keeaumoku Intersection Looking North

Queues between King and Beretania Street intersections on Keeaumoku Street consistently extended back through the Young Street intersection in between, especially during the PM peak period. However, vehicles typically were able to clear the downstream signal within one cycle. Queues and delays on the Young Street approaches were shorter and were not substantially affected by congestion on the primary thoroughfare. At Keeaumoku and King Street, lengthy queues were observed on all approaches during both periods with longer delays experienced during the evening peak period. Again, vehicles typically cleared the intersection in one cycle and overall intersection operations were consistent with calculated results.

Project Site Frontage on Kalakaua Avenue

Due to the two-phase signal operation at the Kalakaua Avenue/Beretania Street intersection, queues that did form were able to clear regularly. Queues extended past the project site during both the AM and PM peak periods, sometimes to Young Street; however, gaps were available for vehicles to exit the on-street spaces along the site frontage and from the adjacent gas station/convenience market. Even when queues did not extend past the future site driveway, left-turning vehicles from Beretania Street to Kalakaua Avenue would make it difficult for vehicles to turn left out of the site.

Congestion in the Punahou Street corridor, especially north of Beretania Street is exacerbated during the AM peak hour by traffic from several schools in the area. These include Punahou School, Maryknoll Grade and High Schools, and St. Clements School on the mauka side of H-1, as well as Washington Middle School and Bingham Tract School Campus on the makai side. Similar to other locations, vehicle queues that did form were generally temporary and cleared during most cycles through the peak hours.

# 3. BACKGROUND CONDITIONS

This chapter discusses the operations of the study intersections under Background Conditions. Background Conditions are defined as conditions prior to completion of the proposed development and serve as the basis to identify project impacts. This scenario provides decision-makers with a description of conditions that will occur regardless of project implementation.

## BACKGROUND TRAFFIC ESTIMATES

Traffic volumes for Background Conditions comprise of existing volumes multiplied by a 2.0 % annual growth factor plus traffic generated by approved but not yet constructed developments in the area. Approved projects account for local growth within the immediate study area, while the growth factor accounts for regional growth in traffic volumes. The project is estimated to be completed by the second quarter of 2010 or approximately two years from the time existing counts were collected. Thus, a growth factor of 1.04 was applied to the existing traffic volumes at the 11 study intersections to estimate projected Year 2010 traffic demands. According to City/County staff, the three approved projects in the area include the following:

- the new 48,263 square foot Hale Pawaa office building on the Diamond Head side of Keeaumoku Street between Beretania and Young Streets
- the Shriners Hospital Modernization Project located on the Ewa side of Punahou Street between H-1 and Beretania Street, and
- the 141,000 square foot Aloha Island Self Storage facility on the Ewa side of Kalakaua Avenue between Young and King Streets

Available traffic projections were obtained from the respective traffic studies or were estimated based on standard trip rates and traffic engineering practice (see Appendix C). Background Condition volumes are shown in Figure 5.

## BACKGROUND ROADWAY IMPROVEMENTS

No capacity changes to any of the study intersections are planned or fully funded at this time. Thus, no roadway improvements were assumed under this scenario.

## BACKGROUND INTERSECTION LEVELS OF SERVICE

LOS calculations were conducted for the 11 study intersections to evaluate their operations under Background Conditions. The results of the LOS analysis are presented in Table 4. Appendix B contains the corresponding calculation sheets.

As shown in Table 4, all but one of the study intersections operate at an acceptable LOS D or better during both peak-hours under this scenario. With the addition of traffic from approved projects and future regional growth, operations at the Beretania Street/Keeaumoku Street intersection are projected to degrade from LOS D to LOS E during both peak hours. The impacts of the proposed project are discussed in the next chapter.

**TABLE 4**
**BACKGROUND INTERSECTION LEVELS OF SERVICE**

| Intersection | Peak Hour | Delay[1] | LOS[2] | V/C[3] |
|---|---|---|---|---|
| 1. Keeaumoku Street and Kinau Street | AM | 10.9 | B | 0.65 |
| | PM | 12.9 | B | 0.72 |
| 2. Keeaumoku Street and S. Beretania Street | AM | **68.3** | **E** | **1.09** |
| | PM | **57.5** | **E** | **1.07** |
| 3. Keeaumoku Street and Young Street | AM | 11.3 | B | 0.70 |
| | PM | 13.7 | B | 0.75 |
| 4. Keeaumoku Street and S. King Street | AM | 13.6 | B | 0.64 |
| | PM | 22.8 | C | 0.85 |
| 5. Kalakaua Avenue and S. Beretania Street | AM | 16.9 | B | 0.80 |
| | PM | 16.2 | B | 0.70 |
| 6. Kalakaua Avenue and Young Street | AM | 12.7 | B | 0.68 |
| | PM | 9.7 | A | 0.56 |
| 7. Kalakaua Avenue and S. King Street | AM | 13.3 | B | 0.55 |
| | PM | 20.4 | C | 0.80 |
| 8. Punahou Street and Lunalilo Freeway (H-1) EB Off-Ramp | AM | 20.7 | C | 0.80 |
| | PM | 14.8 | B | 0.75 |
| 9. Punahou Street and S. Beretania Street | AM | 35.9 | D | 0.97 |
| | PM | 24.0 | C | 0.79 |
| 10. Punahou Street and Young Street | AM | 12.4 | B | 0.64 |
| | PM | 10.3 | B | 0.54 |
| 11. Punahou Street and S. King Street | AM | 23.9 | C | 0.71 |
| | PM | 50.6 | D | 1.02 |

Notes:

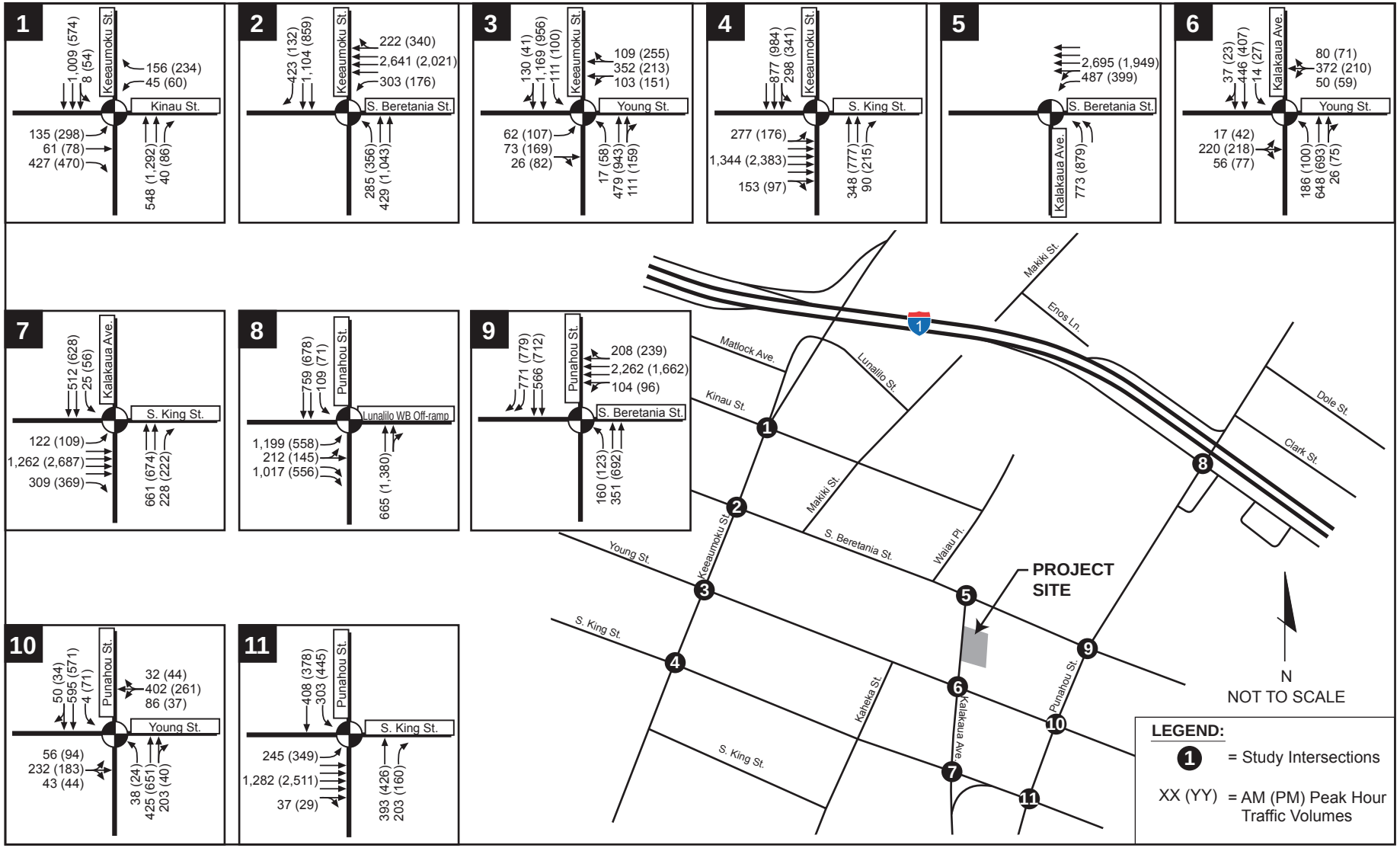
[1] Whole intersection weighted average control delay expressed in seconds per vehicle calculated using methods described in the *2000 HCM*.

[2] LOS = Level of service. LOS calculations conducted using the Synchro level of service analysis software package.

[3] V/C = Volume-to-Capacity Ratio

Unacceptable operations are shown in **bold** typeface.

Source: Fehr & Peers, April 2008.

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# BACKGROUND PEAK-HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS

FIGURE 5

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# 4. PROJECT CONDITIONS

The impacts of the proposed project on the surrounding roadway system are discussed in this chapter. First, the method used to estimate the amount of net new traffic generated by the project is described. Then, the results of the level of service calculations for Project Conditions are presented. Project Conditions are defined as Background Conditions plus traffic generated by the proposed project. A comparison of intersection operations under Background and Project Conditions are presented and the impacts of the project on the study intersections are discussed. This is a realistic evaluation of conditions with already approved development and the proposed project in place.

Other issues addressed in the chapter include potential impacts to non-automobile travel modes and issues regarding site access, on-site circulation, and parking.

## PROJECT TRAFFIC ESTIMATES

The amount of traffic added to the roadway system by the project is estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of added traffic to the roadway network. The second step estimates the direction of travel to and from the project site. The trips are assigned to specific street segments and intersection turning movements during the third step. The results of the process for the proposed project are described in the following sections.

### *Trip Generation*

The amount of traffic generated by the project was estimated based on rates published in *Trip Generation, 7th Edition* (Institute of Transportation Engineers, 2002). ITE describes the land use characteristics for the High-Rise Residential Condominium/Townhouse (Land Use Code 232) as condominiums/townhouse units that are located in buildings with three or more levels (floors). This description matches the project's description of a 23-story residential building. However, the ITE rates published for this use are based on a small number of national trip generation surveys. ITE does not recommend using trip generation studies that are based on low number of studies without further review. Accordingly, we compared ITE rates for high-rise condominiums with those published for the High-Rise Apartment land use category (222). The daily and peak hour rates for high-rise apartments are based on a larger number of studies, but are slightly lower than the condominium rates  Based on this comparison and the fact that this project falls within the range of survey data, we used the High-Rise Condominium rates to estimate vehicle trip generation for the Holomua project. As shown in Table 5 on the next page, the project is estimated to generate 736 new daily trips, 60 new AM peak-hour trips (11 inbound and 49 outbound), and 67 net new PM peak-hour trips (42 inbound and 25 outbound).

### *Trip Distribution*

The directions of approach and departure for the project traffic were estimated based on existing travel patterns and the relative locations of complementary land uses. The major directions of approach and departure form the project trip distribution pattern, as illustrated on Figure 6.

### *Trip Assignment*

The trips generated by the project were assigned to the roadway system based on the directions of approach and departure discussed above. Figure 7 shows the AM and PM peak-hour project trips assigned to each turning movement at the study intersections. Project trips were added to background traffic volumes to establish intersection volumes for Project Conditions, as shown on Figure 8.

**TABLE 5**
**PROJECT TRIP GENERATION RATES AND ESTIMATES**

| Land Use | Size (dwelling units) | Daily Trips | AM Peak Hour Trips | | | PM Peak Hour Trips | | |
|---|---|---|---|---|---|---|---|---|
| | | | In | Out | Total | In | Out | Total |
| **Trip Rates** | | | | | | | | |
| High-Rise Residential Condominums[1] | 1 | 4.18 | 0.06 | 0.28 | 0.34 | 0.24 | 0.14 | 0.38 |
| **Trip Estimates** | | | | | | | | |
| High-Rise Residential Condominums [1] | 176 | 736 | 11 | 49 | 60 | 42 | 25 | 67 |

Notes:

[1] Source: *Trip Generation*, 7th Edition, Institute of Transportation Engineers (2003). Trip generation rates based on average rate for land use code 232.

Source: Fehr & Peers, April 2008.

## PROJECT INTERSECTION LEVELS OF SERVICE

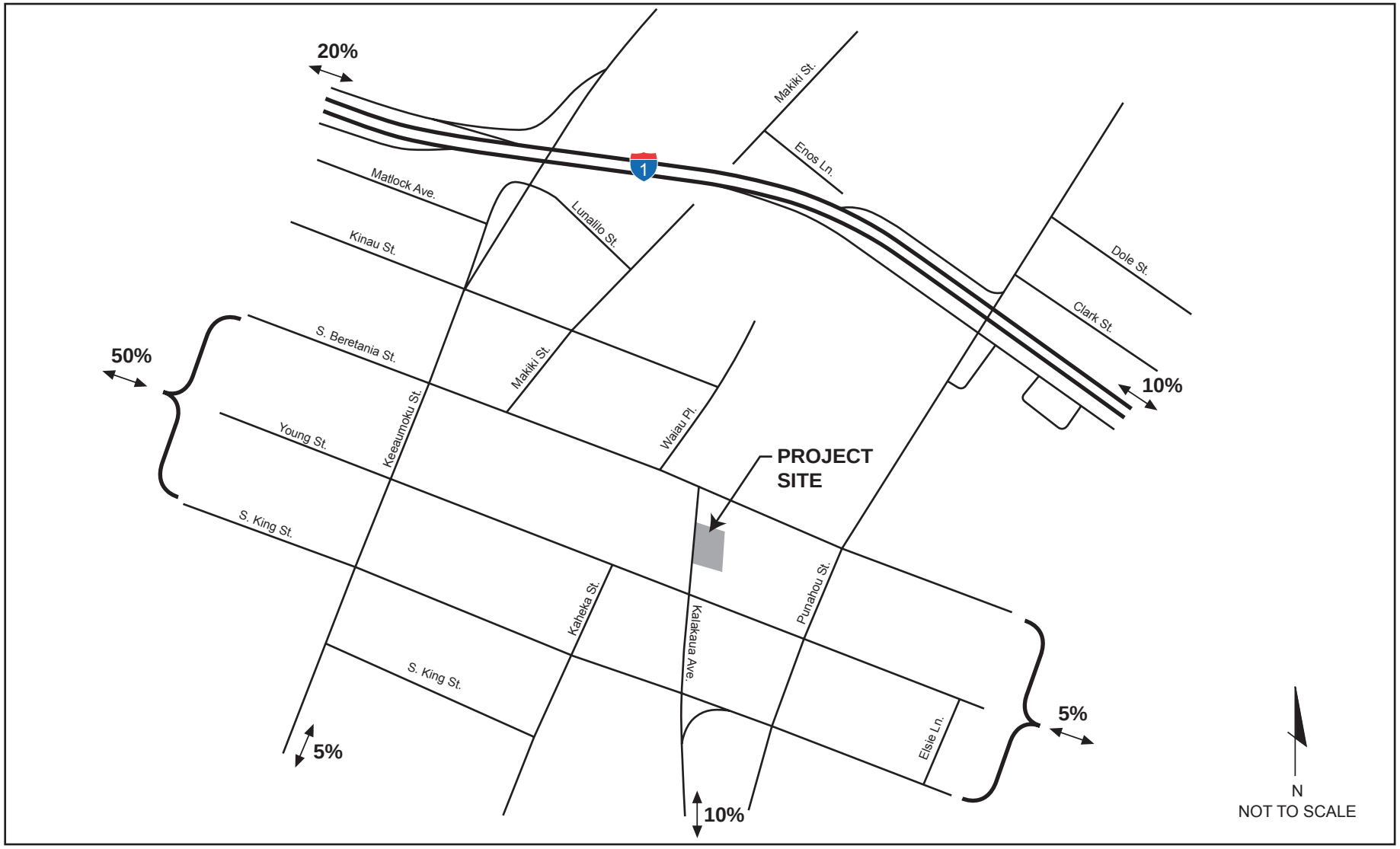
The results of the intersection LOS calculations for Project Conditions are presented in Table 6. Appendix B contains the corresponding calculation sheets. The results for Background Conditions are included for comparison purposes, along with the projected increases in delay and volume-to-capacity (V/C) ratios. The changes in delay and V/C ratio between Background and Project Conditions are used to identify significant impacts if applicable.

Under Project Conditions, all but one of the study intersections will continue to operate at an acceptable level during both peak hours. The addition of project traffic is anticipated to exacerbate unacceptable operations at the Beretania Street/Keeaumoku Street intersection during the AM and PM peak hour. At this location, the project is expected to increase the average vehicle delay by up to 3.9 seconds during the peak hour and the V/C ratio by 0.01.

## INTERSECTION IMPACT CRITERIA

The impacts of the project were evaluated by comparing the results of the level of service calculations under Project Conditions to the results under Background Conditions.

The City and County of Honolulu has not officially adopted impact criteria for assessing the level of significance for project-related impacts on the operating condition of intersections. It is, however, recognized that the potential significance of a proposed project's impact is measured by either the change in the LOS to an unacceptable condition or the change in the average vehicular delay, depending on the base LOS. For example, if an intersection is operating at LOS D or better before the addition of project traffic, the project is expected to have a significant impact if it is projected to operate at LOS E or F after the addition of project traffic.

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## PROJECT TRIP DISTRIBUTION

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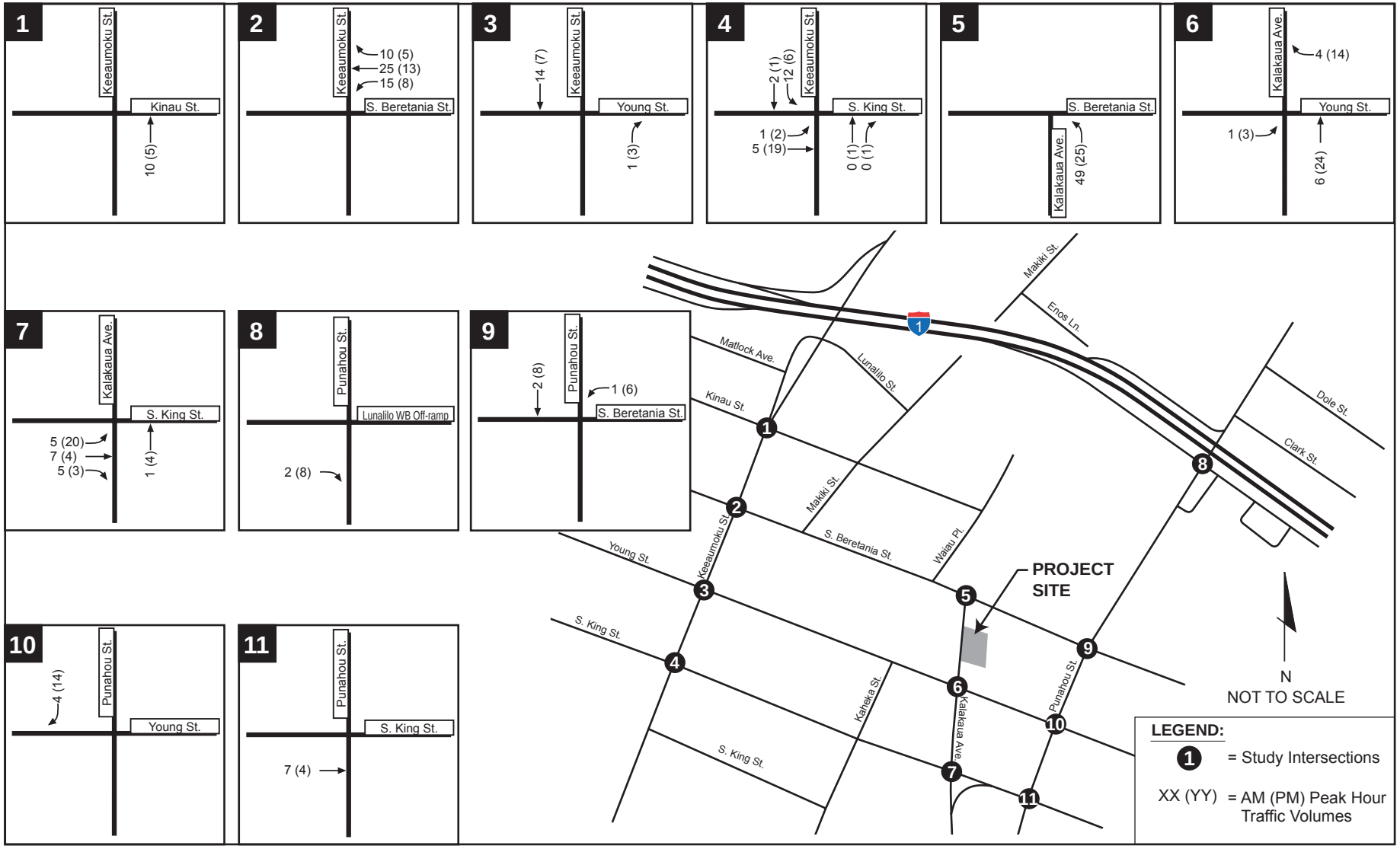
FIGURE 6

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# PEAK-HOUR TURNING MOVEMENT VOLUMES
# PROJECT TRIP ASSIGNMENT

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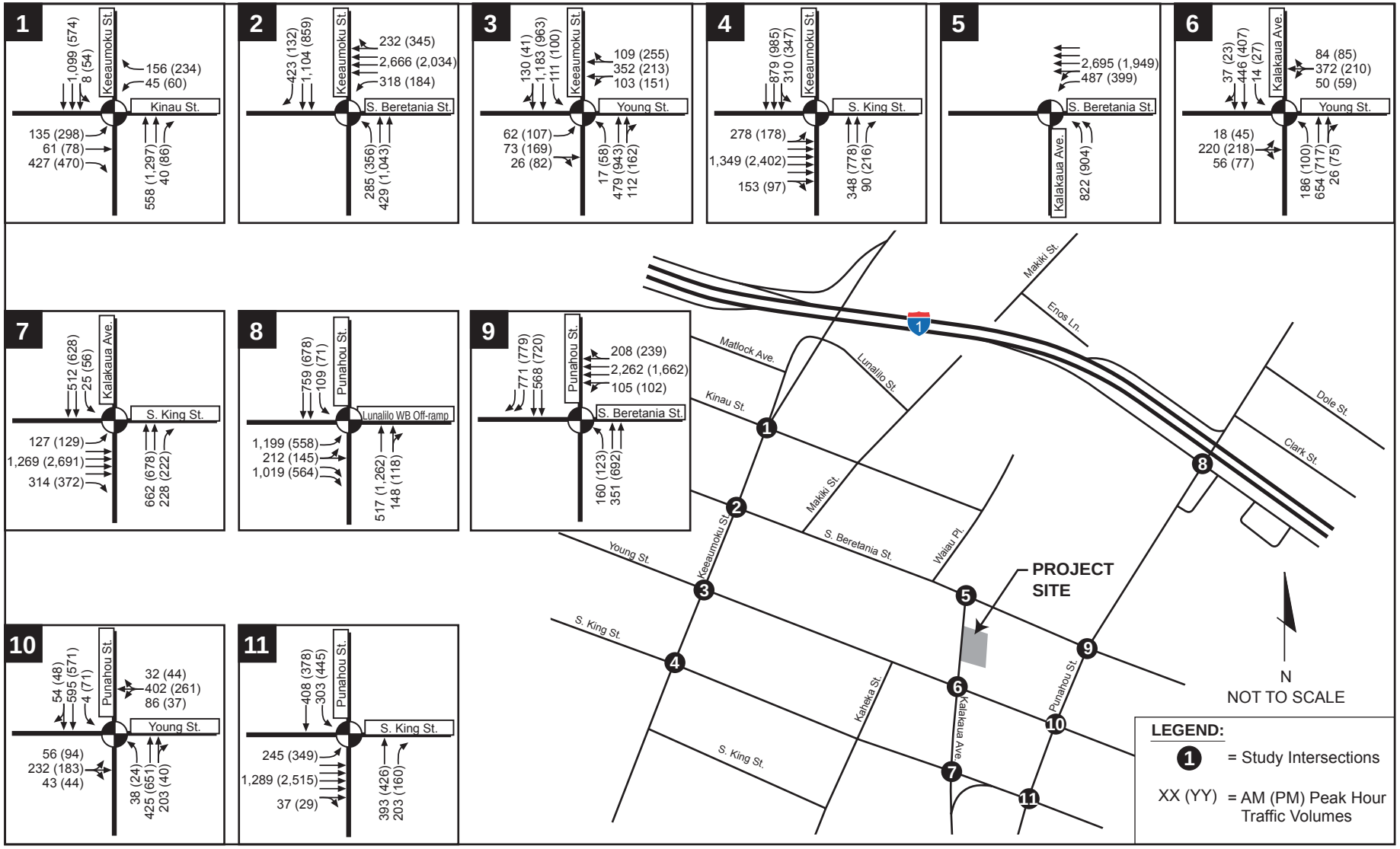
FIGURE 7

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## PROJECT PEAK-HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS

**FIGURE 8**

**TABLE 6**
**PROJECT INTERSECTION LEVELS OF SERVICE**

| Intersection | Peak Hour | Background | | | Project | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Delay[1] | LOS[2] | V/C[3] | Delay[1] | LOS[2] | V/C[3] | Δ in Delay[4] | Δ in V/C[4] |
| 1. Keeaumoku Street and Kinau Street | AM | 10.9 | B | 0.65 | 11.0 | B | 0.65 | +0.1 | 0.000 |
| | PM | 12.9 | B | 0.72 | 13.0 | B | 0.72 | +0.1 | 0.000 |
| 2. Keeaumoku Street and S. Beretania Street | AM | **68.3** | **E** | **1.09** | **71.0** | **E** | **1.09** | +2.7 | 0.000 |
| | PM | **57.5** | **E** | **1.07** | **59.3** | **E** | **1.08** | +1.8 | +0.010 |
| 3. Keeaumoku Street and Young Street | AM | 11.3 | B | 0.70 | 11.4 | B | 0.70 | +0.1 | 0.000 |
| | PM | 13.7 | B | 0.75 | 13.7 | B | 0.74 | 0.0 | -0.010 |
| 4. Keeaumoku Street and S. King Street | AM | 13.6 | B | 0.64 | 13.8 | B | 0.65 | +0.2 | +0.010 |
| | PM | 22.8 | C | 0.85 | 23.1 | C | 0.85 | +0.3 | 0.000 |
| 5. Kalakaua Avenue and S. Beretania Street | AM | 16.9 | B | 0.80 | 18.0 | B | 0.82 | +1.1 | +0.020 |
| | PM | 16.2 | B | 0.70 | 16.6 | B | 0.70 | +0.4 | 0.000 |
| 6. Kalakaua Avenue and Young Street | AM | 12.7 | B | 0.68 | 12.8 | B | 0.68 | +0.1 | 0.000 |
| | PM | 9.7 | A | 0.56 | 10.0 | B | 0.58 | +0.3 | +0.020 |
| 7. Kalakaua Avenue and S. King Street | AM | 13.3 | B | 0.55 | 13.4 | B | 0.55 | +0.1 | 0.000 |
| | PM | 20.4 | C | 0.80 | 20.5 | C | 0.80 | +0.1 | 0.000 |
| 8. Punahou Street and Lunalilo Freeway (H-1) EB Off-Ramp | AM | 20.7 | C | 0.80 | 20.7 | C | 0.80 | 0.0 | 0.000 |
| | PM | 14.8 | B | 0.75 | 14.9 | B | 0.75 | +0.1 | 0.000 |
| 9. Punahou Street and S. Beretania Street | AM | 35.9 | D | 0.97 | 35.9 | D | 0.97 | 0.0 | 0.000 |
| | PM | 24.0 | C | 0.79 | 24.1 | C | 0.79 | +0.1 | 0.000 |
| 10. Punahou Street and Young Street | AM | 12.4 | B | 0.64 | 12.4 | B | 0.64 | 0.0 | 0.000 |
| | PM | 10.3 | B | 0.54 | 10.3 | B | 0.54 | 0.0 | 0.000 |
| 11. Punahou Street and S. King Street | AM | 23.9 | C | 0.71 | 24.1 | C | 0.71 | +0.2 | 0.000 |
| | PM | 50.6 | D | 1.02 | 50.8 | D | 1.02 | +0.2 | 0.000 |

Notes:

1 Whole intersection weighted average control delay expressed in seconds per vehicle calculated using methods described in the *2000 HCM*.

2 LOS = Level of service. LOS calculations conducted using the Synchro level of service analysis software package.

3 Volume-to-capacity ratio (V/C).

4 Change in delay or V/C between Background and Project Conditions.

**Bold** typeface denotes intersections with unacceptable operations.

Source: Fehr & Peers, April 2008.

Typically, if the base or background condition LOS is already E or F, significance is defined in terms of change in the amount of delay and/or V/C ratio as calculated by the HCM operational method. As conditions become more congested, and especially when intersection approaches become over-saturated, the calculation of delay can vary somewhat even with small changes in traffic. In some cases, a small increase in traffic can actually result in a small decrease in delay because the LOS calculations are based on weighted delay. In addition, nominal changes in intersection delay or V/C can be expected on a day-to-day basis as traffic volumes vary by up to 10 percent. Based on this information, a significant impact is defined to occur when the projected change in average control delay is more than five (5) seconds *and* the change in V/C is more than 0.01 or approximately one (1) percent of capacity.

## INTERSECTION IMPACTS

Based on the impact criteria specified above, the proposed project would not have a significant impact at any of the study intersections. While the Beretania Street/Keeaumoku Street intersection is projected to operate unacceptably, this condition is due to the addition of traffic from already approved projects plus growth plus traffic from the project. When project traffic is added directly to existing volumes, the resulting operations at this location would be LOS D with 52.3 and 41.7 seconds of delay during the AM and PM peak hours, respectively. This exercise illustrates that the ***unacceptable operating level at the Beretania Street/Keeaumoku intersection in the future is caused by the cumulative effect of future traffic and not solely by the project***.

## SITE ACCESS, ON-SITE CIRCULATION AND PARKING

### *Site Access*

Access to the site is proposed to be provided by two driveways on Kalakaua Avenue, each of which will be restricted to right turns only (i.e., left-turns in and out will not be permitted). Thus, all project traffic will access the project site in the mauka-bound direction on Kalakaua Avenue. This restriction is appropriate given the volume of traffic (1,270 vehicles during each peak hour) and queuing that currently exists on Kalakaua Avenue along the project site frontage. Though this restriction will lead to some circuitous travel patterns in the project vicinity, the existing layout of streets already requires this similar pattern for existing surrounding land uses. Appropriate signage should be installed indicating to inbound and outbound drivers that both driveways do not permit left turns.

Project Site Frontage on Kalakaua Avenue

Construction of the makai site driveway will require a reduction in the length of the existing loading zone painted on the curb at the makai property line with the adjacent service station/convenience market. Maintaining a loading zone at this location is appropriate to serve all properties along this block and will also limit the time during which a vehicle parks adjacent to the makai project site driveway. The mauka driveway is assumed to primarily be used by vehicles exiting the site or those that require additional room to maneuver.

### *On-Site Circulation*

Vehicle circulation is proposed to be provided by a two-way drive aisle that provides access to parking spaces inside the building. Scaled distances from the site plan on Figure 2 show that the drive aisle is approximately 22 feet wide and serves 18-foot parking spaces. These dimensions meet the minimum parking dimension standards as outlined in the Revised Ordinances of Honolulu (ROH). Section 21, Article 6 and will allow for

adequate two-way circulation and access to parking spaces. Visitor spaces will be located immediately inside the building.

Where the drive aisle intersects the back of the sidewalk on Kalakaua Avenue, adequate sight distance should be provided to allow drivers to see pedestrians. This requires that drivers be able to see at least 8 feet in each direction down the sidewalk before the front of their vehicle crosses the back of walk.

To facilitate walking, a separate pedestrian path should be provided from the sidewalk to the front doors of the building. This helps to separate vehicle traffic from pedestrian activity and minimizes potential conflicts.

Overall, site access and on-site circulation are considered adequate. With adequate sight distance at the driveway and a pedestrian path to the street, we do not recommend any additional changes to the site plan.

***Parking***

This discussion compares the proposed parking supply on the project site to the number of spaces required by the ROH. Section 21, Article 6 of the ROH outlines the minimum number of off-street parking required by type and/or size of land use. Applicable to the proposed project, the following parking requirements apply:

1. Floor area of dwelling unit is 600 s.f. or less: 1 parking space per unit
2. Floor area of dwelling unit is more than 600 s.f. but less than 800 s.f.: 1.5 parking spaces per unit
3. Floor area of dwelling unit is 800 s.f. or more: 2 parking spaces per unit
4. One guest parking space per 10 units

As proposed the project will supply 80 units with areas of 600 s.f. or less, and 96 units with a floor area ranging between 601 s.f. and 800 s.f. This results in a minimum requirement of 242 parking spaces for the project. Table 7 summarizes the number of parking spaces required for the proposed development based on the ROH. The project supply of 245 spaces satisfies the minimum parking code requirements.

**TABLE 7**
**PROJECT PARKING REQUIREMENTS**

| Dwelling Unit Size | Number of Units | Spaces Required[1] | Spaces Provided |
|---|---|---|---|
| 600 s.f. or less | 80 | 80 | |
| More than 600 s.f. but less than 800 s.f. | 96 | 144 | |
| *Subtotal* | *176* | *224* | |
| Guest Parking | | 18 | |
| | **Total** | **242** | **245** |

1. Revised Ordinances of Honolulu (ROH), Section 21, Article 6

Source: City/County of Honolulu website,2008.

## PEDESTRIAN, BICYCLE, AND TRANSIT IMPACT CRITERIA

### *Transit Impact Criteria*

Significant impacts to transit service would occur if the project or any part of the project:

- creates a substantial increase in transit demand that could not be accommodated by existing adjacent transit capacity; or
- causes a substantial increase in delay or operating cost to a transit provider; or
- conflicts with transit policies adopted by the City and County of Honolulu or the State of Hawaii for their respective facilities in the study area.

### *Pedestrian and Bicycle Impact Criteria*

Chapter V. (Transportation & Utilities) of the General Plan for the City and County of Honolulu identifies policies to maintain and enhance existing pedestrian and bicycle networks, as well as policies to reduce dependence on the use of the single occupant automobile. Using the General Plan as a guide, significant impacts to pedestrian and bicycle facilities would occur when the project or an element of the project:

- creates a hazardous condition that currently does not exist for pedestrians or bicyclists, or otherwise interferes with pedestrian accessibility to the site and adjoining areas; or
- creates substantial increase in demand for bicycle and pedestrian facilities where none currently exist or creates conditions that would lead to overcrowding on existing facilities; or
- conflicts with an existing or planned pedestrian or bicycle facility; or
- conflicts with policies related to bicycle and pedestrian activity adopted by the City and County of Honolulu.

Construction-related impacts on pedestrian and bicycle activity are generally not considered significant, since those impacts are temporary.

## POTENTIAL IMPACTS TO NON-AUTOMOBILE MODES

### *Transit Impacts*

Based on the travel characteristics of the proposed residents and the propensity for transit use in Honolulu, the project is expected to generate a substantial number of walk, bike and transit trips due the expected resident demographics, the proximity to available routes and stops, and the higher than average use of transit by Honolulu residents. Numerous retail and restaurant opportunities exist within a short walking distance of the site, including the existing Foodland store on Beretania Street Ewa of Kalakaua Avenue. In addition, all transit lines in the immediate study area can be accessed at stops within a 650-foot walk of the project site.

According to US Census data, 11.6% of commute trips to work are made by transit and taxicabs in the City. This means that an estimated 10 trips and possibly more will be made via transit during the peak hour. These trips would be distributed to most of the routes and stops and would only add a negligible number of riders to existing routes. Implementation of the project would also not substantially affect bus transit operations because: 1) the project would not significantly impact traffic operations, and 2) the project is not proposing

any changes to the configuration of Kalakaua Avenue along the site frontage. Therefore, the project would not significantly impact the bus transit system or operations.

***Pedestrian and Bicycle Impacts***

Currently, sidewalks are provided within typical walking distances on all streets in the immediate vicinity of the project site. In addition, crosswalks are provided at all signalized intersections plus a midblock pedestrian signal on Beretania Street at the Foodland store entrance. While the project will generate pedestrian demand for sidewalks in the area, the volume could be accommodated by the existing facilities. Lastly, project implementation will not conflict with any planned pedestrian facilities. Based on this evaluation, the project is not expected to significantly impact pedestrian circulation, and no improvements are recommended.

Young Street is a designated bicycle route and provides a more attractive alternative to cycling with lower traffic speeds and volumes than King and Beretania Streets. Residents will have direct access to Young Street via Kalakaua Avenue or the sidewalk (for makai-bound riders). In general, the existing off-site bicycle facilities can reasonably accommodate the increased bicycle demand and the project does not conflict with any existing or planned facility; therefore, the project is expected to have a less-than-significant impact to the bicycle system. However, the project should provide bike racks and/or lockers on-site and in highly visible locations to encourage biking and to discourage theft.

# APPENDIX A:
# EXISTING TRAFFIC COUNTS

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Counted by: LT

Intersection of: Keeaumoku Street
and: Kinau Street
Location: Honolulu, Hawaii

Date: February 26, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Tuesday

| TIME | TRAFFIC FROM NORTH on: Keeaumoku Street | | | | | TRAFFIC FROM SOUTH on: Keeaumoku Street | | | | | TRAFFIC FROM EAST on: Kinau Street | | | | | TRAFFIC FROM WEST on: Kinau Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | | 175 | 3 | 0 | 178 | 7 | 129 | | 0 | 136 | 42 | | 7 | 0 | 49 | 71 | 11 | 39 | 0 | 121 | 484 |
| 15-30 | | 205 | 5 | 0 | 210 | 10 | 134 | | 0 | 144 | 46 | | 2 | 0 | 48 | 68 | 5 | 44 | 0 | 117 | 519 |
| 30-45 | | 261 | 1 | 0 | 262 | 16 | 137 | | 0 | 153 | 43 | | 13 | 0 | 56 | 105 | 12 | 28 | 0 | 145 | 616 |
| 45-00 | | 264 | 2 | 0 | 266 | 5 | 140 | | 0 | 145 | 31 | | 21 | 0 | 52 | 116 | 18 | 17 | 0 | 151 | 614 |
| 08:0-15 | | 291 | 0 | 0 | 291 | 7 | 109 | | 0 | 116 | 30 | | 7 | 0 | 37 | 122 | 24 | 41 | 0 | 187 | 631 |
| 15-30 | | 226 | 2 | 0 | 228 | 7 | 127 | | 0 | 134 | 20 | | 13 | 0 | 33 | 119 | 9 | 22 | 0 | 150 | 545 |
| 30-45 | | 173 | 1 | 0 | 174 | 5 | 109 | | 0 | 114 | 16 | | 10 | 0 | 26 | 98 | 15 | 21 | 0 | 134 | 448 |
| 45-00 | | 167 | 1 | 0 | 168 | 8 | 110 | | 0 | 118 | 19 | | 5 | 0 | 24 | 101 | 17 | 14 | 0 | 132 | 442 |
| **2 Hr Totals** | 0 | 1762 | 15 | 0 | 1777 | 65 | 995 | 0 | 0 | 1060 | 247 | 0 | 78 | 0 | 325 | 800 | 111 | 226 | 0 | 1137 | 4299 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 0 | 905 | 11 | 0 | 916 | 38 | 540 | 0 | 0 | 578 | 162 | 0 | 43 | 0 | 205 | 360 | 46 | 128 | 0 | 534 | 2233 |
| 715-815 | 0 | 1021 | 8 | 0 | 1029 | 38 | 520 | 0 | 0 | 558 | 150 | 0 | 43 | 0 | 193 | 411 | 59 | 130 | 0 | 600 | 2380 |
| 730-830 | 0 | 1042 | 5 | 0 | 1047 | 35 | 513 | 0 | 0 | 548 | 124 | 0 | 54 | 0 | 178 | 462 | 63 | 108 | 0 | 633 | 2406 |
| 745-845 | 0 | 954 | 5 | 0 | 959 | 24 | 485 | 0 | 0 | 509 | 97 | 0 | 51 | 0 | 148 | 455 | 66 | 101 | 0 | 622 | 2238 |
| 08-09 | 0 | 857 | 4 | 0 | 861 | 27 | 455 | 0 | 0 | 482 | 85 | 0 | 35 | 0 | 120 | 440 | 65 | 98 | 0 | 603 | 2066 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **730-830** | 0 | 1042 | 5 | 0 | 1047 | 35 | 513 | 0 | 0 | 548 | 124 | 0 | 54 | 0 | 178 | 462 | 63 | 108 | 0 | 633 | 2406 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | | 140 | 9 | 0 | 149 | 13 | 335 | | 0 | 348 | 87 | | 10 | 0 | 97 | 102 | 23 | 91 | 0 | 216 | 810 |
| 15-30 | | 135 | 5 | 0 | 140 | 15 | 268 | | 0 | 283 | 42 | | 10 | 0 | 52 | 78 | 19 | 71 | 0 | 168 | 643 |
| 30-45 | | 139 | 3 | 0 | 142 | 18 | 248 | | 0 | 266 | 39 | | 16 | 0 | 55 | 98 | 13 | 45 | 0 | 156 | 619 |
| 45-00 | | 124 | 17 | 0 | 141 | 29 | 330 | | 0 | 359 | 70 | | 24 | 0 | 94 | 96 | 25 | 69 | 0 | 190 | 784 |
| 05:0-15 | | 120 | 17 | 0 | 137 | 13 | 278 | | 0 | 291 | 60 | | 10 | 0 | 70 | 134 | 19 | 91 | 0 | 244 | 742 |
| 15-30 | | 143 | 15 | 0 | 158 | 23 | 362 | | 0 | 385 | 56 | | 8 | 0 | 64 | 124 | 18 | 82 | 0 | 224 | 831 |
| 30-45 | | 89 | 23 | 0 | 112 | 27 | 298 | | 0 | 325 | 46 | | 21 | 0 | 67 | 108 | 13 | 60 | 0 | 181 | 685 |
| 45-00 | | 99 | 13 | 0 | 112 | 17 | 212 | | 0 | 229 | 49 | | 2 | 0 | 51 | 91 | 28 | 48 | 0 | 167 | 559 |
| **2 Hr Totals** | 0 | 989 | 102 | 0 | 1091 | 155 | 2331 | 0 | 0 | 2486 | 449 | 0 | 101 | 0 | 550 | 831 | 158 | 557 | 0 | 1546 | 5673 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 0 | 538 | 34 | 0 | 572 | 75 | 1181 | 0 | 0 | 1256 | 238 | 0 | 60 | 0 | 298 | 374 | 80 | 276 | 0 | 730 | 2856 |
| 415-515 | 0 | 518 | 42 | 0 | 560 | 75 | 1124 | 0 | 0 | 1199 | 211 | 0 | 60 | 0 | 271 | 406 | 76 | 276 | 0 | 758 | 2788 |
| 430-530 | 0 | 526 | 52 | 0 | 578 | 83 | 1218 | 0 | 0 | 1301 | 225 | 0 | 58 | 0 | 283 | 452 | 75 | 287 | 0 | 814 | 2976 |
| 445-545 | 0 | 476 | 72 | 0 | 548 | 92 | 1268 | 0 | 0 | 1360 | 232 | 0 | 63 | 0 | 295 | 462 | 75 | 302 | 0 | 839 | 3042 |
| 05-06 | 0 | 451 | 68 | 0 | 519 | 80 | 1150 | 0 | 0 | 1230 | 211 | 0 | 41 | 0 | 252 | 457 | 78 | 281 | 0 | 816 | 2817 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **445-545** | 0 | 476 | 72 | 0 | 548 | 92 | 1268 | 0 | 0 | 1360 | 232 | 0 | 63 | 0 | 295 | 462 | 75 | 302 | 0 | 839 | 3042 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Intersection of: Keeaumoku Street
and: Beretania Street
Location: Honolulu, Hawaii

Counted by: LT
Date: March 11, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Tuesday

The Traffic Group

| TIME | TRAFFIC FROM NORTH on: Keeaumoku Street | | | | | TRAFFIC FROM SOUTH on: Keeaumoku Street | | | | | TRAFFIC FROM EAST on: Beretania Street | | | | | TRAFFIC FROM WEST on: Beretania Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | 53 | 184 | | 0 | 237 | | 93 | 93 | 0 | 186 | 48 | 538 | 57 | 0 | 643 | | | | | 0 | 1066 |
| 15-30 | 64 | 196 | | 0 | 260 | | 118 | 74 | 0 | 192 | 52 | 588 | 63 | 0 | 703 | | | | | 0 | 1155 |
| 30-45 | 103 | 242 | | 0 | 345 | | 101 | 68 | 0 | 169 | 51 | 664 | 71 | 0 | 786 | | | | | 0 | 1300 |
| 45-00 | 122 | 286 | | 0 | 408 | | 88 | 61 | 0 | 149 | 49 | 683 | 74 | 0 | 806 | | | | | 0 | 1363 |
| 08:0-15 | 118 | 302 | | 0 | 420 | | 99 | 44 | 0 | 143 | 61 | 603 | 83 | 0 | 747 | | | | | 0 | 1310 |
| 15-30 | 87 | 269 | | 0 | 356 | | 92 | 51 | 0 | 143 | 54 | 538 | 77 | 0 | 669 | | | | | 0 | 1168 |
| 30-45 | 64 | 231 | | 0 | 295 | | 79 | 45 | 0 | 124 | 44 | 485 | 65 | 0 | 594 | | | | | 0 | 1013 |
| 45-00 | 72 | 195 | | 0 | 267 | | 64 | 57 | 0 | 121 | 38 | 472 | 59 | 0 | 569 | | | | | 0 | 957 |
| **2 Hr Totals** | 683 | 1905 | 0 | 0 | 2588 | 0 | 734 | 493 | 0 | 1227 | 397 | 4571 | 549 | 0 | 5517 | 0 | 0 | 0 | 0 | 0 | 9332 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 342 | 908 | 0 | 0 | 1250 | 0 | 400 | 296 | 0 | 696 | 200 | 2473 | 265 | 0 | 2938 | 0 | 0 | 0 | 0 | 0 | 4884 |
| 715-815 | 407 | 1026 | 0 | 0 | 1433 | 0 | 406 | 247 | 0 | 653 | 213 | 2538 | 291 | 0 | 3042 | 0 | 0 | 0 | 0 | 0 | 5128 |
| 730-830 | 430 | 1099 | 0 | 0 | 1529 | 0 | 380 | 224 | 0 | 604 | 215 | 2488 | 305 | 0 | 3008 | 0 | 0 | 0 | 0 | 0 | 5141 |
| 745-845 | 391 | 1088 | 0 | 0 | 1479 | 0 | 358 | 201 | 0 | 559 | 208 | 2309 | 299 | 0 | 2816 | 0 | 0 | 0 | 0 | 0 | 4854 |
| 08-09 | 341 | 997 | 0 | 0 | 1338 | 0 | 334 | 197 | 0 | 531 | 197 | 2098 | 284 | 0 | 2579 | 0 | 0 | 0 | 0 | 0 | 4448 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **730-830** | 430 | 1099 | 0 | 0 | 1529 | 0 | 380 | 224 | 0 | 604 | 215 | 2488 | 305 | 0 | 3008 | 0 | 0 | 0 | 0 | 0 | 5141 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | 40 | 186 | | 0 | 226 | | 209 | 53 | 0 | 262 | 59 | 273 | 24 | 0 | 356 | | | | | 0 | 844 |
| 15-30 | 37 | 191 | | 0 | 228 | | 198 | 49 | 0 | 247 | 62 | 243 | 36 | 0 | 341 | | | | | 0 | 816 |
| 30-45 | 37 | 194 | | 0 | 231 | | 267 | 78 | 0 | 345 | 68 | 392 | 35 | 0 | 495 | | | | | 0 | 1071 |
| 45-00 | 32 | 215 | | 0 | 247 | | 269 | 66 | 0 | 335 | 77 | 390 | 47 | 0 | 514 | | | | | 0 | 1096 |
| 05:0-15 | 28 | 172 | | 0 | 200 | | 212 | 79 | 0 | 291 | 84 | 343 | 43 | 0 | 470 | | | | | 0 | 961 |
| 15-30 | 30 | 219 | | 0 | 249 | | 231 | 84 | 0 | 315 | 98 | 314 | 44 | 0 | 456 | | | | | 0 | 1020 |
| 30-45 | 71 | 173 | | 0 | 244 | | 191 | 63 | 0 | 254 | 122 | 287 | 51 | 0 | 460 | | | | | 0 | 958 |
| 45-00 | 68 | 192 | | 0 | 260 | | 201 | 66 | 0 | 267 | 108 | 262 | 48 | 0 | 418 | | | | | 0 | 945 |
| **2 Hr Totals** | 343 | 1542 | 0 | 0 | 1885 | 0 | 1778 | 538 | 0 | 2316 | 678 | 2504 | 328 | 0 | 3510 | 0 | 0 | 0 | 0 | 0 | 7711 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 146 | 786 | 0 | 0 | 932 | 0 | 943 | 246 | 0 | 1189 | 266 | 1298 | 142 | 0 | 1706 | 0 | 0 | 0 | 0 | 0 | 3827 |
| 415-515 | 134 | 772 | 0 | 0 | 906 | 0 | 946 | 272 | 0 | 1218 | 291 | 1368 | 161 | 0 | 1820 | 0 | 0 | 0 | 0 | 0 | 3944 |
| 430-530 | 127 | 800 | 0 | 0 | 927 | 0 | 979 | 307 | 0 | 1286 | 327 | 1439 | 169 | 0 | 1935 | 0 | 0 | 0 | 0 | 0 | 4148 |
| 445-545 | 161 | 779 | 0 | 0 | 940 | 0 | 903 | 292 | 0 | 1195 | 381 | 1334 | 185 | 0 | 1900 | 0 | 0 | 0 | 0 | 0 | 4035 |
| 05-06 | 197 | 756 | 0 | 0 | 953 | 0 | 835 | 292 | 0 | 1127 | 412 | 1206 | 186 | 0 | 1804 | 0 | 0 | 0 | 0 | 0 | 3884 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **430-530** | 127 | 800 | 0 | 0 | 927 | 0 | 979 | 307 | 0 | 1286 | 327 | 1439 | 169 | 0 | 1935 | 0 | 0 | 0 | 0 | 0 | 4148 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Counted by: AM

Intersection of: Keeaumoku Street
and: Young Street
Location: Honolulu, Hawaii

Date: March 19, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Wednesday

The Traffic Group

| TIME | TRAFFIC FROM NORTH on: Keeaumoku Street | | | | | TRAFFIC FROM SOUTH on: Keeaumoku Street | | | | | TRAFFIC FROM EAST on: Young Street | | | | | TRAFFIC FROM WEST on: Young Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | 15 | 203 | 20 | 0 | 238 | 1 | 121 | 1 | 0 | 123 | 3 | 45 | 12 | 0 | 60 | 7 | 14 | 2 | 0 | 23 | 444 |
| 15-30 | 15 | 230 | 13 | 0 | 258 | 3 | 141 | 4 | 0 | 148 | 9 | 52 | 9 | 0 | 70 | 9 | 10 | 12 | 0 | 31 | 507 |
| 30-45 | 20 | 243 | 13 | 0 | 276 | 3 | 143 | 7 | 0 | 153 | 12 | 52 | 15 | 0 | 79 | 4 | 6 | 3 | 0 | 13 | 521 |
| 45-00 | 25 | 236 | 11 | 0 | 272 | 3 | 103 | 12 | 0 | 118 | 7 | 40 | 8 | 0 | 55 | 10 | 13 | 4 | 0 | 27 | 472 |
| 08:0-15 | 35 | 210 | 12 | 0 | 257 | 1 | 123 | 8 | 0 | 132 | 10 | 47 | 16 | 0 | 73 | 8 | 12 | 4 | 0 | 24 | 486 |
| 15-30 | 28 | 229 | 12 | 0 | 269 | 0 | 124 | 9 | 0 | 133 | 16 | 42 | 15 | 0 | 73 | 14 | 13 | 8 | 0 | 35 | 510 |
| 30-45 | 21 | 229 | 11 | 0 | 261 | 3 | 116 | 14 | 0 | 133 | 17 | 45 | 10 | 0 | 72 | 15 | 17 | 11 | 0 | 43 | 509 |
| 45-00 | 24 | 236 | 14 | 0 | 274 | 4 | 119 | 12 | 0 | 135 | 16 | 48 | 12 | 0 | 76 | 13 | 22 | 9 | 0 | 44 | 529 |
| **2 Hr Totals** | 183 | 1816 | 106 | 0 | 2105 | 18 | 990 | 67 | 0 | 1075 | 90 | 371 | 97 | 0 | 558 | 80 | 107 | 53 | 0 | 240 | 3978 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 75 | 912 | 57 | 0 | 1044 | 10 | 508 | 24 | 0 | 542 | 31 | 189 | 44 | 0 | 264 | 30 | 43 | 21 | 0 | 94 | 1944 |
| 715-815 | 95 | 919 | 49 | 0 | 1063 | 10 | 510 | 31 | 0 | 551 | 38 | 191 | 48 | 0 | 277 | 31 | 41 | 23 | 0 | 95 | 1986 |
| 730-830 | 108 | 918 | 48 | 0 | 1074 | 7 | 493 | 36 | 0 | 536 | 45 | 181 | 54 | 0 | 280 | 36 | 44 | 19 | 0 | 99 | 1989 |
| 745-845 | 109 | 904 | 46 | 0 | 1059 | 7 | 466 | 43 | 0 | 516 | 50 | 174 | 49 | 0 | 273 | 47 | 55 | 27 | 0 | 129 | 1977 |
| 08-09 | 108 | 904 | 49 | 0 | 1061 | 8 | 482 | 43 | 0 | 533 | 59 | 182 | 53 | 0 | 294 | 50 | 64 | 32 | 0 | 146 | 2034 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **08-09** | 108 | 904 | 49 | 0 | 1061 | 8 | 482 | 43 | 0 | 533 | 59 | 182 | 53 | 0 | 294 | 50 | 64 | 32 | 0 | 146 | 2034 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | 13 | 209 | 12 | 0 | 234 | 11 | 157 | 19 | 0 | 187 | 21 | 37 | 10 | 0 | 68 | 17 | 28 | 14 | 0 | 59 | 548 |
| 15-30 | 7 | 211 | 33 | 0 | 251 | 13 | 151 | 14 | 0 | 178 | 28 | 32 | 16 | 0 | 76 | 18 | 28 | 15 | 0 | 61 | 566 |
| 30-45 | 9 | 223 | 12 | 0 | 244 | 16 | 223 | 17 | 0 | 256 | 32 | 50 | 17 | 0 | 99 | 18 | 38 | 19 | 0 | 75 | 674 |
| 45-00 | 13 | 226 | 22 | 0 | 261 | 16 | 266 | 19 | 0 | 301 | 50 | 64 | 21 | 0 | 135 | 19 | 48 | 20 | 0 | 87 | 784 |
| 05:0-15 | 9 | 191 | 14 | 0 | 214 | 2 | 204 | 12 | 0 | 218 | 49 | 39 | 20 | 0 | 108 | 19 | 44 | 33 | 0 | 96 | 636 |
| 15-30 | 8 | 179 | 22 | 0 | 209 | 6 | 214 | 8 | 0 | 228 | 55 | 41 | 5 | 0 | 101 | 23 | 24 | 31 | 0 | 78 | 616 |
| 30-45 | 9 | 193 | 11 | 0 | 213 | 3 | 183 | 18 | 0 | 204 | 67 | 30 | 16 | 0 | 113 | 16 | 26 | 16 | 0 | 58 | 588 |
| 45-00 | 11 | 218 | 11 | 0 | 240 | 3 | 189 | 18 | 0 | 210 | 38 | 40 | 11 | 0 | 89 | 11 | 38 | 20 | 0 | 69 | 608 |
| **2 Hr Totals** | 79 | 1650 | 137 | 0 | 1866 | 70 | 1587 | 125 | 0 | 1782 | 340 | 333 | 116 | 0 | 789 | 141 | 274 | 168 | 0 | 583 | 5020 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 42 | 869 | 79 | 0 | 990 | 56 | 797 | 69 | 0 | 922 | 131 | 183 | 64 | 0 | 378 | 72 | 142 | 68 | 0 | 282 | 2572 |
| 415-515 | 38 | 851 | 81 | 0 | 970 | 47 | 844 | 62 | 0 | 953 | 159 | 185 | 74 | 0 | 418 | 74 | 158 | 87 | 0 | 319 | 2660 |
| 430-530 | 39 | 819 | 70 | 0 | 928 | 40 | 907 | 56 | 0 | 1003 | 186 | 194 | 63 | 0 | 443 | 79 | 154 | 103 | 0 | 336 | 2710 |
| 445-545 | 39 | 789 | 69 | 0 | 897 | 27 | 867 | 57 | 0 | 951 | 221 | 174 | 62 | 0 | 457 | 77 | 142 | 100 | 0 | 319 | 2624 |
| 05-06 | 37 | 781 | 58 | 0 | 876 | 14 | 790 | 56 | 0 | 860 | 209 | 150 | 52 | 0 | 411 | 69 | 132 | 100 | 0 | 301 | 2448 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **430-530** | 39 | 819 | 70 | 0 | 928 | 40 | 907 | 56 | 0 | 1003 | 186 | 194 | 63 | 0 | 443 | 79 | 154 | 103 | 0 | 336 | 2710 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Intersection of: Keeaumoku Street
and: King Street
Location: Honolulu, Hawaii

Counted by: LT/EP
Date: March 12, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Wednesday

The Traffic Group

| TIME | TRAFFIC FROM NORTH on: Keeaumoku Street | | | | | TRAFFIC FROM SOUTH on: Keeaumoku Street | | | | | TRAFFIC FROM EAST on: King Street | | | | | TRAFFIC FROM WEST on: King Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | | 153 | 45 | 0 | 198 | 21 | 66 | | 0 | 87 | | | | | 0 | 36 | 324 | 60 | 0 | 420 | 705 |
| 15-30 | | 176 | 62 | 0 | 238 | 14 | 63 | | 0 | 77 | | | | | 0 | 35 | 375 | 77 | 0 | 487 | 802 |
| 30-45 | | 208 | 73 | 0 | 281 | 22 | 96 | | 0 | 118 | | | | | 0 | 42 | 362 | 55 | 0 | 459 | 858 |
| 45-00 | | 233 | 67 | 0 | 300 | 26 | 78 | | 0 | 104 | | | | | 0 | 33 | 264 | 37 | 0 | 334 | 738 |
| 08:0-15 | | 217 | 75 | 0 | 292 | 25 | 82 | | 0 | 107 | | | | | 0 | 37 | 285 | 46 | 0 | 368 | 767 |
| 15-30 | | 185 | 83 | 0 | 268 | 32 | 69 | | 0 | 101 | | | | | 0 | 41 | 304 | 71 | 0 | 416 | 785 |
| 30-45 | | 166 | 74 | 0 | 240 | 24 | 77 | | 0 | 101 | | | | | 0 | 33 | 332 | 64 | 0 | 429 | 770 |
| 45-00 | | 174 | 69 | 0 | 243 | 33 | 81 | | 0 | 114 | | | | | 0 | 36 | 317 | 57 | 0 | 410 | 767 |
| **2 Hr Totals** | 0 | 1512 | 548 | 0 | 2060 | 197 | 612 | 0 | 0 | 809 | 0 | 0 | 0 | 0 | 0 | 293 | 2563 | 467 | 0 | 3323 | 6192 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 0 | 770 | 247 | 0 | 1017 | 83 | 303 | 0 | 0 | 386 | 0 | 0 | 0 | 0 | 0 | 146 | 1325 | 229 | 0 | 1700 | 3103 |
| 715-815 | 0 | 834 | 277 | 0 | 1111 | 87 | 319 | 0 | 0 | 406 | 0 | 0 | 0 | 0 | 0 | 147 | 1286 | 215 | 0 | 1648 | 3165 |
| 730-830 | 0 | 843 | 298 | 0 | 1141 | 105 | 325 | 0 | 0 | 430 | 0 | 0 | 0 | 0 | 0 | 153 | 1215 | 209 | 0 | 1577 | 3148 |
| 745-845 | 0 | 801 | 299 | 0 | 1100 | 107 | 306 | 0 | 0 | 413 | 0 | 0 | 0 | 0 | 0 | 144 | 1185 | 218 | 0 | 1547 | 3060 |
| 08-09 | 0 | 742 | 301 | 0 | 1043 | 114 | 309 | 0 | 0 | 423 | 0 | 0 | 0 | 0 | 0 | 147 | 1238 | 238 | 0 | 1623 | 3089 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **715-815** | 0 | 834 | 277 | 0 | 1111 | 87 | 319 | 0 | 0 | 406 | 0 | 0 | 0 | 0 | 0 | 147 | 1286 | 215 | 0 | 1648 | 3165 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | | 210 | 83 | 0 | 293 | 32 | 198 | | 0 | 230 | | | | | 0 | 26 | 454 | 30 | 0 | 510 | 1033 |
| 15-30 | | 298 | 73 | 0 | 371 | 42 | 208 | | 0 | 250 | | | | | 0 | 21 | 412 | 22 | 0 | 455 | 1076 |
| 30-45 | | 265 | 84 | 0 | 349 | 36 | 182 | | 0 | 218 | | | | | 0 | 24 | 398 | 26 | 0 | 448 | 1015 |
| 45-00 | | 292 | 78 | 0 | 370 | 32 | 185 | | 0 | 217 | | | | | 0 | 24 | 381 | 24 | 0 | 429 | 1016 |
| 05:0-15 | | 208 | 73 | 0 | 281 | 36 | 196 | | 0 | 232 | | | | | 0 | 22 | 294 | 22 | 0 | 338 | 851 |
| 15-30 | | 169 | 63 | 0 | 232 | 29 | 149 | | 0 | 178 | | | | | 0 | 23 | 284 | 20 | 0 | 327 | 737 |
| 30-45 | | 174 | 67 | 0 | 241 | 23 | 151 | | 0 | 174 | | | | | 0 | 25 | 292 | 23 | 0 | 340 | 755 |
| 45-00 | | 168 | 53 | 0 | 221 | 26 | 147 | | 0 | 173 | | | | | 0 | 23 | 256 | 21 | 0 | 300 | 694 |
| **2 Hr Totals** | 0 | 1784 | 574 | 0 | 2358 | 256 | 1416 | 0 | 0 | 1672 | 0 | 0 | 0 | 0 | 0 | 188 | 2771 | 188 | 0 | 3147 | 7177 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 0 | 1065 | 318 | 0 | 1383 | 142 | 773 | 0 | 0 | 915 | 0 | 0 | 0 | 0 | 0 | 95 | 1645 | 102 | 0 | 1842 | 4140 |
| 415-515 | 0 | 1063 | 308 | 0 | 1371 | 146 | 771 | 0 | 0 | 917 | 0 | 0 | 0 | 0 | 0 | 91 | 1485 | 94 | 0 | 1670 | 3958 |
| 430-530 | 0 | 934 | 298 | 0 | 1232 | 133 | 712 | 0 | 0 | 845 | 0 | 0 | 0 | 0 | 0 | 93 | 1357 | 92 | 0 | 1542 | 3619 |
| 445-545 | 0 | 843 | 281 | 0 | 1124 | 120 | 681 | 0 | 0 | 801 | 0 | 0 | 0 | 0 | 0 | 94 | 1251 | 89 | 0 | 1434 | 3359 |
| 05-06 | 0 | 719 | 256 | 0 | 975 | 114 | 643 | 0 | 0 | 757 | 0 | 0 | 0 | 0 | 0 | 93 | 1126 | 86 | 0 | 1305 | 3037 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **04-05** | 0 | 1065 | 318 | 0 | 1383 | 142 | 773 | 0 | 0 | 915 | 0 | 0 | 0 | 0 | 0 | 95 | 1645 | 102 | 0 | 1842 | 4140 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Counted by: LT

Intersection of: Kalakaua Avenue
and: Beretania Street
Location: Honolulu, Hawaii

Date: March 6, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Thursday

The Traffic Group

| TIME | TRAFFIC FROM NORTH on: Kalakaua Avenue | | | | | TRAFFIC FROM SOUTH on: Kalakaua Avenue | | | | | TRAFFIC FROM EAST on: Beretania Street | | | | | TRAFFIC FROM WEST on: Beretania Steet | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | | | | | 0 | | | 183 | 0 | 183 | | 513 | 92 | 0 | 605 | | | | | 0 | 788 |
| 15-30 | | | | | 0 | | | 186 | 0 | 186 | | 592 | 87 | 0 | 679 | | | | | 0 | 865 |
| 30-45 | | | | | 0 | | | 197 | 0 | 197 | | 653 | 103 | 0 | 756 | | | | | 0 | 953 |
| 45-00 | | | | | 0 | | | 179 | 0 | 179 | | 675 | 117 | 0 | 792 | | | | | 0 | 971 |
| 08:0-15 | | | | | 0 | | | 162 | 0 | 162 | | 622 | 156 | 0 | 778 | | | | | 0 | 940 |
| 15-30 | | | | | 0 | | | 148 | 0 | 148 | | 567 | 142 | 0 | 709 | | | | | 0 | 857 |
| 30-45 | | | | | 0 | | | 127 | 0 | 127 | | 471 | 126 | 0 | 597 | | | | | 0 | 724 |
| 45-00 | | | | | 0 | | | 135 | 0 | 135 | | 429 | 141 | 0 | 570 | | | | | 0 | 705 |
| **2 Hr Totals** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1317 | 0 | 1317 | 0 | 4522 | 964 | 0 | 5486 | 0 | 0 | 0 | 0 | 0 | 6803 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 745 | 0 | 745 | 0 | 2433 | 399 | 0 | 2832 | 0 | 0 | 0 | 0 | 0 | 3577 |
| 715-815 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 724 | 0 | 724 | 0 | 2542 | 463 | 0 | 3005 | 0 | 0 | 0 | 0 | 0 | 3729 |
| 730-830 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 686 | 0 | 686 | 0 | 2517 | 518 | 0 | 3035 | 0 | 0 | 0 | 0 | 0 | 3721 |
| 745-845 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 616 | 0 | 616 | 0 | 2335 | 541 | 0 | 2876 | 0 | 0 | 0 | 0 | 0 | 3492 |
| 08-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 572 | 0 | 572 | 0 | 2089 | 565 | 0 | 2654 | 0 | 0 | 0 | 0 | 0 | 3226 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **715-815** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 724 | 0 | 724 | 0 | 2542 | 463 | 0 | 3005 | 0 | 0 | 0 | 0 | 0 | 3729 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | | | | | 0 | | | 241 | 0 | 241 | | 471 | 134 | 0 | 605 | | | | | 0 | 846 |
| 15-30 | | | | | 0 | | | 219 | 0 | 219 | | 427 | 90 | 0 | 517 | | | | | 0 | 736 |
| 30-45 | | | | | 0 | | | 243 | 0 | 243 | | 493 | 93 | 0 | 586 | | | | | 0 | 829 |
| 45-00 | | | | | 0 | | | 164 | 0 | 164 | | 460 | 78 | 0 | 538 | | | | | 0 | 702 |
| 05:0-15 | | | | | 0 | | | 193 | 0 | 193 | | 415 | 121 | 0 | 536 | | | | | 0 | 729 |
| 15-30 | | | | | 0 | | | 224 | 0 | 224 | | 354 | 85 | 0 | 439 | | | | | 0 | 663 |
| 30-45 | | | | | 0 | | | 176 | 0 | 176 | | 379 | 103 | 0 | 482 | | | | | 0 | 658 |
| 45-00 | | | | | 0 | | | 139 | 0 | 139 | | 318 | 93 | 0 | 411 | | | | | 0 | 550 |
| **2 Hr Totals** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1599 | 0 | 1599 | 0 | 3317 | 797 | 0 | 4114 | 0 | 0 | 0 | 0 | 0 | 5713 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 867 | 0 | 867 | 0 | 1851 | 395 | 0 | 2246 | 0 | 0 | 0 | 0 | 0 | 3113 |
| 415-515 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 819 | 0 | 819 | 0 | 1795 | 382 | 0 | 2177 | 0 | 0 | 0 | 0 | 0 | 2996 |
| 430-530 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 824 | 0 | 824 | 0 | 1722 | 377 | 0 | 2099 | 0 | 0 | 0 | 0 | 0 | 2923 |
| 445-545 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 757 | 0 | 757 | 0 | 1608 | 387 | 0 | 1995 | 0 | 0 | 0 | 0 | 0 | 2752 |
| 05-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 732 | 0 | 732 | 0 | 1466 | 402 | 0 | 1868 | 0 | 0 | 0 | 0 | 0 | 2600 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **04-05** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 867 | 0 | 867 | 0 | 1851 | 395 | 0 | 2246 | 0 | 0 | 0 | 0 | 0 | 3113 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Counted by: EP

Intersection of: Kalakaua Avenue
and: Young Street
Location: Honolulu, Hawaii

Date: February 28, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Thursday

| TIME | TRAFFIC FROM NORTH on: Kalakaua Avenue | | | | | TRAFFIC FROM SOUTH on: Kalakaua Avenue | | | | | TRAFFIC FROM EAST on: Young Street | | | | | TRAFFIC FROM WEST on: Young Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | 5 | 76 | 0 | 0 | 81 | 1 | 163 | 32 | 0 | 196 | 26 | 61 | 6 | 0 | 93 | 10 | 42 | 7 | 0 | 59 | 429 |
| 15-30 | 6 | 77 | 3 | 0 | 86 | 1 | 155 | 42 | 0 | 198 | 22 | 73 | 5 | 0 | 100 | 9 | 48 | 5 | 0 | 62 | 446 |
| 30-45 | 9 | 86 | 2 | 0 | 97 | 8 | 168 | 51 | 0 | 227 | 22 | 103 | 10 | 0 | 135 | 10 | 57 | 2 | 0 | 69 | 528 |
| 45-00 | 10 | 114 | 3 | 0 | 127 | 7 | 147 | 38 | 0 | 192 | 18 | 96 | 14 | 0 | 128 | 12 | 52 | 4 | 0 | 68 | 515 |
| 08:0-15 | 11 | 147 | 5 | 0 | 163 | 9 | 134 | 25 | 0 | 168 | 15 | 86 | 19 | 0 | 120 | 11 | 33 | 5 | 0 | 49 | 500 |
| 15-30 | 10 | 128 | 4 | 0 | 142 | 8 | 122 | 21 | 0 | 151 | 13 | 87 | 14 | 0 | 114 | 7 | 34 | 3 | 0 | 44 | 451 |
| 30-45 | 8 | 117 | 2 | 0 | 127 | 6 | 109 | 16 | 0 | 131 | 10 | 85 | 11 | 0 | 106 | 3 | 27 | 2 | 0 | 32 | 396 |
| 45-00 | 8 | 121 | 6 | 0 | 135 | 7 | 112 | 15 | 0 | 134 | 14 | 82 | 9 | 0 | 105 | 5 | 29 | 4 | 0 | 38 | 412 |
| **2 Hr Totals** | 67 | 866 | 25 | 0 | 958 | 47 | 1110 | 240 | 0 | 1397 | 140 | 673 | 88 | 0 | 901 | 67 | 322 | 32 | 0 | 421 | 3677 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 30 | 353 | 8 | 0 | 391 | 17 | 633 | 163 | 0 | 813 | 88 | 333 | 35 | 0 | 456 | 41 | 199 | 18 | 0 | 258 | 1918 |
| 715-815 | 36 | 424 | 13 | 0 | 473 | 25 | 604 | 156 | 0 | 785 | 77 | 358 | 48 | 0 | 483 | 42 | 190 | 16 | 0 | 248 | 1989 |
| 730-830 | 40 | 475 | 14 | 0 | 529 | 32 | 571 | 135 | 0 | 738 | 68 | 372 | 57 | 0 | 497 | 40 | 176 | 14 | 0 | 230 | 1994 |
| 745-845 | 39 | 506 | 14 | 0 | 559 | 30 | 512 | 100 | 0 | 642 | 56 | 354 | 58 | 0 | 468 | 33 | 146 | 14 | 0 | 193 | 1862 |
| 08-09 | 37 | 513 | 17 | 0 | 567 | 30 | 477 | 77 | 0 | 584 | 52 | 340 | 53 | 0 | 445 | 26 | 123 | 14 | 0 | 163 | 1759 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **730-830** | 40 | 475 | 14 | 0 | 529 | 32 | 571 | 135 | 0 | 738 | 68 | 372 | 57 | 0 | 497 | 40 | 176 | 14 | 0 | 230 | 1994 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | 13 | 103 | 8 | 0 | 124 | 12 | 182 | 22 | 0 | 216 | 26 | 36 | 6 | 0 | 68 | 17 | 41 | 11 | 0 | 69 | 477 |
| 15-30 | 8 | 97 | 3 | 0 | 108 | 12 | 168 | 18 | 0 | 198 | 22 | 48 | 5 | 0 | 75 | 13 | 44 | 6 | 0 | 63 | 444 |
| 30-45 | 2 | 93 | 3 | 0 | 98 | 13 | 163 | 13 | 0 | 189 | 22 | 58 | 10 | 0 | 90 | 18 | 55 | 9 | 0 | 82 | 459 |
| 45-00 | 10 | 95 | 9 | 0 | 114 | 14 | 171 | 23 | 0 | 208 | 18 | 51 | 14 | 0 | 83 | 13 | 50 | 14 | 0 | 77 | 482 |
| 05:0-15 | 6 | 102 | 9 | 0 | 117 | 26 | 153 | 18 | 0 | 197 | 15 | 46 | 19 | 0 | 80 | 16 | 39 | 11 | 0 | 66 | 460 |
| 15-30 | 4 | 95 | 5 | 0 | 104 | 19 | 158 | 13 | 0 | 190 | 13 | 47 | 14 | 0 | 74 | 7 | 37 | 6 | 0 | 50 | 418 |
| 30-45 | 7 | 121 | 3 | 0 | 131 | 29 | 163 | 16 | 0 | 208 | 10 | 45 | 11 | 0 | 66 | 16 | 25 | 12 | 0 | 53 | 458 |
| 45-00 | 3 | 103 | 3 | 0 | 109 | 17 | 147 | 8 | 0 | 172 | 14 | 42 | 9 | 0 | 65 | 16 | 40 | 10 | 0 | 66 | 412 |
| **2 Hr Totals** | 53 | 809 | 43 | 0 | 905 | 142 | 1305 | 131 | 0 | 1578 | 140 | 373 | 88 | 0 | 601 | 116 | 331 | 79 | 0 | 526 | 3610 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 33 | 388 | 23 | 0 | 444 | 51 | 684 | 76 | 0 | 811 | 88 | 193 | 35 | 0 | 316 | 61 | 190 | 40 | 0 | 291 | 1862 |
| 415-515 | 26 | 387 | 24 | 0 | 437 | 65 | 655 | 72 | 0 | 792 | 77 | 203 | 48 | 0 | 328 | 60 | 188 | 40 | 0 | 288 | 1845 |
| 430-530 | 22 | 385 | 26 | 0 | 433 | 72 | 645 | 67 | 0 | 784 | 68 | 202 | 57 | 0 | 327 | 54 | 181 | 40 | 0 | 275 | 1819 |
| 445-545 | 27 | 413 | 26 | 0 | 466 | 88 | 645 | 70 | 0 | 803 | 56 | 189 | 58 | 0 | 303 | 52 | 151 | 43 | 0 | 246 | 1818 |
| 05-06 | 20 | 421 | 20 | 0 | 461 | 91 | 621 | 55 | 0 | 767 | 52 | 180 | 53 | 0 | 285 | 55 | 141 | 39 | 0 | 235 | 1748 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **04-05** | 33 | 388 | 23 | 0 | 444 | 51 | 684 | 76 | 0 | 811 | 88 | 193 | 35 | 0 | 316 | 61 | 190 | 40 | 0 | 291 | 1862 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Counted by: AM

Intersection of: Kalakaua Avenue
and: King Street
Location: Honolulu, Hawaii

Date: March 25, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Tuesday

The Traffic Group

| TIME | TRAFFIC FROM NORTH on: Kalakaua Avenue | | | | | TRAFFIC FROM SOUTH on: Kalakaua Avenue | | | | | TRAFFIC FROM EAST on: King Street | | | | | TRAFFIC FROM WEST on: King Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | | 107 | 1 | 0 | 108 | 21 | 145 | | 0 | 166 | | | | | 0 | 61 | 189 | 7 | 0 | 257 | 531 |
| 15-30 | | 93 | 3 | 0 | 96 | 22 | 180 | | 0 | 202 | | | | | 0 | 87 | 186 | 7 | 0 | 280 | 578 |
| 30-45 | | 142 | 4 | 0 | 146 | 31 | 153 | | 0 | 184 | | | | | 0 | 91 | 251 | 11 | 0 | 353 | 683 |
| 45-00 | | 141 | 7 | 0 | 148 | 33 | 143 | | 0 | 176 | | | | | 0 | 58 | 141 | 12 | 0 | 211 | 535 |
| 08:0-15 | | 104 | 6 | 0 | 110 | 33 | 117 | | 0 | 150 | | | | | 0 | 61 | 193 | 3 | 0 | 257 | 517 |
| 15-30 | | 121 | 5 | 0 | 126 | 31 | 121 | | 0 | 152 | | | | | 0 | 67 | 198 | 8 | 0 | 273 | 551 |
| 30-45 | | 142 | 5 | 0 | 147 | 38 | 151 | | 0 | 189 | | | | | 0 | 53 | 251 | 16 | 0 | 320 | 656 |
| 45-00 | | 137 | 6 | 0 | 143 | 34 | 133 | | 0 | 167 | | | | | 0 | 62 | 227 | 12 | 0 | 301 | 611 |
| **2 Hr Totals** | 0 | 987 | 37 | 0 | 1024 | 243 | 1143 | 0 | 0 | 1386 | 0 | 0 | 0 | 0 | 0 | 540 | 1636 | 76 | 0 | 2252 | 4662 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 0 | 483 | 15 | 0 | 498 | 107 | 621 | 0 | 0 | 728 | 0 | 0 | 0 | 0 | 0 | 297 | 767 | 37 | 0 | 1101 | 2327 |
| 715-815 | 0 | 480 | 20 | 0 | 500 | 119 | 593 | 0 | 0 | 712 | 0 | 0 | 0 | 0 | 0 | 297 | 771 | 33 | 0 | 1101 | 2313 |
| 730-830 | 0 | 508 | 22 | 0 | 530 | 128 | 534 | 0 | 0 | 662 | 0 | 0 | 0 | 0 | 0 | 277 | 783 | 34 | 0 | 1094 | 2286 |
| 745-845 | 0 | 508 | 23 | 0 | 531 | 135 | 532 | 0 | 0 | 667 | 0 | 0 | 0 | 0 | 0 | 239 | 783 | 39 | 0 | 1061 | 2259 |
| 08-09 | 0 | 504 | 22 | 0 | 526 | 136 | 522 | 0 | 0 | 658 | 0 | 0 | 0 | 0 | 0 | 243 | 869 | 39 | 0 | 1151 | 2335 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **08-09** | 0 | 504 | 22 | 0 | 526 | 136 | 522 | 0 | 0 | 658 | 0 | 0 | 0 | 0 | 0 | 243 | 869 | 39 | 0 | 1151 | 2335 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | | 170 | 15 | 0 | 185 | 46 | 184 | | 0 | 230 | | | | | 0 | 64 | 510 | 19 | 0 | 593 | 1008 |
| 15-30 | | 152 | 8 | 0 | 160 | 49 | 202 | | 0 | 251 | | | | | 0 | 75 | 512 | 15 | 0 | 602 | 1013 |
| 30-45 | | 148 | 13 | 0 | 161 | 47 | 179 | | 0 | 226 | | | | | 0 | 65 | 703 | 17 | 0 | 785 | 1172 |
| 45-00 | | 120 | 10 | 0 | 130 | 56 | 126 | | 0 | 182 | | | | | 0 | 98 | 646 | 34 | 0 | 778 | 1090 |
| 05:0-15 | | 168 | 13 | 0 | 181 | 57 | 148 | | 0 | 205 | | | | | 0 | 96 | 624 | 25 | 0 | 745 | 1131 |
| 15-30 | | 146 | 11 | 0 | 157 | 53 | 149 | | 0 | 202 | | | | | 0 | 96 | 608 | 23 | 0 | 727 | 1086 |
| 30-45 | | 154 | 13 | 0 | 167 | 53 | 155 | | 0 | 208 | | | | | 0 | 88 | 651 | 18 | 0 | 757 | 1132 |
| 45-00 | | 128 | 10 | 0 | 138 | 53 | 135 | | 0 | 188 | | | | | 0 | 97 | 514 | 28 | 0 | 639 | 965 |
| **2 Hr Totals** | 0 | 1186 | 93 | 0 | 1279 | 414 | 1278 | 0 | 0 | 1692 | 0 | 0 | 0 | 0 | 0 | 679 | 4768 | 179 | 0 | 5626 | 8597 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 0 | 590 | 46 | 0 | 636 | 198 | 691 | 0 | 0 | 889 | 0 | 0 | 0 | 0 | 0 | 302 | 2371 | 85 | 0 | 2758 | 4283 |
| 415-515 | 0 | 588 | 44 | 0 | 632 | 209 | 655 | 0 | 0 | 864 | 0 | 0 | 0 | 0 | 0 | 334 | 2485 | 91 | 0 | 2910 | 4406 |
| 430-530 | 0 | 582 | 47 | 0 | 629 | 213 | 602 | 0 | 0 | 815 | 0 | 0 | 0 | 0 | 0 | 355 | 2581 | 99 | 0 | 3035 | 4479 |
| 445-545 | 0 | 588 | 47 | 0 | 635 | 219 | 578 | 0 | 0 | 797 | 0 | 0 | 0 | 0 | 0 | 378 | 2529 | 100 | 0 | 3007 | 4439 |
| 05-06 | 0 | 596 | 47 | 0 | 643 | 216 | 587 | 0 | 0 | 803 | 0 | 0 | 0 | 0 | 0 | 377 | 2397 | 94 | 0 | 2868 | 4314 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **430-530** | 0 | 582 | 47 | 0 | 629 | 213 | 602 | 0 | 0 | 815 | 0 | 0 | 0 | 0 | 0 | 355 | 2581 | 99 | 0 | 3035 | 4479 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Counted by: LT

Intersection of: Punahou Street — Date: March 4, 2008 — Day: Tuesday

and: Lunalilo Pwy (H-1) EB Off Ramp/Bingham Street — Weather: Sunny, Warm

Location: Honolulu, Hawaii — Entered by: AG

| TIME | TRAFFIC FROM NORTH on: Punahou Street | | | | | TRAFFIC FROM SOUTH on: Punahou Street | | | | | TRAFFIC FROM EAST on: Bingham Street | | | | | TRAFFIC FROM WEST on: H-1 EB Off Ramp | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | | 159 | 24 | 0 | 183 | 23 | 83 | | 0 | 106 | | | | | 0 | 192 | 25 | 331 | 0 | 548 | 837 |
| 15-30 | | 222 | 24 | 0 | 246 | 22 | 103 | | 0 | 125 | | | | | 0 | 279 | 43 | 330 | 0 | 652 | 1023 |
| 30-45 | | 229 | 28 | 0 | 257 | 48 | 183 | | 0 | 231 | | | | | 0 | 240 | 29 | 305 | 0 | 574 | 1062 |
| 45-00 | | 255 | 23 | 0 | 278 | 64 | 156 | | 0 | 220 | | | | | 0 | 291 | 54 | 297 | 0 | 642 | 1140 |
| 08:0-15 | | 244 | 30 | 0 | 274 | 30 | 125 | | 0 | 155 | | | | | 0 | 341 | 78 | 221 | 0 | 640 | 1069 |
| 15-30 | | 220 | 25 | 0 | 245 | 22 | 136 | | 0 | 158 | | | | | 0 | 352 | 63 | 228 | 0 | 643 | 1046 |
| 30-45 | | 210 | 22 | 0 | 232 | 32 | 112 | | 0 | 144 | | | | | 0 | 310 | 51 | 140 | 0 | 501 | 877 |
| 45-00 | | 147 | 25 | 0 | 172 | 65 | 155 | | 0 | 220 | | | | | 0 | 372 | 101 | 154 | 0 | 627 | 1019 |
| **2 Hr Totals** | 0 | 1686 | 201 | 0 | 1887 | 306 | 1053 | 0 | 0 | 1359 | 0 | 0 | 0 | 0 | 0 | 2377 | 444 | 2006 | 0 | 4827 | 8073 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 0 | 865 | 99 | 0 | 964 | 157 | 525 | 0 | 0 | 682 | 0 | 0 | 0 | 0 | 0 | 1002 | 151 | 1263 | 0 | 2416 | 4062 |
| 715-815 | 0 | 950 | 105 | 0 | 1055 | 164 | 567 | 0 | 0 | 731 | 0 | 0 | 0 | 0 | 0 | 1151 | 204 | 1153 | 0 | 2508 | 4294 |
| 730-830 | 0 | 948 | 106 | 0 | 1054 | 164 | 600 | 0 | 0 | 764 | 0 | 0 | 0 | 0 | 0 | 1224 | 224 | 1051 | 0 | 2499 | 4317 |
| 745-845 | 0 | 929 | 100 | 0 | 1029 | 148 | 529 | 0 | 0 | 677 | 0 | 0 | 0 | 0 | 0 | 1294 | 246 | 886 | 0 | 2426 | 4132 |
| 08-09 | 0 | 821 | 102 | 0 | 923 | 149 | 528 | 0 | 0 | 677 | 0 | 0 | 0 | 0 | 0 | 1375 | 293 | 743 | 0 | 2411 | 4011 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **730-830** | 0 | 948 | 106 | 0 | 1054 | 164 | 600 | 0 | 0 | 764 | 0 | 0 | 0 | 0 | 0 | 1224 | 224 | 1051 | 0 | 2499 | 4317 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | | 195 | 17 | 0 | 212 | 37 | 281 | | 0 | 318 | | | | | 0 | 195 | 39 | 229 | 0 | 463 | 993 |
| 15-30 | | 174 | 29 | 0 | 203 | 26 | 289 | | 0 | 315 | | | | | 0 | 185 | 23 | 161 | 0 | 369 | 887 |
| 30-45 | | 179 | 16 | 0 | 195 | 9 | 322 | | 0 | 331 | | | | | 0 | 149 | 42 | 195 | 0 | 386 | 912 |
| 45-00 | | 140 | 15 | 0 | 155 | 55 | 343 | | 0 | 398 | | | | | 0 | 114 | 34 | 102 | 0 | 250 | 803 |
| 05:0-15 | | 166 | 20 | 0 | 186 | 31 | 342 | | 0 | 373 | | | | | 0 | 101 | 39 | 154 | 0 | 294 | 853 |
| 15-30 | | 167 | 17 | 0 | 184 | 18 | 265 | | 0 | 283 | | | | | 0 | 103 | 24 | 86 | 0 | 213 | 680 |
| 30-45 | | 150 | 17 | 0 | 167 | 16 | 292 | | 0 | 308 | | | | | 0 | 126 | 36 | 112 | 0 | 274 | 749 |
| 45-00 | | 133 | 18 | 0 | 151 | 17 | 255 | | 0 | 272 | | | | | 0 | 129 | 28 | 129 | 0 | 286 | 709 |
| **2 Hr Totals** | 0 | 1304 | 149 | 0 | 1453 | 209 | 2389 | 0 | 0 | 2598 | 0 | 0 | 0 | 0 | 0 | 1102 | 265 | 1168 | 0 | 2535 | 6586 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 0 | 688 | 77 | 0 | 765 | 127 | 1235 | 0 | 0 | 1362 | 0 | 0 | 0 | 0 | 0 | 643 | 138 | 687 | 0 | 1468 | 3595 |
| 415-515 | 0 | 659 | 80 | 0 | 739 | 121 | 1296 | 0 | 0 | 1417 | 0 | 0 | 0 | 0 | 0 | 549 | 138 | 612 | 0 | 1299 | 3455 |
| 430-530 | 0 | 652 | 68 | 0 | 720 | 113 | 1272 | 0 | 0 | 1385 | 0 | 0 | 0 | 0 | 0 | 467 | 139 | 537 | 0 | 1143 | 3248 |
| 445-545 | 0 | 623 | 69 | 0 | 692 | 120 | 1242 | 0 | 0 | 1362 | 0 | 0 | 0 | 0 | 0 | 444 | 133 | 454 | 0 | 1031 | 3085 |
| 05-06 | 0 | 616 | 72 | 0 | 688 | 82 | 1154 | 0 | 0 | 1236 | 0 | 0 | 0 | 0 | 0 | 459 | 127 | 481 | 0 | 1067 | 2991 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **04-05** | 0 | 688 | 77 | 0 | 765 | 127 | 1235 | 0 | 0 | 1362 | 0 | 0 | 0 | 0 | 0 | 643 | 138 | 687 | 0 | 1468 | 3595 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

**Intersection of: Punahou Street**
**and: Beretania Street**
**Location: Honolulu, Hawaii**

**Counted by: LT/EP**
**Date: March 5, 2008**
**Weather: Sunny, Warm**
**Entered by: AG**

**Day: Wednesday**

| TIME | TRAFFIC FROM NORTH on: Punahou Street | | | | | TRAFFIC FROM SOUTH on: Punahou Street | | | | | TRAFFIC FROM EAST on: Beretania Street | | | | | TRAFFIC FROM WEST on: Beretania Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | 131 | 113 | | 0 | 244 | | 65 | 18 | 0 | 83 | 56 | 437 | 18 | 0 | 511 | | | | | 0 | 838 |
| 15-30 | 151 | 107 | | 0 | 258 | | 71 | 33 | 0 | 104 | 55 | 528 | 21 | 0 | 604 | | | | | 0 | 966 |
| 30-45 | 162 | 138 | | 0 | 300 | | 77 | 45 | 0 | 122 | 45 | 541 | 26 | 0 | 612 | | | | | 0 | 1034 |
| 45-00 | 178 | 153 | | 0 | 331 | | 85 | 42 | 0 | 127 | 47 | 553 | 28 | 0 | 628 | | | | | 0 | 1086 |
| 08:0-15 | 196 | 144 | | 0 | 340 | | 86 | 34 | 0 | 120 | 43 | 521 | 25 | 0 | 589 | | | | | 0 | 1049 |
| 15-30 | 211 | 137 | | 0 | 348 | | 74 | 38 | 0 | 112 | 32 | 443 | 17 | 0 | 492 | | | | | 0 | 952 |
| 30-45 | 210 | 151 | | 0 | 361 | | 84 | 13 | 0 | 97 | 45 | 360 | 11 | 0 | 416 | | | | | 0 | 874 |
| 45-00 | 198 | 146 | | 0 | 344 | | 77 | 22 | 0 | 99 | 38 | 347 | 13 | 0 | 398 | | | | | 0 | 841 |
| **2 Hr Totals** | 1437 | 1089 | 0 | 0 | 2526 | 0 | 619 | 245 | 0 | 864 | 361 | 3730 | 159 | 0 | 4250 | 0 | 0 | 0 | 0 | 0 | 7640 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 622 | 511 | 0 | 0 | 1133 | 0 | 298 | 138 | 0 | 436 | 203 | 2059 | 93 | 0 | 2355 | 0 | 0 | 0 | 0 | 0 | 3924 |
| 715-815 | 687 | 542 | 0 | 0 | 1229 | 0 | 319 | 154 | 0 | 473 | 190 | 2143 | 100 | 0 | 2433 | 0 | 0 | 0 | 0 | 0 | 4135 |
| 730-830 | 747 | 572 | 0 | 0 | 1319 | 0 | 322 | 159 | 0 | 481 | 167 | 2058 | 96 | 0 | 2321 | 0 | 0 | 0 | 0 | 0 | 4121 |
| 745-845 | 795 | 585 | 0 | 0 | 1380 | 0 | 329 | 127 | 0 | 456 | 167 | 1877 | 81 | 0 | 2125 | 0 | 0 | 0 | 0 | 0 | 3961 |
| 08-09 | 815 | 578 | 0 | 0 | 1393 | 0 | 321 | 107 | 0 | 428 | 158 | 1671 | 66 | 0 | 1895 | 0 | 0 | 0 | 0 | 0 | 3716 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **715-815** | 687 | 542 | 0 | 0 | 1229 | 0 | 319 | 154 | 0 | 473 | 190 | 2143 | 100 | 0 | 2433 | 0 | 0 | 0 | 0 | 0 | 4135 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | 196 | 165 | | 0 | 361 | | 131 | 24 | 0 | 155 | 62 | 459 | 15 | 0 | 536 | | | | | 0 | 1052 |
| 15-30 | 181 | 169 | | 0 | 350 | | 141 | 29 | 0 | 170 | 50 | 391 | 31 | 0 | 472 | | | | | 0 | 992 |
| 30-45 | 181 | 176 | | 0 | 357 | | 133 | 32 | 0 | 165 | 54 | 373 | 20 | 0 | 447 | | | | | 0 | 969 |
| 45-00 | 188 | 166 | | 0 | 354 | | 157 | 28 | 0 | 185 | 81 | 462 | 24 | 0 | 567 | | | | | 0 | 1106 |
| 05:0-15 | 181 | 164 | | 0 | 345 | | 177 | 24 | 0 | 201 | 64 | 414 | 30 | 0 | 508 | | | | | 0 | 1054 |
| 15-30 | 137 | 162 | | 0 | 299 | | 174 | 34 | 0 | 208 | 34 | 315 | 18 | 0 | 367 | | | | | 0 | 874 |
| 30-45 | 119 | 176 | | 0 | 295 | | 215 | 25 | 0 | 240 | 33 | 357 | 21 | 0 | 411 | | | | | 0 | 946 |
| 45-00 | 143 | 144 | | 0 | 287 | | 197 | 15 | 0 | 212 | 45 | 228 | 22 | 0 | 295 | | | | | 0 | 794 |
| **2 Hr Totals** | 1326 | 1322 | 0 | 0 | 2648 | 0 | 1325 | 211 | 0 | 1536 | 423 | 2999 | 181 | 0 | 3603 | 0 | 0 | 0 | 0 | 0 | 7787 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 746 | 676 | 0 | 0 | 1422 | 0 | 562 | 113 | 0 | 675 | 247 | 1685 | 90 | 0 | 2022 | 0 | 0 | 0 | 0 | 0 | 4119 |
| 415-515 | 731 | 675 | 0 | 0 | 1406 | 0 | 608 | 113 | 0 | 721 | 249 | 1640 | 105 | 0 | 1994 | 0 | 0 | 0 | 0 | 0 | 4121 |
| 430-530 | 687 | 668 | 0 | 0 | 1355 | 0 | 641 | 118 | 0 | 759 | 233 | 1564 | 92 | 0 | 1889 | 0 | 0 | 0 | 0 | 0 | 4003 |
| 445-545 | 625 | 668 | 0 | 0 | 1293 | 0 | 723 | 111 | 0 | 834 | 212 | 1548 | 93 | 0 | 1853 | 0 | 0 | 0 | 0 | 0 | 3980 |
| 05-06 | 580 | 646 | 0 | 0 | 1226 | 0 | 763 | 98 | 0 | 861 | 176 | 1314 | 91 | 0 | 1581 | 0 | 0 | 0 | 0 | 0 | 3668 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **415-515** | 731 | 675 | 0 | 0 | 1406 | 0 | 608 | 113 | 0 | 721 | 249 | 1640 | 105 | 0 | 1994 | 0 | 0 | 0 | 0 | 0 | 4121 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Counted by: LT

Intersection of: Punahou Street
and: Young Street
Location: Honolulu, Hawaii

Date: February 28, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Thursday

| TIME | TRAFFIC FROM NORTH on: Punahou Street | | | | | TRAFFIC FROM SOUTH on: Punahou Street | | | | | TRAFFIC FROM EAST on: Young Street | | | | | TRAFFIC FROM WEST on: Young Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | 10 | 95 | 1 | 0 | 106 | 32 | 50 | 30 | 0 | 112 | 7 | 84 | 18 | 0 | 109 | 9 | 59 | 3 | 0 | 71 | 398 |
| 15-30 | 7 | 116 | 0 | 0 | 123 | 40 | 101 | 9 | 0 | 150 | 7 | 83 | 17 | 0 | 107 | 6 | 51 | 3 | 0 | 60 | 440 |
| 30-45 | 16 | 147 | 2 | 0 | 165 | 62 | 104 | 9 | 0 | 175 | 5 | 87 | 23 | 0 | 115 | 10 | 61 | 16 | 0 | 87 | 542 |
| 45-00 | 14 | 164 | 1 | 0 | 179 | 64 | 89 | 12 | 0 | 165 | 8 | 114 | 25 | 0 | 147 | 14 | 82 | 16 | 0 | 112 | 603 |
| 08:0-15 | 11 | 143 | 1 | 0 | 155 | 29 | 110 | 7 | 0 | 146 | 11 | 103 | 18 | 0 | 132 | 4 | 29 | 5 | 0 | 38 | 471 |
| 15-30 | 12 | 111 | 0 | 0 | 123 | 34 | 93 | 9 | 0 | 136 | 10 | 98 | 17 | 0 | 125 | 6 | 31 | 6 | 0 | 43 | 427 |
| 30-45 | 7 | 172 | 0 | 0 | 179 | 25 | 83 | 5 | 0 | 113 | 3 | 97 | 7 | 0 | 107 | 4 | 24 | 7 | 0 | 35 | 434 |
| 45-00 | 9 | 143 | 1 | 0 | 153 | 29 | 64 | 7 | 0 | 100 | 4 | 83 | 6 | 0 | 93 | 5 | 29 | 12 | 0 | 46 | 392 |
| **2 Hr Totals** | 86 | 1091 | 6 | 0 | 1183 | 315 | 694 | 88 | 0 | 1097 | 55 | 749 | 131 | 0 | 935 | 58 | 366 | 68 | 0 | 492 | 3707 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 47 | 522 | 4 | 0 | 573 | 198 | 344 | 60 | 0 | 602 | 27 | 368 | 83 | 0 | 478 | 39 | 253 | 38 | 0 | 330 | 1983 |
| 715-815 | 48 | 570 | 4 | 0 | 622 | 195 | 404 | 37 | 0 | 636 | 31 | 387 | 83 | 0 | 501 | 34 | 223 | 40 | 0 | 297 | 2056 |
| 730-830 | 53 | 565 | 4 | 0 | 622 | 189 | 396 | 37 | 0 | 622 | 34 | 402 | 83 | 0 | 519 | 34 | 203 | 43 | 0 | 280 | 2043 |
| 745-845 | 44 | 590 | 2 | 0 | 636 | 152 | 375 | 33 | 0 | 560 | 32 | 412 | 67 | 0 | 511 | 28 | 166 | 34 | 0 | 228 | 1935 |
| 08-09 | 39 | 569 | 2 | 0 | 610 | 117 | 350 | 28 | 0 | 495 | 28 | 381 | 48 | 0 | 457 | 19 | 113 | 30 | 0 | 162 | 1724 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **715-815** | 48 | 570 | 4 | 0 | 622 | 195 | 404 | 37 | 0 | 636 | 31 | 387 | 83 | 0 | 501 | 34 | 223 | 40 | 0 | 297 | 2056 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | 8 | 149 | 12 | 0 | 169 | 6 | 172 | 3 | 0 | 181 | 10 | 48 | 5 | 0 | 63 | 6 | 33 | 21 | 0 | 60 | 473 |
| 15-30 | 3 | 137 | 15 | 0 | 155 | 3 | 162 | 10 | 0 | 175 | 9 | 58 | 5 | 0 | 72 | 6 | 28 | 17 | 0 | 51 | 453 |
| 30-45 | 9 | 119 | 12 | 0 | 140 | 10 | 128 | 2 | 0 | 140 | 10 | 84 | 13 | 0 | 107 | 5 | 35 | 17 | 0 | 57 | 444 |
| 45-00 | 8 | 133 | 16 | 0 | 157 | 9 | 130 | 6 | 0 | 145 | 7 | 64 | 5 | 0 | 76 | 13 | 49 | 17 | 0 | 79 | 457 |
| 05:0-15 | 10 | 130 | 14 | 0 | 154 | 9 | 173 | 7 | 0 | 189 | 8 | 55 | 9 | 0 | 72 | 9 | 41 | 18 | 0 | 68 | 483 |
| 15-30 | 6 | 151 | 26 | 0 | 183 | 10 | 189 | 8 | 0 | 207 | 17 | 48 | 9 | 0 | 74 | 5 | 51 | 20 | 0 | 76 | 540 |
| 30-45 | 4 | 105 | 17 | 0 | 126 | 8 | 155 | 6 | 0 | 169 | 19 | 40 | 4 | 0 | 63 | 8 | 20 | 23 | 0 | 51 | 409 |
| 45-00 | 9 | 121 | 17 | 0 | 147 | 5 | 179 | 6 | 0 | 190 | 20 | 46 | 6 | 0 | 72 | 6 | 24 | 12 | 0 | 42 | 451 |
| **2 Hr Totals** | 57 | 1045 | 129 | 0 | 1231 | 60 | 1288 | 48 | 0 | 1396 | 100 | 443 | 56 | 0 | 599 | 58 | 281 | 145 | 0 | 484 | 3710 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 28 | 538 | 55 | 0 | 621 | 28 | 592 | 21 | 0 | 641 | 36 | 254 | 28 | 0 | 318 | 30 | 145 | 72 | 0 | 247 | 1827 |
| 415-515 | 30 | 519 | 57 | 0 | 606 | 31 | 593 | 25 | 0 | 649 | 34 | 261 | 32 | 0 | 327 | 33 | 153 | 69 | 0 | 255 | 1837 |
| 430-530 | 33 | 533 | 68 | 0 | 634 | 38 | 620 | 23 | 0 | 681 | 42 | 251 | 36 | 0 | 329 | 32 | 176 | 72 | 0 | 280 | 1924 |
| 445-545 | 28 | 519 | 73 | 0 | 620 | 36 | 647 | 27 | 0 | 710 | 51 | 207 | 27 | 0 | 285 | 35 | 161 | 78 | 0 | 274 | 1889 |
| 05-06 | 29 | 507 | 74 | 0 | 610 | 32 | 696 | 27 | 0 | 755 | 64 | 189 | 28 | 0 | 281 | 28 | 136 | 73 | 0 | 237 | 1883 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **430-530** | 33 | 533 | 68 | 0 | 634 | 38 | 620 | 23 | 0 | 681 | 42 | 251 | 36 | 0 | 329 | 32 | 176 | 72 | 0 | 280 | 1924 |

## VEHICLE TURNING MOVEMENT COUNT - SUMMARY

Counted by: LT

Intersection of: Punahou Street
and: King Street
Location: Honolulu, Hawaii

Date: February 27, 2008
Weather: Sunny, Warm
Entered by: AG

Day: Wednesday

| TIME | TRAFFIC FROM NORTH on: Punahou Street | | | | | TRAFFIC FROM SOUTH on: Punahou Street | | | | | TRAFFIC FROM EAST on: King Street | | | | | TRAFFIC FROM WEST on: King Street | | | | | TOTAL N + S + E + W |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | RIGHT | THRU | LEFT | U-TN | TOTAL | |
| **AM** | | | | | | | | | | | | | | | | | | | | | |
| 07:0-15 | | 80 | 46 | 0 | 126 | 32 | 82 | | 0 | 114 | | | | | 0 | 8 | 258 | 59 | 0 | 325 | 565 |
| 15-30 | | 91 | 64 | 0 | 155 | 40 | 95 | | 0 | 135 | | | | | 0 | 8 | 316 | 46 | 0 | 370 | 660 |
| 30-45 | | 101 | 86 | 0 | 187 | 62 | 99 | | 0 | 161 | | | | | 0 | 8 | 318 | 59 | 0 | 385 | 733 |
| 45-00 | | 103 | 70 | 0 | 173 | 64 | 102 | | 0 | 166 | | | | | 0 | 14 | 292 | 57 | 0 | 363 | 702 |
| 08:0-15 | | 97 | 62 | 0 | 159 | 29 | 82 | | 0 | 111 | | | | | 0 | 6 | 305 | 69 | 0 | 380 | 650 |
| 15-30 | | 87 | 61 | 0 | 148 | 34 | 62 | | 0 | 96 | | | | | 0 | 9 | 236 | 53 | 0 | 298 | 542 |
| 30-45 | | 91 | 58 | 0 | 149 | 25 | 56 | | 0 | 81 | | | | | 0 | 6 | 233 | 46 | 0 | 285 | 515 |
| 45-00 | | 95 | 73 | 0 | 168 | 29 | 55 | | 0 | 84 | | | | | 0 | 2 | 240 | 55 | 0 | 297 | 549 |
| **2 Hr Totals** | 0 | 745 | 520 | 0 | 1265 | 315 | 633 | 0 | 0 | 948 | 0 | 0 | 0 | 0 | 0 | 61 | 2198 | 444 | 0 | 2703 | 4916 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 07-08 | 0 | 375 | 266 | 0 | 641 | 198 | 378 | 0 | 0 | 576 | 0 | 0 | 0 | 0 | 0 | 38 | 1184 | 221 | 0 | 1443 | 2660 |
| 715-815 | 0 | 392 | 282 | 0 | 674 | 195 | 378 | 0 | 0 | 573 | 0 | 0 | 0 | 0 | 0 | 36 | 1231 | 231 | 0 | 1498 | 2745 |
| 730-830 | 0 | 388 | 279 | 0 | 667 | 189 | 345 | 0 | 0 | 534 | 0 | 0 | 0 | 0 | 0 | 37 | 1151 | 238 | 0 | 1426 | 2627 |
| 745-845 | 0 | 378 | 251 | 0 | 629 | 152 | 302 | 0 | 0 | 454 | 0 | 0 | 0 | 0 | 0 | 35 | 1066 | 225 | 0 | 1326 | 2409 |
| 08-09 | 0 | 370 | 254 | 0 | 624 | 117 | 255 | 0 | 0 | 372 | 0 | 0 | 0 | 0 | 0 | 23 | 1014 | 223 | 0 | 1260 | 2256 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **715-815** | 0 | 392 | 282 | 0 | 674 | 195 | 378 | 0 | 0 | 573 | 0 | 0 | 0 | 0 | 0 | 36 | 1231 | 231 | 0 | 1498 | 2745 |
| **PM** | | | | | | | | | | | | | | | | | | | | | |
| 04:0-15 | | 49 | 81 | 0 | 130 | 44 | 53 | | 0 | 97 | | | | | 0 | 15 | 326 | 37 | 0 | 378 | 605 |
| 15-30 | | 73 | 104 | 0 | 177 | 33 | 57 | | 0 | 90 | | | | | 0 | 6 | 452 | 90 | 0 | 548 | 815 |
| 30-45 | | 104 | 126 | 0 | 230 | 44 | 98 | | 0 | 142 | | | | | 0 | 5 | 596 | 68 | 0 | 669 | 1041 |
| 45-00 | | 68 | 71 | 0 | 139 | 36 | 89 | | 0 | 125 | | | | | 0 | 6 | 574 | 65 | 0 | 645 | 909 |
| 05:0-15 | | 107 | 135 | 0 | 242 | 42 | 104 | | 0 | 146 | | | | | 0 | 8 | 636 | 114 | 0 | 758 | 1146 |
| 15-30 | | 81 | 73 | 0 | 154 | 32 | 119 | | 0 | 151 | | | | | 0 | 9 | 605 | 83 | 0 | 697 | 1002 |
| 30-45 | | 73 | 77 | 0 | 150 | 56 | 105 | | 0 | 161 | | | | | 0 | 2 | 715 | 101 | 0 | 818 | 1129 |
| 45-00 | | 71 | 67 | 0 | 138 | 49 | 106 | | 0 | 155 | | | | | 0 | 13 | 631 | 107 | 0 | 751 | 1044 |
| **2 Hr Totals** | 0 | 626 | 734 | 0 | 1360 | 336 | 731 | 0 | 0 | 1067 | 0 | 0 | 0 | 0 | 0 | 64 | 4535 | 665 | 0 | 5264 | 7691 |
| **1 Hr Totals** | | | | | | | | | | | | | | | | | | | | | |
| 04-05 | 0 | 294 | 382 | 0 | 676 | 157 | 297 | 0 | 0 | 454 | 0 | 0 | 0 | 0 | 0 | 32 | 1948 | 260 | 0 | 2240 | 3370 |
| 415-515 | 0 | 352 | 436 | 0 | 788 | 155 | 348 | 0 | 0 | 503 | 0 | 0 | 0 | 0 | 0 | 25 | 2258 | 337 | 0 | 2620 | 3911 |
| 430-530 | 0 | 360 | 405 | 0 | 765 | 154 | 410 | 0 | 0 | 564 | 0 | 0 | 0 | 0 | 0 | 28 | 2411 | 330 | 0 | 2769 | 4098 |
| 445-545 | 0 | 329 | 356 | 0 | 685 | 166 | 417 | 0 | 0 | 583 | 0 | 0 | 0 | 0 | 0 | 25 | 2530 | 363 | 0 | 2918 | 4186 |
| 05-06 | 0 | 332 | 352 | 0 | 684 | 179 | 434 | 0 | 0 | 613 | 0 | 0 | 0 | 0 | 0 | 32 | 2587 | 405 | 0 | 3024 | 4321 |
| **PEAK HOUR** | | | | | | | | | | | | | | | | | | | | | |
| **05-06** | 0 | 332 | 352 | 0 | 684 | 179 | 434 | 0 | 0 | 613 | 0 | 0 | 0 | 0 | 0 | 32 | 2587 | 405 | 0 | 3024 | 4321 |

# APPENDIX B:
# INTERSECTION LEVEL OF SERVICE CALCULATIONS

## 1: Kinau & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.96 | 1.00 | | 1.00 | | 1.00 | 0.93 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.98 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | | 0.85 | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1525 | 1728 | | 1583 | | 3539 | 1470 | | 5082 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.72 | | 1.00 | | 1.00 | 1.00 | | 0.93 | |
| Satd. Flow (perm) | 1770 | 1863 | 1525 | 1302 | | 1583 | | 3539 | 1470 | | 4754 | |
| Volume (vph) | 130 | 59 | 411 | 43 | 0 | 150 | 0 | 520 | 38 | 8 | 1021 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 140 | 63 | 442 | 46 | 0 | 161 | 0 | 559 | 41 | 9 | 1098 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 100 | 0 | 0 | 23 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 140 | 63 | 411 | 46 | 0 | 61 | 0 | 559 | 18 | 0 | 1107 | 0 |
| Confl. Peds. (#/hr) | | | 50 | 50 | | | | | 50 | 50 | | |
| Turn Type | Perm | | Perm | custom | | custom | | | Perm | Perm | | |
| Protected Phases | | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | 6 | | |
| Actuated Green, G (s) | 16.7 | 16.7 | 16.7 | 16.7 | | 16.7 | | 18.5 | 18.5 | | 18.5 | |
| Effective Green, g (s) | 16.7 | 16.7 | 16.7 | 16.7 | | 16.7 | | 19.5 | 19.5 | | 19.5 | |
| Actuated g/C Ratio | 0.38 | 0.38 | 0.38 | 0.38 | | 0.38 | | 0.44 | 0.44 | | 0.44 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 669 | 704 | 576 | 492 | | 598 | | 1561 | 649 | | 2097 | |
| v/s Ratio Prot | | 0.03 | | | | | | 0.16 | | | | |
| v/s Ratio Perm | 0.08 | | c0.27 | 0.04 | | 0.04 | | | 0.01 | | c0.23 | |
| v/c Ratio | 0.21 | 0.09 | 0.71 | 0.09 | | 0.10 | | 0.36 | 0.03 | | 0.53 | |
| Uniform Delay, d1 | 9.3 | 8.9 | 11.7 | 8.9 | | 8.9 | | 8.2 | 7.0 | | 9.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.1 | 4.2 | 0.1 | | 0.1 | | 0.1 | 0.0 | | 0.2 | |
| Delay (s) | 9.4 | 8.9 | 15.9 | 9.0 | | 9.0 | | 8.3 | 7.0 | | 9.2 | |
| Level of Service | A | A | B | A | | A | | A | A | | A | |
| Approach Delay (s) | | 13.8 | | | 9.0 | | | 8.2 | | | 9.2 | |
| Approach LOS | | B | | | A | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 10.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 44.2 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 63.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 2: S. Beretania St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | 1.00 | 0.86 | | 1.00 | 0.95 | | | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.93 |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1770 | 6301 | | 1770 | 3539 | | | 3539 | 1480 |
| Flt Permitted | | | | 0.95 | 1.00 | | 0.14 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1770 | 6301 | | 266 | 3539 | | | 3539 | 1480 |
| Volume (vph) | 0 | 0 | 0 | 291 | 2538 | 213 | 247 | 406 | 0 | 0 | 1026 | 407 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 313 | 2729 | 229 | 266 | 437 | 0 | 0 | 1103 | 438 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 313 | 2942 | 0 | 266 | 437 | 0 | 0 | 1103 | 424 |
| Confl. Peds. (#/hr) | | | | | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | | | | Split | | | pm+pt | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | 2 | | | | | 6 |
| Actuated Green, G (s) | | | | 36.0 | 36.0 | | 35.0 | 35.0 | | | 23.0 | 23.0 |
| Effective Green, g (s) | | | | 36.0 | 36.0 | | 36.0 | 36.0 | | | 24.0 | 24.0 |
| Actuated g/C Ratio | | | | 0.45 | 0.45 | | 0.45 | 0.45 | | | 0.30 | 0.30 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 797 | 2835 | | 270 | 1593 | | | 1062 | 444 |
| v/s Ratio Prot | | | | 0.18 | c0.47 | | c0.10 | 0.12 | | | 0.31 | |
| v/s Ratio Perm | | | | | | | c0.34 | | | | | 0.29 |
| v/c Ratio | | | | 0.39 | 1.04 | | 0.99 | 0.27 | | | 1.04 | 0.95 |
| Uniform Delay, d1 | | | | 14.7 | 22.0 | | 18.9 | 13.8 | | | 28.0 | 27.5 |
| Progression Factor | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.3 | 27.6 | | 50.3 | 0.1 | | | 38.1 | 31.2 |
| Delay (s) | | | | 15.0 | 49.6 | | 69.2 | 13.9 | | | 66.1 | 58.6 |
| Level of Service | | | | B | D | | E | B | | | E | E |
| Approach Delay (s) | | 0.0 | | | 46.3 | | | 34.8 | | | 64.0 | |
| Approach LOS | | A | | | D | | | C | | | E | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 49.8 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.99 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 93.5% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 3: Young St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.98 | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 0.96 | 1.00 | |
| Frt | 1.00 | 0.96 | | | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1742 | 1762 | | | 3394 | | 1761 | 3470 | | 1704 | 3466 | |
| Flt Permitted | 0.38 | 1.00 | | | 0.89 | | 0.14 | 1.00 | | 0.45 | 1.00 | |
| Satd. Flow (perm) | 690 | 1762 | | | 3035 | | 264 | 3470 | | 807 | 3466 | |
| Volume (vph) | 60 | 65 | 25 | 80 | 335 | 71 | 16 | 461 | 40 | 71 | 1124 | 125 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 65 | 70 | 27 | 86 | 360 | 76 | 17 | 496 | 43 | 76 | 1209 | 134 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 19 | 0 | 0 | 9 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 65 | 78 | 0 | 0 | 503 | 0 | 17 | 530 | 0 | 76 | 1332 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 13.9 | 13.9 | | | 13.9 | | 27.1 | 27.1 | | 27.1 | 27.1 | |
| Effective Green, g (s) | 13.9 | 13.9 | | | 13.9 | | 28.1 | 28.1 | | 28.1 | 28.1 | |
| Actuated g/C Ratio | 0.28 | 0.28 | | | 0.28 | | 0.56 | 0.56 | | 0.56 | 0.56 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 192 | 490 | | | 844 | | 148 | 1950 | | 454 | 1948 | |
| v/s Ratio Prot | | 0.04 | | | | | | 0.15 | | | c0.38 | |
| v/s Ratio Perm | 0.09 | | | | c0.17 | | 0.06 | | | 0.09 | | |
| v/c Ratio | 0.34 | 0.16 | | | 0.60 | | 0.11 | 0.27 | | 0.17 | 0.68 | |
| Uniform Delay, d1 | 14.4 | 13.6 | | | 15.6 | | 5.1 | 5.7 | | 5.3 | 7.8 | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.1 | 0.2 | | | 1.1 | | 0.3 | 0.1 | | 0.2 | 1.0 | |
| Delay (s) | 15.4 | 13.8 | | | 16.8 | | 5.5 | 5.7 | | 5.5 | 8.8 | |
| Level of Service | B | B | | | B | | A | A | | A | A | |
| Approach Delay (s) | | 14.4 | | | 16.8 | | | 5.7 | | | 8.6 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 10.0 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 50.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 85.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 4: S. King St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | | 0.76 | | | | | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | 0.96 | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Frt | | 0.99 | | | | | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | 1.00 | | 0.99 | |
| Satd. Flow (prot) | | 8290 | | | | | | 3539 | 1515 | | 4998 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | 1.00 | | 0.77 | |
| Satd. Flow (perm) | | 8290 | | | | | | 3539 | 1515 | | 3916 | |
| Volume (vph) | 215 | 1286 | 147 | 0 | 0 | 0 | 0 | 319 | 87 | 277 | 834 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 231 | 1383 | 158 | 0 | 0 | 0 | 0 | 343 | 94 | 298 | 897 | 0 |
| RTOR Reduction (vph) | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1751 | 0 | 0 | 0 | 0 | 0 | 343 | 42 | 0 | 1195 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | | 22.9 | | | | | | 24.6 | 24.6 | | 24.6 | |
| Effective Green, g (s) | | 22.9 | | | | | | 24.6 | 24.6 | | 24.6 | |
| Actuated g/C Ratio | | 0.41 | | | | | | 0.44 | 0.44 | | 0.44 | |
| Clearance Time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | | 3421 | | | | | | 1569 | 672 | | 1736 | |
| v/s Ratio Prot | | c0.21 | | | | | | 0.10 | | | | |
| v/s Ratio Perm | | | | | | | | | 0.03 | | c0.31 | |
| v/c Ratio | | 0.51 | | | | | | 0.22 | 0.06 | | 0.69 | |
| Uniform Delay, d1 | | 12.1 | | | | | | 9.5 | 8.8 | | 12.4 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | | 0.1 | | | | | | 0.1 | 0.0 | | 1.2 | |
| Delay (s) | | 12.3 | | | | | | 9.6 | 8.9 | | 13.5 | |
| Level of Service | | B | | | | | | A | A | | B | |
| Approach Delay (s) | | 12.3 | | | 0.0 | | | 9.4 | | | 13.5 | |
| Approach LOS | | B | | | A | | | A | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 12.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.60 | | |
| Actuated Cycle Length (s) | 55.5 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 69.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 5: S. Beretania St & Kalakaua St

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | | 0.81 | 0.81 | 0.97 | |
| Frpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Frt | | | 1.00 | 1.00 | 1.00 | |
| Flt Protected | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (prot) | | | 1433 | 6035 | 3433 | |
| Flt Permitted | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (perm) | | | 1433 | 6035 | 3433 | |
| Volume (vph) | 0 | 0 | 463 | 2542 | 724 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 498 | 2733 | 778 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 498 | 2733 | 778 | 0 |
| Confl. Peds. (#/hr) | | | 20 | | | |
| Turn Type | | | Split | | | |
| Protected Phases | | | 8 | 8 | 2 | |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | | | 50.0 | 50.0 | 22.6 | |
| Effective Green, g (s) | | | 51.0 | 51.0 | 23.6 | |
| Actuated g/C Ratio | | | 0.62 | 0.62 | 0.29 | |
| Clearance Time (s) | | | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 885 | 3726 | 981 | |
| v/s Ratio Prot | | | 0.35 | c0.45 | c0.23 | |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | | | 0.56 | 0.73 | 0.79 | |
| Uniform Delay, d1 | | | 9.3 | 11.0 | 27.2 | |
| Progression Factor | | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | 0.8 | 0.8 | 4.5 | |
| Delay (s) | | | 10.1 | 11.8 | 31.7 | |
| Level of Service | | | B | B | C | |
| Approach Delay (s) | 0.0 | | | 11.6 | 31.7 | |
| Approach LOS | A | | | B | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 15.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 82.6 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 64.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 6: Young St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1800 | | | 1797 | | 1734 | 3506 | | 1727 | 3483 | |
| Flt Permitted | | 0.96 | | | 0.95 | | 0.44 | 1.00 | | 0.31 | 1.00 | |
| Satd. Flow (perm) | | 1735 | | | 1712 | | 803 | 3506 | | 569 | 3483 | |
| Volume (vph) | 16 | 190 | 42 | 48 | 358 | 77 | 156 | 604 | 25 | 13 | 424 | 36 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 17 | 204 | 45 | 52 | 385 | 83 | 168 | 649 | 27 | 14 | 456 | 39 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 7 | 0 | 0 | 6 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 259 | 0 | 0 | 513 | 0 | 168 | 670 | 0 | 14 | 482 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 21.1 | | | 21.1 | | 16.5 | 16.5 | | 16.5 | 16.5 | |
| Effective Green, g (s) | | 22.1 | | | 22.1 | | 16.5 | 16.5 | | 16.5 | 16.5 | |
| Actuated g/C Ratio | | 0.47 | | | 0.47 | | 0.35 | 0.35 | | 0.35 | 0.35 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 823 | | | 812 | | 284 | 1241 | | 201 | 1233 | |
| v/s Ratio Prot | | | | | | | | 0.19 | | | 0.14 | |
| v/s Ratio Perm | | 0.15 | | | c0.30 | | c0.21 | | | 0.02 | | |
| v/c Ratio | | 0.31 | | | 0.63 | | 0.59 | 0.54 | | 0.07 | 0.39 | |
| Uniform Delay, d1 | | 7.6 | | | 9.2 | | 12.3 | 12.0 | | 10.0 | 11.3 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | 1.6 | | 3.3 | 0.5 | | 0.1 | 0.2 | |
| Delay (s) | | 7.8 | | | 10.8 | | 15.6 | 12.5 | | 10.1 | 11.5 | |
| Level of Service | | A | | | B | | B | B | | B | B | |
| Approach Delay (s) | | 7.8 | | | 10.8 | | | 13.1 | | | 11.5 | |
| Approach LOS | | A | | | B | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 11.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 46.6 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 71.7% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 7: S. King St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.86 | 1.00 | | | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.95 | | | | | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 6408 | 1505 | | | | | 3539 | 1514 | 1766 | 3539 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.24 | 1.00 | |
| Satd. Flow (perm) | 1770 | 6408 | 1505 | | | | | 3539 | 1514 | 449 | 3539 | |
| Volume (vph) | 113 | 1211 | 297 | 0 | 0 | 0 | 0 | 593 | 219 | 20 | 480 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 122 | 1302 | 319 | 0 | 0 | 0 | 0 | 638 | 235 | 22 | 516 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 157 | 0 | 0 | 0 | 0 | 0 | 140 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 122 | 1302 | 162 | 0 | 0 | 0 | 0 | 638 | 95 | 22 | 516 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | 22.5 | 22.5 | 22.5 | | | | | 16.4 | 16.4 | 23.2 | 23.2 | |
| Effective Green, g (s) | 23.5 | 23.5 | 23.5 | | | | | 17.4 | 17.4 | 24.2 | 24.2 | |
| Actuated g/C Ratio | 0.42 | 0.42 | 0.42 | | | | | 0.31 | 0.31 | 0.43 | 0.43 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 747 | 2704 | 635 | | | | | 1106 | 473 | 261 | 1538 | |
| v/s Ratio Prot | 0.07 | c0.20 | | | | | | c0.18 | | 0.00 | c0.15 | |
| v/s Ratio Perm | | | 0.11 | | | | | | 0.06 | 0.03 | | |
| v/c Ratio | 0.16 | 0.48 | 0.26 | | | | | 0.58 | 0.20 | 0.08 | 0.34 | |
| Uniform Delay, d1 | 10.0 | 11.7 | 10.4 | | | | | 16.1 | 14.0 | 9.7 | 10.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.1 | 0.2 | | | | | 0.7 | 0.2 | 0.1 | 0.1 | |
| Delay (s) | 10.1 | 11.8 | 10.6 | | | | | 16.8 | 14.3 | 9.9 | 10.6 | |
| Level of Service | B | B | B | | | | | B | B | A | B | |
| Approach Delay (s) | | 11.5 | | | 0.0 | | | 16.1 | | | 10.5 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 12.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 55.7 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 52.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 8: I-1 Off-Ramp & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.88 | | | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.92 | | | | | 0.97 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 0.96 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 0.97 | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1709 | 2570 | | | | | 3316 | | 1705 | 3539 | |
| Flt Permitted | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.31 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1709 | 2570 | | | | | 3316 | | 556 | 3539 | |
| Volume (vph) | 1153 | 204 | 911 | 0 | 0 | 0 | 0 | 479 | 142 | 105 | 730 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 1240 | 219 | 980 | 0 | 0 | 0 | 0 | 515 | 153 | 113 | 785 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 132 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 711 | 748 | 848 | 0 | 0 | 0 | 0 | 616 | 0 | 113 | 785 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | | Perm | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | | | 4 | | | | | | | 6 | | |
| Actuated Green, G (s) | 26.3 | 26.3 | 26.3 | | | | | 18.5 | | 18.5 | 18.5 | |
| Effective Green, g (s) | 26.3 | 26.3 | 26.3 | | | | | 19.5 | | 19.5 | 19.5 | |
| Actuated g/C Ratio | 0.49 | 0.49 | 0.49 | | | | | 0.36 | | 0.36 | 0.36 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 822 | 835 | 1256 | | | | | 1202 | | 202 | 1283 | |
| v/s Ratio Prot | 0.42 | c0.44 | | | | | | 0.19 | | | c0.22 | |
| v/s Ratio Perm | | | 0.33 | | | | | | | 0.20 | | |
| v/c Ratio | 0.86 | 0.90 | 0.68 | | | | | 0.51 | | 0.56 | 0.61 | |
| Uniform Delay, d1 | 12.2 | 12.5 | 10.5 | | | | | 13.4 | | 13.7 | 14.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 9.4 | 12.1 | 1.5 | | | | | 0.4 | | 3.3 | 0.9 | |
| Delay (s) | 21.6 | 24.6 | 11.9 | | | | | 13.8 | | 17.1 | 14.9 | |
| Level of Service | C | C | B | | | | | B | | B | B | |
| Approach Delay (s) | | 18.7 | | | 0.0 | | | 13.8 | | | 15.2 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 17.1 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.77 | | |
| Actuated Cycle Length (s) | 53.8 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 71.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 9: S. Beretania St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | | 0.86 | | 1.00 | 0.95 | | | 0.95 | 0.88 |
| Frpb, ped/bikes | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | | 6284 | | 1770 | 3539 | | | 3539 | 2787 |
| Flt Permitted | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | | 6284 | | 1770 | 3539 | | | 3539 | 2787 |
| Volume (vph) | 0 | 0 | 0 | 100 | 2143 | 190 | 154 | 319 | 0 | 0 | 542 | 687 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 108 | 2304 | 204 | 166 | 343 | 0 | 0 | 583 | 739 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2600 | 0 | 166 | 343 | 0 | 0 | 583 | 723 |
| Confl. Peds. (#/hr) | | | | 50 | | 50 | | | | | | |
| Turn Type | | | | Split | | | Prot | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | | | | | 35.0 | | 6.0 | 34.3 | | | 23.3 | 23.3 |
| Effective Green, g (s) | | | | | 36.0 | | 7.0 | 35.3 | | | 24.3 | 24.3 |
| Actuated g/C Ratio | | | | | 0.45 | | 0.09 | 0.45 | | | 0.31 | 0.31 |
| Clearance Time (s) | | | | | 5.0 | | 5.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | | 2853 | | 156 | 1575 | | | 1084 | 854 |
| v/s Ratio Prot | | | | | c0.41 | | c0.09 | 0.10 | | | 0.16 | |
| v/s Ratio Perm | | | | | | | | | | | | c0.26 |
| v/c Ratio | | | | | 0.91 | | 1.06 | 0.22 | | | 0.54 | 0.85 |
| Uniform Delay, d1 | | | | | 20.2 | | 36.1 | 13.5 | | | 22.8 | 25.8 |
| Progression Factor | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | | 4.9 | | 90.1 | 0.1 | | | 0.5 | 7.8 |
| Delay (s) | | | | | 25.1 | | 126.3 | 13.6 | | | 23.4 | 33.5 |
| Level of Service | | | | | C | | F | B | | | C | C |
| Approach Delay (s) | | 0.0 | | | 25.1 | | | 50.3 | | | 29.0 | |
| Approach LOS | | A | | | C | | | D | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 29.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.90 | | |
| Actuated Cycle Length (s) | 79.3 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 78.6% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 10: Young St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | | 1.00 | 0.97 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.97 | 1.00 | | 0.97 | 1.00 | |
| Frt | | 0.98 | | | 0.99 | | 1.00 | 0.95 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1809 | | | 1822 | | 1725 | 3268 | | 1723 | 3473 | |
| Flt Permitted | | 0.90 | | | 0.89 | | 0.31 | 1.00 | | 0.33 | 1.00 | |
| Satd. Flow (perm) | | 1636 | | | 1642 | | 569 | 3268 | | 594 | 3473 | |
| Volume (vph) | 40 | 223 | 34 | 83 | 387 | 31 | 37 | 404 | 195 | 4 | 570 | 48 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 43 | 240 | 37 | 89 | 416 | 33 | 40 | 434 | 210 | 4 | 613 | 52 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 3 | 0 | 0 | 108 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 315 | 0 | 0 | 535 | 0 | 40 | 536 | 0 | 4 | 654 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 21.1 | | | 21.1 | | 14.2 | 14.2 | | 14.2 | 14.2 | |
| Effective Green, g (s) | | 22.1 | | | 22.1 | | 15.2 | 15.2 | | 15.2 | 15.2 | |
| Actuated g/C Ratio | | 0.49 | | | 0.49 | | 0.34 | 0.34 | | 0.34 | 0.34 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 798 | | | 801 | | 191 | 1097 | | 199 | 1165 | |
| v/s Ratio Prot | | | | | | | | 0.16 | | | c0.19 | |
| v/s Ratio Perm | | 0.19 | | | c0.33 | | 0.07 | | | 0.01 | | |
| v/c Ratio | | 0.39 | | | 0.67 | | 0.21 | 0.49 | | 0.02 | 0.56 | |
| Uniform Delay, d1 | | 7.4 | | | 8.8 | | 10.8 | 12.0 | | 10.1 | 12.3 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 2.1 | | 0.5 | 0.3 | | 0.0 | 0.6 | |
| Delay (s) | | 7.7 | | | 10.9 | | 11.3 | 12.3 | | 10.1 | 12.9 | |
| Level of Service | | A | | | B | | B | B | | B | B | |
| Approach Delay (s) | | 7.7 | | | 10.9 | | | 12.2 | | | 12.9 | |
| Approach LOS | | A | | | B | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 11.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.62 | | |
| Actuated Cycle Length (s) | 45.3 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 70.7% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 11: S. King St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.81 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 0.95 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 7490 | | | | | | 1863 | 1498 | 1770 | 1863 | |
| Flt Permitted | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 7490 | | | | | | 1863 | 1498 | 1770 | 1863 | |
| Volume (vph) | 231 | 1231 | 36 | 0 | 0 | 0 | 0 | 378 | 195 | 282 | 392 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 248 | 1324 | 39 | 0 | 0 | 0 | 0 | 406 | 210 | 303 | 422 | 0 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 248 | 1357 | 0 | 0 | 0 | 0 | 0 | 406 | 186 | 303 | 422 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | | | |
| Turn Type | Split | | | | | | | | Perm | Prot | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | | | |
| Actuated Green, G (s) | 24.0 | 24.0 | | | | | | 20.0 | 20.0 | 14.6 | 39.6 | |
| Effective Green, g (s) | 25.0 | 25.0 | | | | | | 21.0 | 21.0 | 15.6 | 40.6 | |
| Actuated g/C Ratio | 0.34 | 0.34 | | | | | | 0.29 | 0.29 | 0.21 | 0.55 | |
| Clearance Time (s) | 5.0 | 5.0 | | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 601 | 2544 | | | | | | 532 | 427 | 375 | 1028 | |
| v/s Ratio Prot | 0.14 | c0.18 | | | | | | c0.22 | | c0.17 | 0.23 | |
| v/s Ratio Perm | | | | | | | | | 0.12 | | | |
| v/c Ratio | 0.41 | 0.53 | | | | | | 0.76 | 0.43 | 0.81 | 0.41 | |
| Uniform Delay, d1 | 18.7 | 19.6 | | | | | | 24.0 | 21.5 | 27.6 | 9.6 | |
| Progression Factor | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.5 | 0.2 | | | | | | 6.4 | 0.7 | 12.1 | 0.3 | |
| Delay (s) | 19.1 | 19.8 | | | | | | 30.4 | 22.2 | 39.6 | 9.8 | |
| Level of Service | B | B | | | | | | C | C | D | A | |
| Approach Delay (s) | | 19.7 | | | 0.0 | | | 27.6 | | | 22.3 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 22.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.68 | | |
| Actuated Cycle Length (s) | 73.6 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 64.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 1: Kinau & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.96 | 1.00 | | 1.00 | | 1.00 | 0.92 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.97 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | | 0.85 | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1517 | 1721 | | 1583 | | 3539 | 1453 | | 5059 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.70 | | 1.00 | | 1.00 | 1.00 | | 0.78 | |
| Satd. Flow (perm) | 1770 | 1863 | 1517 | 1276 | | 1583 | | 3539 | 1453 | | 3955 | |
| Volume (vph) | 287 | 75 | 452 | 58 | 0 | 225 | 0 | 1218 | 83 | 52 | 526 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 309 | 81 | 486 | 62 | 0 | 242 | 0 | 1310 | 89 | 56 | 566 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 186 | 0 | 0 | 20 | 0 | 0 | 42 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 309 | 81 | 300 | 62 | 0 | 222 | 0 | 1310 | 47 | 0 | 622 | 0 |
| Confl. Peds. (#/hr) | | | 50 | 50 | | | | | 50 | 50 | | |
| Turn Type | Perm | | Perm | custom | | custom | | | Perm | Perm | | |
| Protected Phases | | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | 6 | | |
| Actuated Green, G (s) | 16.2 | 16.2 | 16.2 | 16.2 | | 16.2 | | 27.1 | 27.1 | | 27.1 | |
| Effective Green, g (s) | 17.2 | 17.2 | 17.2 | 17.2 | | 17.2 | | 28.1 | 28.1 | | 28.1 | |
| Actuated g/C Ratio | 0.32 | 0.32 | 0.32 | 0.32 | | 0.32 | | 0.53 | 0.53 | | 0.53 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 571 | 601 | 490 | 412 | | 511 | | 1866 | 766 | | 2085 | |
| v/s Ratio Prot | | 0.04 | | | | | | c0.37 | | | | |
| v/s Ratio Perm | 0.17 | | c0.20 | 0.05 | | 0.14 | | | 0.03 | | 0.16 | |
| v/c Ratio | 0.54 | 0.13 | 0.61 | 0.15 | | 0.43 | | 0.70 | 0.06 | | 0.30 | |
| Uniform Delay, d1 | 14.8 | 12.8 | 15.2 | 12.8 | | 14.2 | | 9.5 | 6.2 | | 7.1 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 1.1 | 0.1 | 2.3 | 0.2 | | 0.6 | | 1.2 | 0.0 | | 0.1 | |
| Delay (s) | 15.9 | 12.9 | 17.5 | 13.0 | | 14.8 | | 10.7 | 6.2 | | 7.1 | |
| Level of Service | B | B | B | B | | B | | B | A | | A | |
| Approach Delay (s) | | 16.5 | | | 14.4 | | | 10.4 | | | 7.1 | |
| Approach LOS | | B | | | B | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 11.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.67 | | |
| Actuated Cycle Length (s) | 53.3 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 75.3% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 2: S. Beretania St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | 1.00 | 0.86 | | 1.00 | 0.95 | | | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.93 |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 0.98 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1770 | 6207 | | 1768 | 3539 | | | 3539 | 1475 |
| Flt Permitted | | | | 0.95 | 1.00 | | 0.14 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1770 | 6207 | | 251 | 3539 | | | 3539 | 1475 |
| Volume (vph) | 0 | 0 | 0 | 169 | 1939 | 327 | 307 | 979 | 0 | 0 | 800 | 127 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 182 | 2085 | 352 | 330 | 1053 | 0 | 0 | 860 | 137 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 31 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 182 | 2407 | 0 | 330 | 1053 | 0 | 0 | 860 | 106 |
| Confl. Peds. (#/hr) | | | | | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | | | | Split | | | pm+pt | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | 2 | | | | | 6 |
| Actuated Green, G (s) | | | | 31.2 | 31.2 | | 44.0 | 44.0 | | | 27.0 | 27.0 |
| Effective Green, g (s) | | | | 31.2 | 31.2 | | 45.0 | 45.0 | | | 28.0 | 28.0 |
| Actuated g/C Ratio | | | | 0.37 | 0.37 | | 0.53 | 0.53 | | | 0.33 | 0.33 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 656 | 2300 | | 368 | 1891 | | | 1177 | 490 |
| v/s Ratio Prot | | | | 0.10 | c0.39 | | c0.14 | 0.30 | | | 0.24 | |
| v/s Ratio Perm | | | | | | | c0.34 | | | | | 0.07 |
| v/c Ratio | | | | 0.28 | 1.05 | | 0.90 | 0.56 | | | 0.73 | 0.22 |
| Uniform Delay, d1 | | | | 18.6 | 26.5 | | 19.9 | 13.0 | | | 24.8 | 20.2 |
| Progression Factor | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.2 | 32.4 | | 23.3 | 0.4 | | | 2.4 | 0.2 |
| Delay (s) | | | | 18.8 | 58.9 | | 43.2 | 13.3 | | | 27.1 | 20.4 |
| Level of Service | | | | B | E | | D | B | | | C | C |
| Approach Delay (s) | | 0.0 | | | 56.1 | | | 20.5 | | | 26.2 | |
| Approach LOS | | A | | | E | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 40.3 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.94 | | |
| Actuated Cycle Length (s) | 84.2 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 83.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 3: Young St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.98 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.94 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1745 | 1744 | | | 3234 | | 1755 | 3504 | | 1745 | 3510 | |
| Flt Permitted | 0.42 | 1.00 | | | 0.82 | | 0.20 | 1.00 | | 0.21 | 1.00 | |
| Satd. Flow (perm) | 774 | 1744 | | | 2686 | | 376 | 3504 | | 382 | 3510 | |
| Volume (vph) | 103 | 154 | 79 | 103 | 194 | 186 | 56 | 907 | 40 | 70 | 919 | 39 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 111 | 166 | 85 | 111 | 209 | 200 | 60 | 975 | 43 | 75 | 988 | 42 |
| RTOR Reduction (vph) | 0 | 23 | 0 | 0 | 63 | 0 | 0 | 5 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 111 | 228 | 0 | 0 | 457 | 0 | 60 | 1013 | 0 | 75 | 1025 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 13.4 | 13.4 | | | 13.4 | | 20.0 | 20.0 | | 20.0 | 20.0 | |
| Effective Green, g (s) | 14.4 | 14.4 | | | 14.4 | | 21.0 | 21.0 | | 21.0 | 21.0 | |
| Actuated g/C Ratio | 0.33 | 0.33 | | | 0.33 | | 0.48 | 0.48 | | 0.48 | 0.48 | |
| Clearance Time (s) | 5.0 | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 257 | 579 | | | 891 | | 182 | 1695 | | 185 | 1698 | |
| v/s Ratio Prot | | 0.13 | | | | | | 0.29 | | | c0.29 | |
| v/s Ratio Perm | 0.14 | | | | c0.17 | | 0.16 | | | 0.20 | | |
| v/c Ratio | 0.43 | 0.39 | | | 0.51 | | 0.33 | 0.60 | | 0.41 | 0.60 | |
| Uniform Delay, d1 | 11.3 | 11.1 | | | 11.7 | | 6.9 | 8.1 | | 7.2 | 8.2 | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.2 | 0.4 | | | 0.5 | | 1.1 | 0.6 | | 1.5 | 0.6 | |
| Delay (s) | 12.5 | 11.6 | | | 12.2 | | 7.9 | 8.7 | | 8.6 | 8.8 | |
| Level of Service | B | B | | | B | | A | A | | A | A | |
| Approach Delay (s) | | 11.9 | | | 12.2 | | | 8.7 | | | 8.8 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 9.7 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.57 | | |
| Actuated Cycle Length (s) | 43.4 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 79.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 4: S. King St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | | 0.76 | | | | | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | 0.94 | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Frt | | 0.99 | | | | | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | 1.00 | 1.00 | | 0.99 | |
| Satd. Flow (prot) | | 8408 | | | | | | 3539 | 1488 | | 5008 | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | 1.00 | | 0.67 | |
| Satd. Flow (perm) | | 8408 | | | | | | 3539 | 1488 | | 3371 | |
| Volume (vph) | 92 | 2283 | 93 | 0 | 0 | 0 | 0 | 712 | 207 | 298 | 934 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 99 | 2455 | 100 | 0 | 0 | 0 | 0 | 766 | 223 | 320 | 1004 | 0 |
| RTOR Reduction (vph) | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 2646 | 0 | 0 | 0 | 0 | 0 | 766 | 194 | 0 | 1324 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | | 37.0 | | | | | | 38.8 | 38.8 | | 38.8 | |
| Effective Green, g (s) | | 38.0 | | | | | | 39.8 | 39.8 | | 39.8 | |
| Actuated g/C Ratio | | 0.44 | | | | | | 0.46 | 0.46 | | 0.46 | |
| Clearance Time (s) | | 5.0 | | | | | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | | 3724 | | | | | | 1642 | 690 | | 1564 | |
| v/s Ratio Prot | | c0.31 | | | | | | 0.22 | | | | |
| v/s Ratio Perm | | | | | | | | | 0.13 | | c0.39 | |
| v/c Ratio | | 0.71 | | | | | | 0.47 | 0.28 | | 1.62dl | |
| Uniform Delay, d1 | | 19.4 | | | | | | 15.7 | 14.2 | | 20.3 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | | 0.7 | | | | | | 0.2 | 0.2 | | 4.4 | |
| Delay (s) | | 20.1 | | | | | | 15.9 | 14.4 | | 24.7 | |
| Level of Service | | C | | | | | | B | B | | C | |
| Approach Delay (s) | | 20.1 | | | 0.0 | | | 15.6 | | | 24.7 | |
| Approach LOS | | C | | | A | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 20.4 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.78 | | |
| Actuated Cycle Length (s) | 85.8 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 79.6% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

## 5: S. Beretania St & Kalakaua St

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | | 0.81 | 0.81 | 0.97 | |
| Frpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Frt | | | 1.00 | 1.00 | 1.00 | |
| Flt Protected | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (prot) | | | 1433 | 6035 | 3433 | |
| Flt Permitted | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (perm) | | | 1433 | 6035 | 3433 | |
| Volume (vph) | 0 | 0 | 377 | 1822 | 824 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 405 | 1959 | 886 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 405 | 1959 | 886 | 0 |
| Confl. Peds. (#/hr) | | | 20 | | | |
| Turn Type | | | Split | | | |
| Protected Phases | | | 8 | 8 | 2 | |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | | | 35.7 | 35.7 | 23.8 | |
| Effective Green, g (s) | | | 36.7 | 36.7 | 24.8 | |
| Actuated g/C Ratio | | | 0.53 | 0.53 | 0.36 | |
| Clearance Time (s) | | | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 757 | 3187 | 1225 | |
| v/s Ratio Prot | | | 0.28 | c0.32 | c0.26 | |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | | | 0.54 | 0.61 | 0.72 | |
| Uniform Delay, d1 | | | 10.8 | 11.5 | 19.4 | |
| Progression Factor | | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | 0.7 | 0.4 | 2.1 | |
| Delay (s) | | | 11.5 | 11.8 | 21.5 | |
| Level of Service | | | B | B | C | |
| Approach Delay (s) | 0.0 | | | 11.8 | 21.5 | |
| Approach LOS | A | | | B | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 14.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.66 | | |
| Actuated Cycle Length (s) | 69.5 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 56.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 6: Young St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.99 | | 1.00 | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.97 | | | 0.97 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1783 | | | 1776 | | 1736 | 3460 | | 1737 | 3501 | |
| Flt Permitted | | 0.91 | | | 0.90 | | 0.50 | 1.00 | | 0.30 | 1.00 | |
| Satd. Flow (perm) | | 1642 | | | 1613 | | 910 | 3460 | | 553 | 3501 | |
| Volume (vph) | 40 | 181 | 54 | 57 | 202 | 68 | 67 | 645 | 72 | 26 | 385 | 22 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 43 | 195 | 58 | 61 | 217 | 73 | 72 | 694 | 77 | 28 | 414 | 24 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 11 | 0 | 0 | 16 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 285 | 0 | 0 | 340 | 0 | 72 | 755 | 0 | 28 | 430 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 13.7 | | | 13.7 | | 15.4 | 15.4 | | 15.4 | 15.4 | |
| Effective Green, g (s) | | 14.7 | | | 14.7 | | 16.4 | 16.4 | | 16.4 | 16.4 | |
| Actuated g/C Ratio | | 0.38 | | | 0.38 | | 0.42 | 0.42 | | 0.42 | 0.42 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 617 | | | 606 | | 382 | 1451 | | 232 | 1468 | |
| v/s Ratio Prot | | | | | | | | c0.22 | | | 0.12 | |
| v/s Ratio Perm | | 0.17 | | | c0.21 | | 0.08 | | | 0.05 | | |
| v/c Ratio | | 0.46 | | | 0.56 | | 0.19 | 0.52 | | 0.12 | 0.29 | |
| Uniform Delay, d1 | | 9.2 | | | 9.6 | | 7.2 | 8.4 | | 6.9 | 7.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.6 | | | 1.2 | | 0.2 | 0.3 | | 0.2 | 0.1 | |
| Delay (s) | | 9.8 | | | 10.8 | | 7.4 | 8.8 | | 7.2 | 7.6 | |
| Level of Service | | A | | | B | | A | A | | A | A | |
| Approach Delay (s) | | 9.8 | | | 10.8 | | | 8.7 | | | 7.6 | |
| Approach LOS | | A | | | B | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 9.0 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.54 | | |
| Actuated Cycle Length (s) | 39.1 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 60.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 7: S. King St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.86 | 1.00 | | | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | | | | | 1.00 | 0.94 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 6408 | 1477 | | | | | 3539 | 1490 | 1766 | 3539 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.18 | 1.00 | |
| Satd. Flow (perm) | 1770 | 6408 | 1477 | | | | | 3539 | 1490 | 326 | 3539 | |
| Volume (vph) | 99 | 2581 | 355 | 0 | 0 | 0 | 0 | 602 | 213 | 47 | 582 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 106 | 2775 | 382 | 0 | 0 | 0 | 0 | 647 | 229 | 51 | 626 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 61 | 0 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 106 | 2775 | 321 | 0 | 0 | 0 | 0 | 647 | 188 | 51 | 626 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | 45.1 | 45.1 | 45.1 | | | | | 20.2 | 20.2 | 27.4 | 27.4 | |
| Effective Green, g (s) | 46.1 | 46.1 | 46.1 | | | | | 21.2 | 21.2 | 28.4 | 28.4 | |
| Actuated g/C Ratio | 0.56 | 0.56 | 0.56 | | | | | 0.26 | 0.26 | 0.34 | 0.34 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 989 | 3581 | 825 | | | | | 909 | 383 | 168 | 1218 | |
| v/s Ratio Prot | 0.06 | c0.43 | | | | | | c0.18 | | 0.01 | c0.18 | |
| v/s Ratio Perm | | | 0.22 | | | | | | 0.13 | 0.09 | | |
| v/c Ratio | 0.11 | 0.77 | 0.39 | | | | | 0.71 | 0.49 | 0.30 | 0.51 | |
| Uniform Delay, d1 | 8.5 | 14.2 | 10.3 | | | | | 27.9 | 26.1 | 19.6 | 21.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.0 | 1.1 | 0.3 | | | | | 2.7 | 1.0 | 1.0 | 0.4 | |
| Delay (s) | 8.6 | 15.3 | 10.6 | | | | | 30.5 | 27.1 | 20.6 | 21.9 | |
| Level of Service | A | B | B | | | | | C | C | C | C | |
| Approach Delay (s) | | 14.5 | | | 0.0 | | | 29.6 | | | 21.8 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 18.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 82.5 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 71.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 8: I-1 Off-Ramp & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.88 | | | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.91 | | | | | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 0.99 | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1718 | 2542 | | | | | 3454 | | 1770 | 3539 | |
| Flt Permitted | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.11 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1718 | 2542 | | | | | 3454 | | 208 | 3539 | |
| Volume (vph) | 537 | 139 | 467 | 0 | 0 | 0 | 0 | 1272 | 113 | 68 | 652 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 577 | 149 | 502 | 0 | 0 | 0 | 0 | 1368 | 122 | 73 | 701 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 315 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 353 | 373 | 187 | 0 | 0 | 0 | 0 | 1481 | 0 | 73 | 701 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | | Perm | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | | | 4 | | | | | | | 6 | | |
| Actuated Green, G (s) | 18.1 | 18.1 | 18.1 | | | | | 34.8 | | 34.8 | 34.8 | |
| Effective Green, g (s) | 18.1 | 18.1 | 18.1 | | | | | 35.8 | | 35.8 | 35.8 | |
| Actuated g/C Ratio | 0.29 | 0.29 | 0.29 | | | | | 0.58 | | 0.58 | 0.58 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 492 | 502 | 743 | | | | | 1998 | | 120 | 2047 | |
| v/s Ratio Prot | 0.21 | c0.22 | | | | | | c0.43 | | | 0.20 | |
| v/s Ratio Perm | | | 0.07 | | | | | | | 0.35 | | |
| v/c Ratio | 0.72 | 0.74 | 0.25 | | | | | 0.74 | | 0.61 | 0.34 | |
| Uniform Delay, d1 | 19.6 | 19.8 | 16.7 | | | | | 9.6 | | 8.5 | 6.9 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 5.0 | 5.9 | 0.2 | | | | | 1.5 | | 8.4 | 0.1 | |
| Delay (s) | 24.6 | 25.7 | 16.9 | | | | | 11.1 | | 16.9 | 7.0 | |
| Level of Service | C | C | B | | | | | B | | B | A | |
| Approach Delay (s) | | 21.8 | | | 0.0 | | | 11.1 | | | 7.9 | |
| Approach LOS | | C | | | A | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 14.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.74 | | |
| Actuated Cycle Length (s) | 61.9 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 71.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 9: S. Beretania St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | | 0.86 | | 1.00 | 0.95 | | | 0.95 | 0.88 |
| Frpb, ped/bikes | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | | 0.98 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | | 6224 | | 1770 | 3539 | | | 3539 | 2787 |
| Flt Permitted | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | | 6224 | | 1770 | 3539 | | | 3539 | 2787 |
| Volume (vph) | 0 | 0 | 0 | 92 | 1564 | 223 | 118 | 641 | 0 | 0 | 668 | 687 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 99 | 1682 | 240 | 127 | 689 | 0 | 0 | 718 | 739 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 129 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 1995 | 0 | 127 | 689 | 0 | 0 | 718 | 610 |
| Confl. Peds. (#/hr) | | | | 50 | | 50 | | | | | | |
| Turn Type | | | | Split | | | Prot | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | | | | | 32.4 | | 8.3 | 35.9 | | | 22.6 | 22.6 |
| Effective Green, g (s) | | | | | 33.4 | | 9.3 | 36.9 | | | 23.6 | 23.6 |
| Actuated g/C Ratio | | | | | 0.43 | | 0.12 | 0.47 | | | 0.30 | 0.30 |
| Clearance Time (s) | | | | | 5.0 | | 5.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | | 2655 | | 210 | 1668 | | | 1067 | 840 |
| v/s Ratio Prot | | | | | c0.32 | | c0.07 | 0.19 | | | 0.20 | |
| v/s Ratio Perm | | | | | | | | | | | | c0.22 |
| v/c Ratio | | | | | 0.75 | | 0.60 | 0.41 | | | 0.67 | 0.73 |
| Uniform Delay, d1 | | | | | 18.9 | | 32.8 | 13.6 | | | 24.0 | 24.5 |
| Progression Factor | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | | 1.2 | | 4.9 | 0.2 | | | 1.7 | 3.2 |
| Delay (s) | | | | | 20.2 | | 37.6 | 13.8 | | | 25.7 | 27.6 |
| Level of Service | | | | | C | | D | B | | | C | C |
| Approach Delay (s) | | 0.0 | | | 20.2 | | | 17.5 | | | 26.7 | |
| Approach LOS | | A | | | C | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 21.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 78.3 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 68.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 10: Young St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1797 | | | 1809 | | 1727 | 3493 | | 1733 | 3493 | |
| Flt Permitted | | 0.86 | | | 0.94 | | 0.40 | 1.00 | | 0.34 | 1.00 | |
| Satd. Flow (perm) | | 1563 | | | 1704 | | 728 | 3493 | | 617 | 3493 | |
| Volume (vph) | 72 | 176 | 32 | 36 | 251 | 42 | 23 | 620 | 38 | 68 | 533 | 33 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 77 | 189 | 34 | 39 | 270 | 45 | 25 | 667 | 41 | 73 | 573 | 35 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 6 | 0 | 0 | 8 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 294 | 0 | 0 | 348 | 0 | 25 | 700 | 0 | 73 | 600 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 13.0 | | | 13.0 | | 14.0 | 14.0 | | 14.0 | 14.0 | |
| Effective Green, g (s) | | 14.0 | | | 14.0 | | 15.0 | 15.0 | | 15.0 | 15.0 | |
| Actuated g/C Ratio | | 0.38 | | | 0.38 | | 0.41 | 0.41 | | 0.41 | 0.41 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 591 | | | 645 | | 295 | 1416 | | 250 | 1416 | |
| v/s Ratio Prot | | | | | | | | c0.20 | | | 0.17 | |
| v/s Ratio Perm | | 0.19 | | | c0.20 | | 0.03 | | | 0.12 | | |
| v/c Ratio | | 0.50 | | | 0.54 | | 0.08 | 0.49 | | 0.29 | 0.42 | |
| Uniform Delay, d1 | | 8.8 | | | 9.0 | | 6.8 | 8.2 | | 7.4 | 7.9 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.7 | | | 0.9 | | 0.1 | 0.3 | | 0.7 | 0.2 | |
| Delay (s) | | 9.5 | | | 9.9 | | 6.9 | 8.5 | | 8.1 | 8.1 | |
| Level of Service | | A | | | A | | A | A | | A | A | |
| Approach Delay (s) | | 9.5 | | | 9.9 | | | 8.4 | | | 8.1 | |
| Approach LOS | | A | | | A | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 8.7 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 37.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 61.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 11: S. King St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.81 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 0.94 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 7521 | | | | | | 1863 | 1486 | 1770 | 1863 | |
| Flt Permitted | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 7521 | | | | | | 1863 | 1486 | 1770 | 1863 | |
| Volume (vph) | 330 | 2411 | 28 | 0 | 0 | 0 | 0 | 410 | 154 | 405 | 360 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 355 | 2592 | 30 | 0 | 0 | 0 | 0 | 441 | 166 | 435 | 387 | 0 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 355 | 2620 | 0 | 0 | 0 | 0 | 0 | 441 | 151 | 435 | 387 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | | | |
| Turn Type | Split | | | | | | | | Perm | Prot | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | | | |
| Actuated Green, G (s) | 32.1 | 32.1 | | | | | | 23.5 | 23.5 | 17.0 | 45.5 | |
| Effective Green, g (s) | 33.1 | 33.1 | | | | | | 24.5 | 24.5 | 18.0 | 46.5 | |
| Actuated g/C Ratio | 0.38 | 0.38 | | | | | | 0.28 | 0.28 | 0.21 | 0.53 | |
| Clearance Time (s) | 5.0 | 5.0 | | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 669 | 2842 | | | | | | 521 | 416 | 364 | 989 | |
| v/s Ratio Prot | 0.20 | c0.35 | | | | | | c0.24 | | c0.25 | 0.21 | |
| v/s Ratio Perm | | | | | | | | | 0.10 | | | |
| v/c Ratio | 0.53 | 0.92 | | | | | | 0.85 | 0.36 | 1.20 | 0.39 | |
| Uniform Delay, d1 | 21.2 | 26.0 | | | | | | 29.8 | 25.3 | 34.8 | 12.2 | |
| Progression Factor | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.8 | 5.6 | | | | | | 12.1 | 0.5 | 111.6 | 0.3 | |
| Delay (s) | 22.0 | 31.6 | | | | | | 41.8 | 25.8 | 146.4 | 12.4 | |
| Level of Service | C | C | | | | | | D | C | F | B | |
| Approach Delay (s) | | 30.5 | | | 0.0 | | | 37.5 | | | 83.3 | |
| Approach LOS | | C | | | A | | | D | | | F | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 41.3 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.96 | | |
| Actuated Cycle Length (s) | 87.6 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 82.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 1: Kinau & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.96 | 1.00 | | 1.00 | | 1.00 | 0.92 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.98 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | | 0.85 | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1522 | 1725 | | 1583 | | 3539 | 1464 | | 5082 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.71 | | 1.00 | | 1.00 | 1.00 | | 0.94 | |
| Satd. Flow (perm) | 1770 | 1863 | 1522 | 1297 | | 1583 | | 3539 | 1464 | | 4755 | |
| Volume (vph) | 135 | 61 | 427 | 45 | 0 | 156 | 0 | 548 | 40 | 8 | 1099 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 145 | 66 | 459 | 48 | 0 | 168 | 0 | 589 | 43 | 9 | 1182 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 24 | 0 | 0 | 100 | 0 | 0 | 24 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 145 | 66 | 435 | 48 | 0 | 68 | 0 | 589 | 19 | 0 | 1191 | 0 |
| Confl. Peds. (#/hr) | | | 50 | 50 | | | | | 50 | 50 | | |
| Turn Type | Perm | | Perm | custom | | custom | | | Perm | Perm | | |
| Protected Phases | | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | 6 | | |
| Actuated Green, G (s) | 18.2 | 18.2 | 18.2 | 18.2 | | 18.2 | | 20.2 | 20.2 | | 20.2 | |
| Effective Green, g (s) | 18.2 | 18.2 | 18.2 | 18.2 | | 18.2 | | 21.2 | 21.2 | | 21.2 | |
| Actuated g/C Ratio | 0.38 | 0.38 | 0.38 | 0.38 | | 0.38 | | 0.45 | 0.45 | | 0.45 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 680 | 715 | 584 | 498 | | 608 | | 1583 | 655 | | 2127 | |
| v/s Ratio Prot | | 0.04 | | | | | | 0.17 | | | | |
| v/s Ratio Perm | 0.08 | | c0.29 | 0.04 | | 0.04 | | | 0.01 | | c0.25 | |
| v/c Ratio | 0.21 | 0.09 | 0.74 | 0.10 | | 0.11 | | 0.37 | 0.03 | | 0.56 | |
| Uniform Delay, d1 | 9.8 | 9.3 | 12.6 | 9.3 | | 9.4 | | 8.7 | 7.3 | | 9.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.1 | 5.1 | 0.1 | | 0.1 | | 0.1 | 0.0 | | 0.3 | |
| Delay (s) | 10.0 | 9.4 | 17.7 | 9.4 | | 9.5 | | 8.8 | 7.4 | | 10.0 | |
| Level of Service | A | A | B | A | | A | | A | A | | A | |
| Approach Delay (s) | | 15.2 | | | 9.5 | | | 8.7 | | | 10.0 | |
| Approach LOS | | B | | | A | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 10.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 47.4 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 65.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 2: S. Beretania St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | 1.00 | 0.86 | | 1.00 | 0.95 | | | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.93 |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1770 | 6301 | | 1770 | 3539 | | | 3539 | 1480 |
| Flt Permitted | | | | 0.95 | 1.00 | | 0.14 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1770 | 6301 | | 266 | 3539 | | | 3539 | 1480 |
| Volume (vph) | 0 | 0 | 0 | 303 | 2641 | 222 | 285 | 429 | 0 | 0 | 1104 | 423 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 326 | 2840 | 239 | 306 | 461 | 0 | 0 | 1187 | 455 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 326 | 3063 | 0 | 306 | 461 | 0 | 0 | 1187 | 445 |
| Confl. Peds. (#/hr) | | | | | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | | | | Split | | | pm+pt | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | 2 | | | | | 6 |
| Actuated Green, G (s) | | | | 36.0 | 36.0 | | 35.0 | 35.0 | | | 23.0 | 23.0 |
| Effective Green, g (s) | | | | 36.0 | 36.0 | | 36.0 | 36.0 | | | 24.0 | 24.0 |
| Actuated g/C Ratio | | | | 0.45 | 0.45 | | 0.45 | 0.45 | | | 0.30 | 0.30 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 797 | 2835 | | 270 | 1593 | | | 1062 | 444 |
| v/s Ratio Prot | | | | 0.18 | c0.49 | | c0.11 | 0.13 | | | 0.34 | |
| v/s Ratio Perm | | | | | | | c0.40 | | | | | 0.30 |
| v/c Ratio | | | | 0.41 | 1.08 | | 1.13 | 0.29 | | | 1.12 | 1.00 |
| Uniform Delay, d1 | | | | 14.8 | 22.0 | | 38.2 | 13.9 | | | 28.0 | 28.0 |
| Progression Factor | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.3 | 43.2 | | 95.6 | 0.1 | | | 65.9 | 43.4 |
| Delay (s) | | | | 15.2 | 65.2 | | 133.8 | 14.0 | | | 93.9 | 71.4 |
| Level of Service | | | | B | E | | F | B | | | F | E |
| Approach Delay (s) | | 0.0 | | | 60.5 | | | 61.8 | | | 87.7 | |
| Approach LOS | | A | | | E | | | E | | | F | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 68.3 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 1.09 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 98.6% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 3: Young St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | 1.00 | 0.98 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | 1.00 | 1.00 | | 0.97 | 1.00 | |
| Frt | 1.00 | 0.96 | | | 0.97 | | 1.00 | 0.97 | | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1744 | 1766 | | | 3354 | | 1762 | 3373 | | 1710 | 3464 | |
| Flt Permitted | 0.31 | 1.00 | | | 0.87 | | 0.13 | 1.00 | | 0.39 | 1.00 | |
| Satd. Flow (perm) | 571 | 1766 | | | 2952 | | 246 | 3373 | | 705 | 3464 | |
| Volume (vph) | 62 | 73 | 26 | 103 | 352 | 109 | 17 | 479 | 111 | 111 | 1169 | 130 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 67 | 78 | 28 | 111 | 378 | 117 | 18 | 515 | 119 | 119 | 1257 | 140 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 29 | 0 | 0 | 27 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 67 | 88 | 0 | 0 | 577 | 0 | 18 | 607 | 0 | 119 | 1385 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 16.0 | 16.0 | | | 16.0 | | 29.2 | 29.2 | | 29.2 | 29.2 | |
| Effective Green, g (s) | 16.0 | 16.0 | | | 16.0 | | 30.2 | 30.2 | | 30.2 | 30.2 | |
| Actuated g/C Ratio | 0.30 | 0.30 | | | 0.30 | | 0.56 | 0.56 | | 0.56 | 0.56 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 169 | 521 | | | 871 | | 137 | 1879 | | 393 | 1930 | |
| v/s Ratio Prot | | 0.05 | | | | | | 0.18 | | | c0.40 | |
| v/s Ratio Perm | 0.12 | | | | c0.20 | | 0.07 | | | 0.17 | | |
| v/c Ratio | 0.40 | 0.17 | | | 0.66 | | 0.13 | 0.32 | | 0.30 | 0.72 | |
| Uniform Delay, d1 | 15.2 | 14.2 | | | 16.7 | | 5.7 | 6.5 | | 6.4 | 8.9 | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.5 | 0.2 | | | 1.9 | | 0.4 | 0.1 | | 0.4 | 1.3 | |
| Delay (s) | 16.8 | 14.3 | | | 18.6 | | 6.2 | 6.6 | | 6.8 | 10.2 | |
| Level of Service | B | B | | | B | | A | A | | A | B | |
| Approach Delay (s) | | 15.3 | | | 18.6 | | | 6.6 | | | 9.9 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 11.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 54.2 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 87.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 4: S. King St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | | 0.76 | | | | | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | 0.95 | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | 1.00 | | 0.99 | |
| Frt | | 0.99 | | | | | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | 1.00 | | 0.99 | |
| Satd. Flow (prot) | | 8281 | | | | | | 3539 | 1510 | | 4995 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | 1.00 | | 0.76 | |
| Satd. Flow (perm) | | 8281 | | | | | | 3539 | 1510 | | 3863 | |
| Volume (vph) | 277 | 1344 | 153 | 0 | 0 | 0 | 0 | 348 | 90 | 298 | 877 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 298 | 1445 | 165 | 0 | 0 | 0 | 0 | 374 | 97 | 320 | 943 | 0 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 53 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1889 | 0 | 0 | 0 | 0 | 0 | 374 | 44 | 0 | 1263 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | | 24.8 | | | | | | 27.5 | 27.5 | | 27.5 | |
| Effective Green, g (s) | | 24.8 | | | | | | 27.5 | 27.5 | | 27.5 | |
| Actuated g/C Ratio | | 0.41 | | | | | | 0.46 | 0.46 | | 0.46 | |
| Clearance Time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | | 3406 | | | | | | 1614 | 689 | | 1762 | |
| v/s Ratio Prot | | c0.23 | | | | | | 0.11 | | | | |
| v/s Ratio Perm | | | | | | | | | 0.03 | | c0.33 | |
| v/c Ratio | | 0.55 | | | | | | 0.23 | 0.06 | | 0.72 | |
| Uniform Delay, d1 | | 13.5 | | | | | | 10.0 | 9.2 | | 13.3 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | | | | 0.1 | 0.0 | | 1.4 | |
| Delay (s) | | 13.7 | | | | | | 10.0 | 9.2 | | 14.7 | |
| Level of Service | | B | | | | | | B | A | | B | |
| Approach Delay (s) | | 13.7 | | | 0.0 | | | 9.9 | | | 14.7 | |
| Approach LOS | | B | | | A | | | A | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 13.6 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.64 | | |
| Actuated Cycle Length (s) | 60.3 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 70.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 5: S. Beretania St & Kalakaua St

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | | 0.81 | 0.81 | 0.97 | |
| Frpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Frt | | | 1.00 | 1.00 | 1.00 | |
| Flt Protected | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (prot) | | | 1433 | 6035 | 3433 | |
| Flt Permitted | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (perm) | | | 1433 | 6035 | 3433 | |
| Volume (vph) | 0 | 0 | 487 | 2695 | 773 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 524 | 2898 | 831 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 524 | 2898 | 831 | 0 |
| Confl. Peds. (#/hr) | | | 20 | | | |
| Turn Type | | | Split | | | |
| Protected Phases | | | 8 | 8 | 2 | |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | | | 50.1 | 50.1 | 23.3 | |
| Effective Green, g (s) | | | 51.1 | 51.1 | 24.3 | |
| Actuated g/C Ratio | | | 0.61 | 0.61 | 0.29 | |
| Clearance Time (s) | | | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 878 | 3698 | 1000 | |
| v/s Ratio Prot | | | 0.37 | c0.48 | c0.24 | |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | | | 0.60 | 0.78 | 0.83 | |
| Uniform Delay, d1 | | | 9.9 | 12.0 | 27.6 | |
| Progression Factor | | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | 1.1 | 1.1 | 6.0 | |
| Delay (s) | | | 11.0 | 13.2 | 33.6 | |
| Level of Service | | | B | B | C | |
| Approach Delay (s) | 0.0 | | | 12.8 | 33.6 | |
| Approach LOS | A | | | B | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 16.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 83.4 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 67.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 6: Young St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.97 | | | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1792 | | | 1797 | | 1733 | 3506 | | 1728 | 3483 | |
| Flt Permitted | | 0.96 | | | 0.94 | | 0.42 | 1.00 | | 0.29 | 1.00 | |
| Satd. Flow (perm) | | 1731 | | | 1699 | | 766 | 3506 | | 524 | 3483 | |
| Volume (vph) | 17 | 220 | 56 | 50 | 372 | 80 | 186 | 648 | 26 | 14 | 446 | 37 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 18 | 237 | 60 | 54 | 400 | 86 | 200 | 697 | 28 | 15 | 480 | 40 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 7 | 0 | 0 | 6 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 306 | 0 | 0 | 533 | 0 | 200 | 719 | 0 | 15 | 508 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 22.6 | | | 22.6 | | 19.3 | 19.3 | | 19.3 | 19.3 | |
| Effective Green, g (s) | | 23.6 | | | 23.6 | | 19.3 | 19.3 | | 19.3 | 19.3 | |
| Actuated g/C Ratio | | 0.46 | | | 0.46 | | 0.38 | 0.38 | | 0.38 | 0.38 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 803 | | | 788 | | 290 | 1329 | | 199 | 1321 | |
| v/s Ratio Prot | | | | | | | | 0.21 | | | 0.15 | |
| v/s Ratio Perm | | 0.18 | | | c0.31 | | c0.26 | | | 0.03 | | |
| v/c Ratio | | 0.38 | | | 0.68 | | 0.69 | 0.54 | | 0.08 | 0.38 | |
| Uniform Delay, d1 | | 8.9 | | | 10.7 | | 13.3 | 12.3 | | 10.1 | 11.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 2.3 | | 6.7 | 0.5 | | 0.2 | 0.2 | |
| Delay (s) | | 9.2 | | | 13.0 | | 20.0 | 12.8 | | 10.3 | 11.7 | |
| Level of Service | | A | | | B | | B | B | | B | B | |
| Approach Delay (s) | | 9.2 | | | 13.0 | | | 14.3 | | | 11.6 | |
| Approach LOS | | A | | | B | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 12.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.68 | | |
| Actuated Cycle Length (s) | 50.9 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 76.0% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 7: S. King St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.86 | 1.00 | | | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.95 | | | | | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 6408 | 1503 | | | | | 3539 | 1512 | 1767 | 3539 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.21 | 1.00 | |
| Satd. Flow (perm) | 1770 | 6408 | 1503 | | | | | 3539 | 1512 | 382 | 3539 | |
| Volume (vph) | 122 | 1262 | 309 | 0 | 0 | 0 | 0 | 661 | 228 | 25 | 512 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 131 | 1357 | 332 | 0 | 0 | 0 | 0 | 711 | 245 | 27 | 551 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 141 | 0 | 0 | 0 | 0 | 0 | 132 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 131 | 1357 | 191 | 0 | 0 | 0 | 0 | 711 | 113 | 27 | 551 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | 23.8 | 23.8 | 23.8 | | | | | 17.6 | 17.6 | 24.5 | 24.5 | |
| Effective Green, g (s) | 24.8 | 24.8 | 24.8 | | | | | 18.6 | 18.6 | 25.5 | 25.5 | |
| Actuated g/C Ratio | 0.43 | 0.43 | 0.43 | | | | | 0.32 | 0.32 | 0.44 | 0.44 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 753 | 2726 | 639 | | | | | 1129 | 482 | 236 | 1548 | |
| v/s Ratio Prot | 0.07 | c0.21 | | | | | | c0.20 | | 0.01 | c0.16 | |
| v/s Ratio Perm | | | 0.13 | | | | | | 0.07 | 0.04 | | |
| v/c Ratio | 0.17 | 0.50 | 0.30 | | | | | 0.63 | 0.23 | 0.11 | 0.36 | |
| Uniform Delay, d1 | 10.4 | 12.2 | 11.0 | | | | | 16.9 | 14.6 | 10.3 | 10.9 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.1 | 0.3 | | | | | 1.1 | 0.3 | 0.2 | 0.1 | |
| Delay (s) | 10.5 | 12.4 | 11.3 | | | | | 18.0 | 14.9 | 10.6 | 11.1 | |
| Level of Service | B | B | B | | | | | B | B | B | B | |
| Approach Delay (s) | | 12.0 | | | 0.0 | | | 17.2 | | | 11.0 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 13.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 58.3 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 52.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 8: I-1 Off-Ramp & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.88 | | | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.92 | | | | | 0.97 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 0.97 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 0.97 | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1709 | 2565 | | | | | 3321 | | 1710 | 3539 | |
| Flt Permitted | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.29 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1709 | 2565 | | | | | 3321 | | 515 | 3539 | |
| Volume (vph) | 1199 | 212 | 1017 | 0 | 0 | 0 | 0 | 517 | 148 | 109 | 759 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 1289 | 228 | 1094 | 0 | 0 | 0 | 0 | 556 | 159 | 117 | 816 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 123 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 739 | 778 | 971 | 0 | 0 | 0 | 0 | 666 | 0 | 117 | 816 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | | Perm | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | | | 4 | | | | | | | 6 | | |
| Actuated Green, G (s) | 26.4 | 26.4 | 26.4 | | | | | 19.6 | | 19.6 | 19.6 | |
| Effective Green, g (s) | 26.4 | 26.4 | 26.4 | | | | | 20.6 | | 20.6 | 20.6 | |
| Actuated g/C Ratio | 0.48 | 0.48 | 0.48 | | | | | 0.37 | | 0.37 | 0.37 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 807 | 820 | 1231 | | | | | 1244 | | 193 | 1326 | |
| v/s Ratio Prot | 0.44 | c0.46 | | | | | | 0.20 | | | c0.23 | |
| v/s Ratio Perm | | | 0.38 | | | | | | | 0.23 | | |
| v/c Ratio | 0.92 | 0.95 | 0.79 | | | | | 0.54 | | 0.61 | 0.62 | |
| Uniform Delay, d1 | 13.3 | 13.7 | 12.0 | | | | | 13.5 | | 13.9 | 14.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 14.9 | 19.8 | 3.4 | | | | | 0.4 | | 5.3 | 0.9 | |
| Delay (s) | 28.2 | 33.4 | 15.4 | | | | | 13.9 | | 19.2 | 14.8 | |
| Level of Service | C | C | B | | | | | B | | B | B | |
| Approach Delay (s) | | 24.4 | | | 0.0 | | | 13.9 | | | 15.4 | |
| Approach LOS | | C | | | A | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 20.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 55.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 74.7% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 9: S. Beretania St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | | 0.86 | | 1.00 | 0.95 | | | 0.95 | 0.88 |
| Frpb, ped/bikes | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | | 6280 | | 1770 | 3539 | | | 3539 | 2787 |
| Flt Permitted | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | | 6280 | | 1770 | 3539 | | | 3539 | 2787 |
| Volume (vph) | 0 | 0 | 0 | 104 | 2262 | 208 | 160 | 351 | 0 | 0 | 566 | 771 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 112 | 2432 | 224 | 172 | 377 | 0 | 0 | 609 | 829 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2750 | 0 | 172 | 377 | 0 | 0 | 609 | 815 |
| Confl. Peds. (#/hr) | | | | 50 | | 50 | | | | | | |
| Turn Type | | | | Split | | | Prot | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | | | | | 35.0 | | 6.0 | 35.0 | | | 24.0 | 24.0 |
| Effective Green, g (s) | | | | | 36.0 | | 7.0 | 36.0 | | | 25.0 | 25.0 |
| Actuated g/C Ratio | | | | | 0.45 | | 0.09 | 0.45 | | | 0.31 | 0.31 |
| Clearance Time (s) | | | | | 5.0 | | 5.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | | 2826 | | 155 | 1593 | | | 1106 | 871 |
| v/s Ratio Prot | | | | | c0.44 | | c0.10 | 0.11 | | | 0.17 | |
| v/s Ratio Perm | | | | | | | | | | | | c0.29 |
| v/c Ratio | | | | | 0.97 | | 1.11 | 0.24 | | | 0.55 | 0.94 |
| Uniform Delay, d1 | | | | | 21.5 | | 36.5 | 13.5 | | | 22.8 | 26.7 |
| Progression Factor | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | | 11.4 | | 104.7 | 0.1 | | | 0.6 | 16.8 |
| Delay (s) | | | | | 32.9 | | 141.2 | 13.6 | | | 23.4 | 43.5 |
| Level of Service | | | | | C | | F | B | | | C | D |
| Approach Delay (s) | | 0.0 | | | 32.9 | | | 53.6 | | | 35.0 | |
| Approach LOS | | A | | | C | | | D | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 35.9 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.97 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 84.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 10: Young St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | 1.00 | 0.97 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.97 | 1.00 | | 0.97 | 1.00 | |
| Frt | | 0.98 | | | 0.99 | | 1.00 | 0.95 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1800 | | | 1822 | | 1725 | 3265 | | 1724 | 3472 | |
| Flt Permitted | | 0.86 | | | 0.89 | | 0.28 | 1.00 | | 0.30 | 1.00 | |
| Satd. Flow (perm) | | 1563 | | | 1629 | | 517 | 3265 | | 539 | 3472 | |
| Volume (vph) | 56 | 232 | 43 | 86 | 402 | 32 | 38 | 425 | 203 | 4 | 595 | 50 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 60 | 249 | 46 | 92 | 432 | 34 | 41 | 457 | 218 | 4 | 640 | 54 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 2 | 0 | 0 | 106 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 350 | 0 | 0 | 556 | 0 | 41 | 569 | 0 | 4 | 683 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 23.5 | | | 23.5 | | 15.1 | 15.1 | | 15.1 | 15.1 | |
| Effective Green, g (s) | | 24.5 | | | 24.5 | | 16.1 | 16.1 | | 16.1 | 16.1 | |
| Actuated g/C Ratio | | 0.50 | | | 0.50 | | 0.33 | 0.33 | | 0.33 | 0.33 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 788 | | | 821 | | 171 | 1082 | | 179 | 1150 | |
| v/s Ratio Prot | | | | | | | | 0.17 | | | c0.20 | |
| v/s Ratio Perm | | 0.22 | | | c0.34 | | 0.08 | | | 0.01 | | |
| v/c Ratio | | 0.44 | | | 0.68 | | 0.24 | 0.53 | | 0.02 | 0.59 | |
| Uniform Delay, d1 | | 7.7 | | | 9.1 | | 11.8 | 13.2 | | 10.9 | 13.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 2.2 | | 0.7 | 0.5 | | 0.1 | 0.8 | |
| Delay (s) | | 8.1 | | | 11.3 | | 12.5 | 13.6 | | 11.0 | 14.4 | |
| Level of Service | | A | | | B | | B | B | | B | B | |
| Approach Delay (s) | | 8.1 | | | 11.3 | | | 13.6 | | | 14.3 | |
| Approach LOS | | A | | | B | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 12.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.64 | | |
| Actuated Cycle Length (s) | 48.6 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 70.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 11: S. King St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.81 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 0.95 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 7490 | | | | | | 1863 | 1497 | 1770 | 1863 | |
| Flt Permitted | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 7490 | | | | | | 1863 | 1497 | 1770 | 1863 | |
| Volume (vph) | 245 | 1282 | 37 | 0 | 0 | 0 | 0 | 393 | 203 | 303 | 408 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 263 | 1378 | 40 | 0 | 0 | 0 | 0 | 423 | 218 | 326 | 439 | 0 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 263 | 1412 | 0 | 0 | 0 | 0 | 0 | 423 | 198 | 326 | 439 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | | | |
| Turn Type | Split | | | | | | | | Perm | Prot | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | | | |
| Actuated Green, G (s) | 25.3 | 25.3 | | | | | | 20.8 | 20.8 | 14.6 | 40.4 | |
| Effective Green, g (s) | 26.3 | 26.3 | | | | | | 21.8 | 21.8 | 15.6 | 41.4 | |
| Actuated g/C Ratio | 0.35 | 0.35 | | | | | | 0.29 | 0.29 | 0.21 | 0.55 | |
| Clearance Time (s) | 5.0 | 5.0 | | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 615 | 2602 | | | | | | 537 | 431 | 365 | 1019 | |
| v/s Ratio Prot | 0.15 | c0.19 | | | | | | c0.23 | | c0.18 | 0.24 | |
| v/s Ratio Perm | | | | | | | | | 0.13 | | | |
| v/c Ratio | 0.43 | 0.54 | | | | | | 0.79 | 0.46 | 0.89 | 0.43 | |
| Uniform Delay, d1 | 18.9 | 19.9 | | | | | | 24.8 | 22.1 | 29.2 | 10.2 | |
| Progression Factor | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.5 | 0.2 | | | | | | 7.5 | 0.8 | 23.0 | 0.3 | |
| Delay (s) | 19.4 | 20.1 | | | | | | 32.3 | 22.9 | 52.2 | 10.5 | |
| Level of Service | B | C | | | | | | C | C | D | B | |
| Approach Delay (s) | | 20.0 | | | 0.0 | | | 29.1 | | | 28.3 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 23.9 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.71 | | |
| Actuated Cycle Length (s) | 75.7 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 66.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# 1: Kinau & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.96 | 1.00 | | 1.00 | | 1.00 | 0.91 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.97 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | | 0.85 | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1514 | 1718 | | 1583 | | 3539 | 1447 | | 5061 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.70 | | 1.00 | | 1.00 | 1.00 | | 0.76 | |
| Satd. Flow (perm) | 1770 | 1863 | 1514 | 1271 | | 1583 | | 3539 | 1447 | | 3882 | |
| Volume (vph) | 298 | 78 | 470 | 60 | 0 | 234 | 0 | 1292 | 86 | 54 | 574 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 320 | 84 | 505 | 65 | 0 | 252 | 0 | 1389 | 92 | 58 | 617 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 163 | 0 | 0 | 17 | 0 | 0 | 43 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 320 | 84 | 342 | 65 | 0 | 235 | 0 | 1389 | 49 | 0 | 675 | 0 |
| Confl. Peds. (#/hr) | | | 50 | 50 | | | | | 50 | 50 | | |
| Turn Type | Perm | | Perm | custom | | custom | | | Perm | Perm | | |
| Protected Phases | | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | 6 | | |
| Actuated Green, G (s) | 17.3 | 17.3 | 17.3 | 17.3 | | 17.3 | | 29.1 | 29.1 | | 29.1 | |
| Effective Green, g (s) | 18.3 | 18.3 | 18.3 | 18.3 | | 18.3 | | 30.1 | 30.1 | | 30.1 | |
| Actuated g/C Ratio | 0.32 | 0.32 | 0.32 | 0.32 | | 0.32 | | 0.53 | 0.53 | | 0.53 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 574 | 604 | 491 | 412 | | 514 | | 1889 | 772 | | 2072 | |
| v/s Ratio Prot | | 0.05 | | | | | | c0.39 | | | | |
| v/s Ratio Perm | 0.18 | | c0.23 | 0.05 | | 0.15 | | | 0.03 | | 0.17 | |
| v/c Ratio | 0.56 | 0.14 | 0.70 | 0.16 | | 0.46 | | 0.74 | 0.06 | | 0.33 | |
| Uniform Delay, d1 | 15.7 | 13.5 | 16.6 | 13.6 | | 15.1 | | 10.1 | 6.3 | | 7.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 1.2 | 0.1 | 4.3 | 0.2 | | 0.6 | | 1.5 | 0.0 | | 0.1 | |
| Delay (s) | 16.9 | 13.6 | 20.9 | 13.7 | | 15.8 | | 11.6 | 6.4 | | 7.5 | |
| Level of Service | B | B | C | B | | B | | B | A | | A | |
| Approach Delay (s) | | 18.8 | | | 15.3 | | | 11.3 | | | 7.5 | |
| Approach LOS | | B | | | B | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 12.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 56.4 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 79.9% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 2: S. Beretania St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | 1.00 | 0.86 | | 1.00 | 0.95 | | | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.93 |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 0.98 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1770 | 6206 | | 1768 | 3539 | | | 3539 | 1473 |
| Flt Permitted | | | | 0.95 | 1.00 | | 0.12 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1770 | 6206 | | 223 | 3539 | | | 3539 | 1473 |
| Volume (vph) | 0 | 0 | 0 | 176 | 2021 | 340 | 356 | 1043 | 0 | 0 | 859 | 132 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 189 | 2173 | 366 | 383 | 1122 | 0 | 0 | 924 | 142 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 189 | 2509 | 0 | 383 | 1122 | 0 | 0 | 924 | 122 |
| Confl. Peds. (#/hr) | | | | | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | | | | Split | | | pm+pt | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | 2 | | | | | 6 |
| Actuated Green, G (s) | | | | 31.2 | 31.2 | | 46.1 | 46.1 | | | 29.0 | 29.0 |
| Effective Green, g (s) | | | | 31.2 | 31.2 | | 47.1 | 47.1 | | | 30.0 | 30.0 |
| Actuated g/C Ratio | | | | 0.36 | 0.36 | | 0.55 | 0.55 | | | 0.35 | 0.35 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 640 | 2244 | | 356 | 1931 | | | 1230 | 512 |
| v/s Ratio Prot | | | | 0.11 | c0.40 | | c0.16 | 0.32 | | | 0.26 | |
| v/s Ratio Perm | | | | | | | c0.42 | | | | | 0.08 |
| v/c Ratio | | | | 0.30 | 1.12 | | 1.08 | 0.58 | | | 0.75 | 0.24 |
| Uniform Delay, d1 | | | | 19.7 | 27.6 | | 23.7 | 13.0 | | | 24.9 | 20.0 |
| Progression Factor | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.3 | 59.9 | | 69.4 | 0.4 | | | 2.6 | 0.2 |
| Delay (s) | | | | 20.0 | 87.4 | | 93.1 | 13.5 | | | 27.5 | 20.3 |
| Level of Service | | | | B | F | | F | B | | | C | C |
| Approach Delay (s) | | 0.0 | | | 82.8 | | | 33.7 | | | 26.5 | |
| Approach LOS | | A | | | F | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 57.5 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 1.07 | | |
| Actuated Cycle Length (s) | 86.3 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 89.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 3: Young St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.98 | | | 0.98 | | 1.00 | 0.98 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.94 | | 1.00 | 0.98 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1745 | 1743 | | | 3193 | | 1754 | 3409 | | 1749 | 3508 | |
| Flt Permitted | 0.30 | 1.00 | | | 0.75 | | 0.19 | 1.00 | | 0.15 | 1.00 | |
| Satd. Flow (perm) | 550 | 1743 | | | 2414 | | 345 | 3409 | | 277 | 3508 | |
| Volume (vph) | 107 | 169 | 82 | 151 | 213 | 255 | 58 | 943 | 159 | 100 | 956 | 41 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 115 | 182 | 88 | 162 | 229 | 274 | 62 | 1014 | 171 | 108 | 1028 | 44 |
| RTOR Reduction (vph) | 0 | 21 | 0 | 0 | 57 | 0 | 0 | 21 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 115 | 249 | 0 | 0 | 608 | 0 | 62 | 1164 | 0 | 108 | 1067 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 18.9 | 18.9 | | | 18.9 | | 28.2 | 28.2 | | 28.2 | 28.2 | |
| Effective Green, g (s) | 19.9 | 19.9 | | | 19.9 | | 29.2 | 29.2 | | 29.2 | 29.2 | |
| Actuated g/C Ratio | 0.35 | 0.35 | | | 0.35 | | 0.51 | 0.51 | | 0.51 | 0.51 | |
| Clearance Time (s) | 5.0 | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 192 | 607 | | | 841 | | 176 | 1743 | | 142 | 1794 | |
| v/s Ratio Prot | | 0.14 | | | | | | 0.34 | | | 0.30 | |
| v/s Ratio Perm | 0.21 | | | | c0.25 | | 0.18 | | | c0.39 | | |
| v/c Ratio | 0.60 | 0.41 | | | 0.72 | | 0.35 | 0.67 | | 0.76 | 0.59 | |
| Uniform Delay, d1 | 15.3 | 14.1 | | | 16.2 | | 8.3 | 10.3 | | 11.2 | 9.8 | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 5.0 | 0.5 | | | 3.1 | | 1.2 | 1.0 | | 21.0 | 0.5 | |
| Delay (s) | 20.3 | 14.6 | | | 19.3 | | 9.5 | 11.3 | | 32.2 | 10.3 | |
| Level of Service | C | B | | | B | | A | B | | C | B | |
| Approach Delay (s) | | 16.3 | | | 19.3 | | | 11.2 | | | 12.3 | |
| Approach LOS | | B | | | B | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 13.7 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 57.1 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 88.4% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 4: S. King St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | | 0.76 | | | | | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | 0.94 | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Frt | | 0.99 | | | | | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | 1.00 | 1.00 | | 0.99 | |
| Satd. Flow (prot) | | 8398 | | | | | | 3539 | 1486 | | 5004 | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | 1.00 | | 0.65 | |
| Satd. Flow (perm) | | 8398 | | | | | | 3539 | 1486 | | 3310 | |
| Volume (vph) | 176 | 2383 | 97 | 0 | 0 | 0 | 0 | 777 | 215 | 341 | 984 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 189 | 2562 | 104 | 0 | 0 | 0 | 0 | 835 | 231 | 367 | 1058 | 0 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 2848 | 0 | 0 | 0 | 0 | 0 | 835 | 207 | 0 | 1425 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | | 37.1 | | | | | | 40.4 | 40.4 | | 40.4 | |
| Effective Green, g (s) | | 38.1 | | | | | | 41.4 | 41.4 | | 41.4 | |
| Actuated g/C Ratio | | 0.44 | | | | | | 0.47 | 0.47 | | 0.47 | |
| Clearance Time (s) | | 5.0 | | | | | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | | 3657 | | | | | | 1674 | 703 | | 1566 | |
| v/s Ratio Prot | | c0.34 | | | | | | 0.24 | | | | |
| v/s Ratio Perm | | | | | | | | | 0.14 | | c0.43 | |
| v/c Ratio | | 0.78 | | | | | | 0.50 | 0.29 | | 2.12dl | |
| Uniform Delay, d1 | | 21.1 | | | | | | 15.9 | 14.1 | | 21.3 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | | 1.1 | | | | | | 0.2 | 0.2 | | 8.1 | |
| Delay (s) | | 22.2 | | | | | | 16.1 | 14.3 | | 29.5 | |
| Level of Service | | C | | | | | | B | B | | C | |
| Approach Delay (s) | | 22.2 | | | 0.0 | | | 15.7 | | | 29.5 | |
| Approach LOS | | C | | | A | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 22.8 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 87.5 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 83.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

## 5: S. Beretania St & Kalakaua St

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | | 0.81 | 0.81 | 0.97 | |
| Frpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Frt | | | 1.00 | 1.00 | 1.00 | |
| Flt Protected | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (prot) | | | 1433 | 6035 | 3433 | |
| Flt Permitted | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (perm) | | | 1433 | 6035 | 3433 | |
| Volume (vph) | 0 | 0 | 399 | 1949 | 879 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 429 | 2096 | 945 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 429 | 2096 | 945 | 0 |
| Confl. Peds. (#/hr) | | | 20 | | | |
| Turn Type | | | Split | | | |
| Protected Phases | | | 8 | 8 | 2 | |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | | | 38.6 | 38.6 | 27.2 | |
| Effective Green, g (s) | | | 39.6 | 39.6 | 28.2 | |
| Actuated g/C Ratio | | | 0.52 | 0.52 | 0.37 | |
| Clearance Time (s) | | | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 749 | 3153 | 1277 | |
| v/s Ratio Prot | | | 0.30 | c0.35 | c0.28 | |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | | | 0.57 | 0.66 | 0.74 | |
| Uniform Delay, d1 | | | 12.3 | 13.2 | 20.6 | |
| Progression Factor | | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | 1.1 | 0.5 | 2.3 | |
| Delay (s) | | | 13.4 | 13.8 | 23.0 | |
| Level of Service | | | B | B | C | |
| Approach Delay (s) | 0.0 | | | 13.7 | 23.0 | |
| Approach LOS | A | | | B | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 16.2 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 75.8 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 60.0% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 6: Young St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.99 | | 1.00 | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.97 | | | 0.97 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1774 | | | 1775 | | 1735 | 3460 | | 1739 | 3501 | |
| Flt Permitted | | 0.92 | | | 0.90 | | 0.49 | 1.00 | | 0.27 | 1.00 | |
| Satd. Flow (perm) | | 1646 | | | 1612 | | 887 | 3460 | | 489 | 3501 | |
| Volume (vph) | 42 | 218 | 77 | 59 | 210 | 71 | 100 | 693 | 75 | 27 | 407 | 23 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 45 | 234 | 83 | 63 | 226 | 76 | 108 | 745 | 81 | 29 | 438 | 25 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 11 | 0 | 0 | 16 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 349 | 0 | 0 | 354 | 0 | 108 | 810 | 0 | 29 | 455 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 15.3 | | | 15.3 | | 16.4 | 16.4 | | 16.4 | 16.4 | |
| Effective Green, g (s) | | 16.3 | | | 16.3 | | 17.4 | 17.4 | | 17.4 | 17.4 | |
| Actuated g/C Ratio | | 0.39 | | | 0.39 | | 0.42 | 0.42 | | 0.42 | 0.42 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 643 | | | 630 | | 370 | 1444 | | 204 | 1461 | |
| v/s Ratio Prot | | | | | | | | c0.23 | | | 0.13 | |
| v/s Ratio Perm | | 0.21 | | | c0.22 | | 0.12 | | | 0.06 | | |
| v/c Ratio | | 0.54 | | | 0.56 | | 0.29 | 0.56 | | 0.14 | 0.31 | |
| Uniform Delay, d1 | | 9.8 | | | 9.9 | | 8.1 | 9.2 | | 7.5 | 8.1 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.9 | | | 1.2 | | 0.4 | 0.5 | | 0.3 | 0.1 | |
| Delay (s) | | 10.8 | | | 11.1 | | 8.5 | 9.7 | | 7.8 | 8.3 | |
| Level of Service | | B | | | B | | A | A | | A | A | |
| Approach Delay (s) | | 10.8 | | | 11.1 | | | 9.6 | | | 8.2 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 9.7 | HCM Level of Service | A |
| HCM Volume to Capacity ratio | 0.56 | | |
| Actuated Cycle Length (s) | 41.7 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 63.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 7: S. King St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.86 | 1.00 | | | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | | | | | 1.00 | 0.94 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 6408 | 1474 | | | | | 3539 | 1488 | 1767 | 3539 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.15 | 1.00 | |
| Satd. Flow (perm) | 1770 | 6408 | 1474 | | | | | 3539 | 1488 | 275 | 3539 | |
| Volume (vph) | 109 | 2687 | 369 | 0 | 0 | 0 | 0 | 674 | 222 | 56 | 628 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 117 | 2889 | 397 | 0 | 0 | 0 | 0 | 725 | 239 | 60 | 675 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 54 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 117 | 2889 | 343 | 0 | 0 | 0 | 0 | 725 | 205 | 60 | 675 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | 45.4 | 45.4 | 45.4 | | | | | 22.1 | 22.1 | 30.2 | 30.2 | |
| Effective Green, g (s) | 46.4 | 46.4 | 46.4 | | | | | 23.1 | 23.1 | 31.2 | 31.2 | |
| Actuated g/C Ratio | 0.54 | 0.54 | 0.54 | | | | | 0.27 | 0.27 | 0.36 | 0.36 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 959 | 3473 | 799 | | | | | 955 | 402 | 172 | 1290 | |
| v/s Ratio Prot | 0.07 | c0.45 | | | | | | c0.20 | | 0.02 | c0.19 | |
| v/s Ratio Perm | | | 0.23 | | | | | | 0.14 | 0.11 | | |
| v/c Ratio | 0.12 | 0.83 | 0.43 | | | | | 0.76 | 0.51 | 0.35 | 0.52 | |
| Uniform Delay, d1 | 9.6 | 16.3 | 11.7 | | | | | 28.7 | 26.5 | 19.7 | 21.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.1 | 1.8 | 0.4 | | | | | 3.5 | 1.1 | 1.2 | 0.4 | |
| Delay (s) | 9.7 | 18.2 | 12.1 | | | | | 32.2 | 27.6 | 20.9 | 21.7 | |
| Level of Service | A | B | B | | | | | C | C | C | C | |
| Approach Delay (s) | | 17.2 | | | 0.0 | | | 31.1 | | | 21.7 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 20.4 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 85.6 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 73.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 8: I-1 Off-Ramp & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.88 | | | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.91 | | | | | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 0.99 | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1718 | 2539 | | | | | 3449 | | 1770 | 3539 | |
| Flt Permitted | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.11 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1718 | 2539 | | | | | 3449 | | 207 | 3539 | |
| Volume (vph) | 558 | 145 | 556 | 0 | 0 | 0 | 0 | 1262 | 118 | 71 | 678 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 600 | 156 | 598 | 0 | 0 | 0 | 0 | 1357 | 127 | 76 | 729 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 294 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 368 | 388 | 304 | 0 | 0 | 0 | 0 | 1474 | 0 | 76 | 729 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | | Perm | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | | | 4 | | | | | | | 6 | | |
| Actuated Green, G (s) | 18.8 | 18.8 | 18.8 | | | | | 35.0 | | 35.0 | 35.0 | |
| Effective Green, g (s) | 18.8 | 18.8 | 18.8 | | | | | 36.0 | | 36.0 | 36.0 | |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | | | | | 0.57 | | 0.57 | 0.57 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 503 | 514 | 760 | | | | | 1977 | | 119 | 2029 | |
| v/s Ratio Prot | 0.22 | c0.23 | | | | | | c0.43 | | | 0.21 | |
| v/s Ratio Perm | | | 0.12 | | | | | | | 0.37 | | |
| v/c Ratio | 0.73 | 0.75 | 0.40 | | | | | 0.75 | | 0.64 | 0.36 | |
| Uniform Delay, d1 | 19.7 | 19.9 | 17.5 | | | | | 10.0 | | 9.0 | 7.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 5.4 | 6.2 | 0.3 | | | | | 1.6 | | 10.7 | 0.1 | |
| Delay (s) | 25.2 | 26.1 | 17.9 | | | | | 11.6 | | 19.8 | 7.3 | |
| Level of Service | C | C | B | | | | | B | | B | A | |
| Approach Delay (s) | | 22.2 | | | 0.0 | | | 11.6 | | | 8.5 | |
| Approach LOS | | C | | | A | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 14.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 62.8 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 72.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 9: S. Beretania St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | | 0.86 | | 1.00 | 0.95 | | | 0.95 | 0.88 |
| Frpb, ped/bikes | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | | 0.98 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | | 6222 | | 1770 | 3539 | | | 3539 | 2787 |
| Flt Permitted | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | | 6222 | | 1770 | 3539 | | | 3539 | 2787 |
| Volume (vph) | 0 | 0 | 0 | 96 | 1662 | 239 | 123 | 692 | 0 | 0 | 712 | 779 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 103 | 1787 | 257 | 132 | 744 | 0 | 0 | 766 | 838 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 120 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2121 | 0 | 132 | 744 | 0 | 0 | 766 | 718 |
| Confl. Peds. (#/hr) | | | | 50 | | 50 | | | | | | |
| Turn Type | | | | Split | | | Prot | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | | | | | 33.0 | | 8.6 | 38.0 | | | 24.4 | 24.4 |
| Effective Green, g (s) | | | | | 34.0 | | 9.6 | 39.0 | | | 25.4 | 25.4 |
| Actuated g/C Ratio | | | | | 0.42 | | 0.12 | 0.48 | | | 0.31 | 0.31 |
| Clearance Time (s) | | | | | 5.0 | | 5.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | | 2612 | | 210 | 1704 | | | 1110 | 874 |
| v/s Ratio Prot | | | | | c0.34 | | c0.07 | 0.21 | | | 0.22 | |
| v/s Ratio Perm | | | | | | | | | | | | c0.26 |
| v/c Ratio | | | | | 0.81 | | 0.63 | 0.44 | | | 0.69 | 0.82 |
| Uniform Delay, d1 | | | | | 20.7 | | 34.0 | 13.8 | | | 24.4 | 25.7 |
| Progression Factor | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | | 2.0 | | 5.8 | 0.2 | | | 1.9 | 6.3 |
| Delay (s) | | | | | 22.7 | | 39.8 | 14.0 | | | 26.2 | 32.0 |
| Level of Service | | | | | C | | D | B | | | C | C |
| Approach Delay (s) | | 0.0 | | | 22.7 | | | 17.9 | | | 29.2 | |
| Approach LOS | | A | | | C | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 24.0 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 81.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 74.1% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 10: Young St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.97 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1784 | | | 1808 | | 1725 | 3491 | | 1732 | 3492 | |
| Flt Permitted | | 0.83 | | | 0.94 | | 0.35 | 1.00 | | 0.29 | 1.00 | |
| Satd. Flow (perm) | | 1500 | | | 1703 | | 632 | 3491 | | 533 | 3492 | |
| Volume (vph) | 94 | 183 | 44 | 37 | 261 | 44 | 24 | 651 | 40 | 71 | 571 | 34 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 101 | 197 | 47 | 40 | 281 | 47 | 26 | 700 | 43 | 76 | 614 | 37 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 6 | 0 | 0 | 8 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 339 | 0 | 0 | 362 | 0 | 26 | 735 | 0 | 76 | 643 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 17.7 | | | 17.7 | | 15.3 | 15.3 | | 15.3 | 15.3 | |
| Effective Green, g (s) | | 18.7 | | | 18.7 | | 16.3 | 16.3 | | 16.3 | 16.3 | |
| Actuated g/C Ratio | | 0.43 | | | 0.43 | | 0.38 | 0.38 | | 0.38 | 0.38 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 652 | | | 741 | | 240 | 1323 | | 202 | 1324 | |
| v/s Ratio Prot | | | | | | | | c0.21 | | | 0.18 | |
| v/s Ratio Perm | | c0.23 | | | 0.21 | | 0.04 | | | 0.14 | | |
| v/c Ratio | | 0.52 | | | 0.49 | | 0.11 | 0.56 | | 0.38 | 0.49 | |
| Uniform Delay, d1 | | 8.9 | | | 8.7 | | 8.6 | 10.5 | | 9.7 | 10.2 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.7 | | | 0.5 | | 0.2 | 0.5 | | 1.2 | 0.3 | |
| Delay (s) | | 9.6 | | | 9.2 | | 8.8 | 11.0 | | 10.8 | 10.4 | |
| Level of Service | | A | | | A | | A | B | | B | B | |
| Approach Delay (s) | | 9.6 | | | 9.2 | | | 10.9 | | | 10.5 | |
| Approach LOS | | A | | | A | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 10.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.54 | | |
| Actuated Cycle Length (s) | 43.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 70.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 11: S. King St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.81 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 0.94 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 7521 | | | | | | 1863 | 1486 | 1770 | 1863 | |
| Flt Permitted | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 7521 | | | | | | 1863 | 1486 | 1770 | 1863 | |
| Volume (vph) | 349 | 2511 | 29 | 0 | 0 | 0 | 0 | 426 | 160 | 445 | 378 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 375 | 2700 | 31 | 0 | 0 | 0 | 0 | 458 | 172 | 478 | 406 | 0 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 375 | 2729 | 0 | 0 | 0 | 0 | 0 | 458 | 161 | 478 | 406 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | | | |
| Turn Type | Split | | | | | | | | Perm | Prot | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | | | |
| Actuated Green, G (s) | 32.0 | 32.0 | | | | | | 23.9 | 23.9 | 17.0 | 45.9 | |
| Effective Green, g (s) | 33.0 | 33.0 | | | | | | 24.9 | 24.9 | 18.0 | 46.9 | |
| Actuated g/C Ratio | 0.38 | 0.38 | | | | | | 0.28 | 0.28 | 0.20 | 0.53 | |
| Clearance Time (s) | 5.0 | 5.0 | | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 665 | 2824 | | | | | | 528 | 421 | 362 | 994 | |
| v/s Ratio Prot | 0.21 | c0.36 | | | | | | c0.25 | | c0.27 | 0.22 | |
| v/s Ratio Perm | | | | | | | | | 0.11 | | | |
| v/c Ratio | 0.56 | 0.97 | | | | | | 0.87 | 0.38 | 1.32 | 0.41 | |
| Uniform Delay, d1 | 21.7 | 26.9 | | | | | | 29.9 | 25.3 | 35.0 | 12.2 | |
| Progression Factor | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.1 | 10.2 | | | | | | 14.0 | 0.6 | 162.4 | 0.3 | |
| Delay (s) | 22.8 | 37.1 | | | | | | 43.9 | 25.9 | 197.3 | 12.5 | |
| Level of Service | C | D | | | | | | D | C | F | B | |
| Approach Delay (s) | | 35.4 | | | 0.0 | | | 39.0 | | | 112.4 | |
| Approach LOS | | D | | | A | | | D | | | F | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 50.6 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 1.02 | | |
| Actuated Cycle Length (s) | 87.9 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 86.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 1: Kinau & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.96 | 1.00 | | 1.00 | | 1.00 | 0.92 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.98 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | | 0.85 | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1522 | 1725 | | 1583 | | 3539 | 1464 | | 5082 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.71 | | 1.00 | | 1.00 | 1.00 | | 0.94 | |
| Satd. Flow (perm) | 1770 | 1863 | 1522 | 1297 | | 1583 | | 3539 | 1464 | | 4754 | |
| Volume (vph) | 135 | 61 | 427 | 45 | 0 | 156 | 0 | 562 | 40 | 8 | 1099 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 145 | 66 | 459 | 48 | 0 | 168 | 0 | 604 | 43 | 9 | 1182 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 24 | 0 | 0 | 95 | 0 | 0 | 24 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 145 | 66 | 435 | 48 | 0 | 73 | 0 | 604 | 19 | 0 | 1191 | 0 |
| Confl. Peds. (#/hr) | | | 50 | 50 | | | | | 50 | 50 | | |
| Turn Type | Perm | | Perm | custom | | custom | | | Perm | Perm | | |
| Protected Phases | | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | 6 | | |
| Actuated Green, G (s) | 18.2 | 18.2 | 18.2 | 18.2 | | 18.2 | | 20.2 | 20.2 | | 20.2 | |
| Effective Green, g (s) | 18.2 | 18.2 | 18.2 | 18.2 | | 18.2 | | 21.2 | 21.2 | | 21.2 | |
| Actuated g/C Ratio | 0.38 | 0.38 | 0.38 | 0.38 | | 0.38 | | 0.45 | 0.45 | | 0.45 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 680 | 715 | 584 | 498 | | 608 | | 1583 | 655 | | 2126 | |
| v/s Ratio Prot | | 0.04 | | | | | | 0.17 | | | | |
| v/s Ratio Perm | 0.08 | | c0.29 | 0.04 | | 0.05 | | | 0.01 | | c0.25 | |
| v/c Ratio | 0.21 | 0.09 | 0.74 | 0.10 | | 0.12 | | 0.38 | 0.03 | | 0.56 | |
| Uniform Delay, d1 | 9.8 | 9.3 | 12.6 | 9.3 | | 9.4 | | 8.7 | 7.3 | | 9.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.1 | 5.1 | 0.1 | | 0.1 | | 0.2 | 0.0 | | 0.3 | |
| Delay (s) | 10.0 | 9.4 | 17.7 | 9.4 | | 9.5 | | 8.9 | 7.4 | | 10.0 | |
| Level of Service | A | A | B | A | | A | | A | A | | B | |
| Approach Delay (s) | | 15.2 | | | 9.5 | | | 8.8 | | | 10.0 | |
| Approach LOS | | B | | | A | | | A | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 11.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 47.4 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 65.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 2: S. Beretania St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | 1.00 | 0.86 | | 1.00 | 0.95 | | | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.93 |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1770 | 6296 | | 1770 | 3539 | | | 3539 | 1480 |
| Flt Permitted | | | | 0.95 | 1.00 | | 0.14 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1770 | 6296 | | 266 | 3539 | | | 3539 | 1480 |
| Volume (vph) | 0 | 0 | 0 | 325 | 2677 | 236 | 285 | 429 | 0 | 0 | 1104 | 423 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 349 | 2878 | 254 | 306 | 461 | 0 | 0 | 1187 | 455 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 349 | 3114 | 0 | 306 | 461 | 0 | 0 | 1187 | 445 |
| Confl. Peds. (#/hr) | | | | | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | | | | Split | | | pm+pt | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | 2 | | | | | 6 |
| Actuated Green, G (s) | | | | 36.0 | 36.0 | | 35.0 | 35.0 | | | 23.0 | 23.0 |
| Effective Green, g (s) | | | | 36.0 | 36.0 | | 36.0 | 36.0 | | | 24.0 | 24.0 |
| Actuated g/C Ratio | | | | 0.45 | 0.45 | | 0.45 | 0.45 | | | 0.30 | 0.30 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 797 | 2833 | | 270 | 1593 | | | 1062 | 444 |
| v/s Ratio Prot | | | | 0.20 | c0.49 | | c0.11 | 0.13 | | | 0.34 | |
| v/s Ratio Perm | | | | | | | c0.40 | | | | | 0.30 |
| v/c Ratio | | | | 0.44 | 1.10 | | 1.13 | 0.29 | | | 1.12 | 1.00 |
| Uniform Delay, d1 | | | | 15.1 | 22.0 | | 38.2 | 13.9 | | | 28.0 | 28.0 |
| Progression Factor | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.4 | 50.9 | | 95.6 | 0.1 | | | 65.9 | 43.4 |
| Delay (s) | | | | 15.5 | 72.9 | | 133.8 | 14.0 | | | 93.9 | 71.4 |
| Level of Service | | | | B | E | | F | B | | | F | E |
| Approach Delay (s) | | 0.0 | | | 67.1 | | | 61.8 | | | 87.7 | |
| Approach LOS | | A | | | E | | | E | | | F | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 72.2 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 1.10 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 99.4% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 3: Young St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | | 0.99 | | 1.00 | 0.98 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | 1.00 | 1.00 | | 0.97 | 1.00 | |
| Frt | 1.00 | 0.96 | | | 0.97 | | 1.00 | 0.97 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1744 | 1766 | | | 3354 | | 1762 | 3371 | | 1710 | 3465 | |
| Flt Permitted | 0.31 | 1.00 | | | 0.87 | | 0.13 | 1.00 | | 0.39 | 1.00 | |
| Satd. Flow (perm) | 568 | 1766 | | | 2952 | | 242 | 3371 | | 703 | 3465 | |
| Volume (vph) | 62 | 73 | 26 | 103 | 352 | 109 | 17 | 479 | 112 | 111 | 1190 | 130 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 67 | 78 | 28 | 111 | 378 | 117 | 18 | 515 | 120 | 119 | 1280 | 140 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 29 | 0 | 0 | 28 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 67 | 88 | 0 | 0 | 577 | 0 | 18 | 607 | 0 | 119 | 1409 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 16.1 | 16.1 | | | 16.1 | | 29.6 | 29.6 | | 29.6 | 29.6 | |
| Effective Green, g (s) | 16.1 | 16.1 | | | 16.1 | | 30.6 | 30.6 | | 30.6 | 30.6 | |
| Actuated g/C Ratio | 0.29 | 0.29 | | | 0.29 | | 0.56 | 0.56 | | 0.56 | 0.56 | |
| Clearance Time (s) | 4.0 | 4.0 | | | 4.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 167 | 520 | | | 869 | | 135 | 1886 | | 393 | 1938 | |
| v/s Ratio Prot | | 0.05 | | | | | | 0.18 | | | c0.41 | |
| v/s Ratio Perm | 0.12 | | | | c0.20 | | 0.07 | | | 0.17 | | |
| v/c Ratio | 0.40 | 0.17 | | | 0.66 | | 0.13 | 0.32 | | 0.30 | 0.73 | |
| Uniform Delay, d1 | 15.4 | 14.3 | | | 16.9 | | 5.7 | 6.5 | | 6.4 | 8.9 | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.6 | 0.2 | | | 1.9 | | 0.5 | 0.1 | | 0.4 | 1.4 | |
| Delay (s) | 17.0 | 14.5 | | | 18.9 | | 6.2 | 6.6 | | 6.8 | 10.3 | |
| Level of Service | B | B | | | B | | A | A | | A | B | |
| Approach Delay (s) | | 15.5 | | | 18.9 | | | 6.6 | | | 10.1 | |
| Approach LOS | | B | | | B | | | A | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 11.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.71 | | |
| Actuated Cycle Length (s) | 54.7 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 88.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 4: S. King St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | | 0.76 | | | | | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | 0.95 | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | 1.00 | | 0.99 | |
| Frt | | 0.99 | | | | | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | | 0.99 | | | | | | 1.00 | 1.00 | | 0.99 | |
| Satd. Flow (prot) | | 8282 | | | | | | 3539 | 1509 | | 4991 | |
| Flt Permitted | | 0.99 | | | | | | 1.00 | 1.00 | | 0.76 | |
| Satd. Flow (perm) | | 8282 | | | | | | 3539 | 1509 | | 3839 | |
| Volume (vph) | 278 | 1352 | 153 | 0 | 0 | 0 | 0 | 349 | 90 | 316 | 881 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 299 | 1454 | 165 | 0 | 0 | 0 | 0 | 375 | 97 | 340 | 947 | 0 |
| RTOR Reduction (vph) | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1899 | 0 | 0 | 0 | 0 | 0 | 375 | 45 | 0 | 1287 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | | 25.2 | | | | | | 28.3 | 28.3 | | 28.3 | |
| Effective Green, g (s) | | 25.2 | | | | | | 28.3 | 28.3 | | 28.3 | |
| Actuated g/C Ratio | | 0.41 | | | | | | 0.46 | 0.46 | | 0.46 | |
| Clearance Time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | | 3394 | | | | | | 1629 | 694 | | 1767 | |
| v/s Ratio Prot | | c0.23 | | | | | | 0.11 | | | | |
| v/s Ratio Perm | | | | | | | | | 0.03 | | c0.34 | |
| v/c Ratio | | 0.56 | | | | | | 0.23 | 0.06 | | 0.73 | |
| Uniform Delay, d1 | | 13.9 | | | | | | 10.0 | 9.2 | | 13.5 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | | 0.2 | | | | | | 0.1 | 0.0 | | 1.5 | |
| Delay (s) | | 14.1 | | | | | | 10.1 | 9.3 | | 15.0 | |
| Level of Service | | B | | | | | | B | A | | B | |
| Approach Delay (s) | | 14.1 | | | 0.0 | | | 9.9 | | | 15.0 | |
| Approach LOS | | B | | | A | | | A | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 13.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 61.5 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 71.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 5: S. Beretania St & Kalakaua St

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | | 0.81 | 0.81 | 0.97 | |
| Frpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Frt | | | 1.00 | 1.00 | 1.00 | |
| Flt Protected | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (prot) | | | 1433 | 6035 | 3433 | |
| Flt Permitted | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (perm) | | | 1433 | 6035 | 3433 | |
| Volume (vph) | 0 | 0 | 487 | 2695 | 845 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 524 | 2898 | 909 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 524 | 2898 | 909 | 0 |
| Confl. Peds. (#/hr) | | | 20 | | | |
| Turn Type | | | Split | | | |
| Protected Phases | | | 8 | 8 | 2 | |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | | | 50.0 | 50.0 | 24.4 | |
| Effective Green, g (s) | | | 51.0 | 51.0 | 25.4 | |
| Actuated g/C Ratio | | | 0.60 | 0.60 | 0.30 | |
| Clearance Time (s) | | | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 866 | 3647 | 1033 | |
| v/s Ratio Prot | | | 0.37 | c0.48 | c0.26 | |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | | | 0.61 | 0.79 | 0.88 | |
| Uniform Delay, d1 | | | 10.4 | 12.7 | 28.1 | |
| Progression Factor | | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | 1.2 | 1.3 | 8.7 | |
| Delay (s) | | | 11.6 | 14.0 | 36.8 | |
| Level of Service | | | B | B | D | |
| Approach Delay (s) | 0.0 | | | 13.6 | 36.8 | |
| Approach LOS | A | | | B | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 18.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.82 | | |
| Actuated Cycle Length (s) | 84.4 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 69.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 6: Young St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.97 | | | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 1.00 | | | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1792 | | | 1794 | | 1733 | 3507 | | 1728 | 3483 | |
| Flt Permitted | | 0.96 | | | 0.94 | | 0.42 | 1.00 | | 0.28 | 1.00 | |
| Satd. Flow (perm) | | 1726 | | | 1697 | | 766 | 3507 | | 514 | 3483 | |
| Volume (vph) | 18 | 220 | 56 | 50 | 372 | 86 | 186 | 658 | 26 | 14 | 446 | 37 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 19 | 237 | 60 | 54 | 400 | 92 | 200 | 708 | 28 | 15 | 480 | 40 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 8 | 0 | 0 | 6 | 0 | 0 | 12 | 0 |
| Lane Group Flow (vph) | 0 | 307 | 0 | 0 | 538 | 0 | 200 | 730 | 0 | 15 | 508 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 22.6 | | | 22.6 | | 19.4 | 19.4 | | 19.4 | 19.4 | |
| Effective Green, g (s) | | 23.6 | | | 23.6 | | 19.4 | 19.4 | | 19.4 | 19.4 | |
| Actuated g/C Ratio | | 0.46 | | | 0.46 | | 0.38 | 0.38 | | 0.38 | 0.38 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 799 | | | 785 | | 291 | 1334 | | 196 | 1325 | |
| v/s Ratio Prot | | | | | | | | 0.21 | | | 0.15 | |
| v/s Ratio Perm | | 0.18 | | | c0.32 | | c0.26 | | | 0.03 | | |
| v/c Ratio | | 0.38 | | | 0.69 | | 0.69 | 0.55 | | 0.08 | 0.38 | |
| Uniform Delay, d1 | | 9.0 | | | 10.8 | | 13.3 | 12.4 | | 10.1 | 11.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.3 | | | 2.5 | | 6.6 | 0.5 | | 0.2 | 0.2 | |
| Delay (s) | | 9.3 | | | 13.3 | | 19.9 | 12.8 | | 10.3 | 11.6 | |
| Level of Service | | A | | | B | | B | B | | B | B | |
| Approach Delay (s) | | 9.3 | | | 13.3 | | | 14.3 | | | 11.6 | |
| Approach LOS | | A | | | B | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 12.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.69 | | |
| Actuated Cycle Length (s) | 51.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 75.9% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 7: S. King St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.86 | 1.00 | | | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.95 | | | | | 1.00 | 0.95 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 6408 | 1502 | | | | | 3539 | 1512 | 1767 | 3539 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.20 | 1.00 | |
| Satd. Flow (perm) | 1770 | 6408 | 1502 | | | | | 3539 | 1512 | 377 | 3539 | |
| Volume (vph) | 131 | 1272 | 316 | 0 | 0 | 0 | 0 | 663 | 228 | 25 | 512 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 141 | 1368 | 340 | 0 | 0 | 0 | 0 | 713 | 245 | 27 | 551 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 140 | 0 | 0 | 0 | 0 | 0 | 133 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 141 | 1368 | 200 | 0 | 0 | 0 | 0 | 713 | 112 | 27 | 551 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | 24.4 | 24.4 | 24.4 | | | | | 17.7 | 17.7 | 24.6 | 24.6 | |
| Effective Green, g (s) | 25.4 | 25.4 | 25.4 | | | | | 18.7 | 18.7 | 25.6 | 25.6 | |
| Actuated g/C Ratio | 0.43 | 0.43 | 0.43 | | | | | 0.32 | 0.32 | 0.43 | 0.43 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 762 | 2759 | 647 | | | | | 1122 | 479 | 232 | 1536 | |
| v/s Ratio Prot | 0.08 | c0.21 | | | | | | c0.20 | | 0.01 | c0.16 | |
| v/s Ratio Perm | | | 0.13 | | | | | | 0.07 | 0.04 | | |
| v/c Ratio | 0.19 | 0.50 | 0.31 | | | | | 0.64 | 0.23 | 0.12 | 0.36 | |
| Uniform Delay, d1 | 10.4 | 12.2 | 11.0 | | | | | 17.2 | 14.9 | 10.6 | 11.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.1 | 0.3 | | | | | 1.2 | 0.3 | 0.2 | 0.1 | |
| Delay (s) | 10.5 | 12.3 | 11.3 | | | | | 18.4 | 15.1 | 10.8 | 11.3 | |
| Level of Service | B | B | B | | | | | B | B | B | B | |
| Approach Delay (s) | | 12.0 | | | 0.0 | | | 17.6 | | | 11.3 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 13.5 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 59.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 52.8% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 8: I-1 Off-Ramp & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.88 | | | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.92 | | | | | 0.97 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 0.97 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 0.97 | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1709 | 2565 | | | | | 3321 | | 1710 | 3539 | |
| Flt Permitted | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.29 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1709 | 2565 | | | | | 3321 | | 515 | 3539 | |
| Volume (vph) | 1199 | 212 | 1021 | 0 | 0 | 0 | 0 | 517 | 148 | 109 | 759 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 1289 | 228 | 1098 | 0 | 0 | 0 | 0 | 556 | 159 | 117 | 816 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 123 | 0 | 0 | 0 | 0 | 49 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 739 | 778 | 975 | 0 | 0 | 0 | 0 | 666 | 0 | 117 | 816 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | | Perm | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | | | 4 | | | | | | | 6 | | |
| Actuated Green, G (s) | 26.4 | 26.4 | 26.4 | | | | | 19.6 | | 19.6 | 19.6 | |
| Effective Green, g (s) | 26.4 | 26.4 | 26.4 | | | | | 20.6 | | 20.6 | 20.6 | |
| Actuated g/C Ratio | 0.48 | 0.48 | 0.48 | | | | | 0.37 | | 0.37 | 0.37 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 807 | 820 | 1231 | | | | | 1244 | | 193 | 1326 | |
| v/s Ratio Prot | 0.44 | c0.46 | | | | | | 0.20 | | | c0.23 | |
| v/s Ratio Perm | | | 0.38 | | | | | | | 0.23 | | |
| v/c Ratio | 0.92 | 0.95 | 0.79 | | | | | 0.54 | | 0.61 | 0.62 | |
| Uniform Delay, d1 | 13.3 | 13.7 | 12.0 | | | | | 13.5 | | 13.9 | 14.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 14.9 | 19.8 | 3.6 | | | | | 0.4 | | 5.3 | 0.9 | |
| Delay (s) | 28.2 | 33.4 | 15.6 | | | | | 13.9 | | 19.2 | 14.8 | |
| Level of Service | C | C | B | | | | | B | | B | B | |
| Approach Delay (s) | | 24.4 | | | 0.0 | | | 13.9 | | | 15.4 | |
| Approach LOS | | C | | | A | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 20.7 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.80 | | |
| Actuated Cycle Length (s) | 55.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 74.7% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 9: S. Beretania St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | | 0.86 | | 1.00 | 0.95 | | | 0.95 | 0.88 |
| Frpb, ped/bikes | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | | 6279 | | 1770 | 3539 | | | 3539 | 2787 |
| Flt Permitted | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | | 6279 | | 1770 | 3539 | | | 3539 | 2787 |
| Volume (vph) | 0 | 0 | 0 | 106 | 2262 | 208 | 160 | 351 | 0 | 0 | 570 | 771 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 114 | 2432 | 224 | 172 | 377 | 0 | 0 | 613 | 829 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2752 | 0 | 172 | 377 | 0 | 0 | 613 | 815 |
| Confl. Peds. (#/hr) | | | | 50 | | 50 | | | | | | |
| Turn Type | | | | Split | | | Prot | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | | | | | 35.0 | | 6.0 | 35.0 | | | 24.0 | 24.0 |
| Effective Green, g (s) | | | | | 36.0 | | 7.0 | 36.0 | | | 25.0 | 25.0 |
| Actuated g/C Ratio | | | | | 0.45 | | 0.09 | 0.45 | | | 0.31 | 0.31 |
| Clearance Time (s) | | | | | 5.0 | | 5.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | | 2826 | | 155 | 1593 | | | 1106 | 871 |
| v/s Ratio Prot | | | | | c0.44 | | c0.10 | 0.11 | | | 0.17 | |
| v/s Ratio Perm | | | | | | | | | | | | c0.29 |
| v/c Ratio | | | | | 0.97 | | 1.11 | 0.24 | | | 0.55 | 0.94 |
| Uniform Delay, d1 | | | | | 21.5 | | 36.5 | 13.5 | | | 22.9 | 26.7 |
| Progression Factor | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | | 11.5 | | 104.7 | 0.1 | | | 0.6 | 16.8 |
| Delay (s) | | | | | 33.0 | | 141.2 | 13.6 | | | 23.5 | 43.5 |
| Level of Service | | | | | C | | F | B | | | C | D |
| Approach Delay (s) | | 0.0 | | | 33.0 | | | 53.6 | | | 35.0 | |
| Approach LOS | | A | | | C | | | D | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 36.0 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.97 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 84.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 10: Young St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | | 1.00 | 0.97 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.97 | 1.00 | |
| Frt | | 0.98 | | | 0.99 | | 1.00 | 0.95 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1800 | | | 1822 | | 1726 | 3265 | | 1723 | 3465 | |
| Flt Permitted | | 0.86 | | | 0.89 | | 0.28 | 1.00 | | 0.30 | 1.00 | |
| Satd. Flow (perm) | | 1563 | | | 1629 | | 512 | 3265 | | 540 | 3465 | |
| Volume (vph) | 56 | 232 | 43 | 86 | 402 | 32 | 38 | 425 | 203 | 4 | 595 | 56 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 60 | 249 | 46 | 92 | 432 | 34 | 41 | 457 | 218 | 4 | 640 | 60 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 2 | 0 | 0 | 106 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 0 | 350 | 0 | 0 | 556 | 0 | 41 | 569 | 0 | 4 | 687 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 23.5 | | | 23.5 | | 15.2 | 15.2 | | 15.2 | 15.2 | |
| Effective Green, g (s) | | 24.5 | | | 24.5 | | 16.2 | 16.2 | | 16.2 | 16.2 | |
| Actuated g/C Ratio | | 0.50 | | | 0.50 | | 0.33 | 0.33 | | 0.33 | 0.33 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 786 | | | 820 | | 170 | 1086 | | 180 | 1153 | |
| v/s Ratio Prot | | | | | | | | 0.17 | | | c0.20 | |
| v/s Ratio Perm | | 0.22 | | | c0.34 | | 0.08 | | | 0.01 | | |
| v/c Ratio | | 0.44 | | | 0.68 | | 0.24 | 0.52 | | 0.02 | 0.60 | |
| Uniform Delay, d1 | | 7.7 | | | 9.1 | | 11.8 | 13.1 | | 10.9 | 13.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 2.2 | | 0.7 | 0.5 | | 0.0 | 0.8 | |
| Delay (s) | | 8.1 | | | 11.4 | | 12.5 | 13.6 | | 11.0 | 14.4 | |
| Level of Service | | A | | | B | | B | B | | B | B | |
| Approach Delay (s) | | 8.1 | | | 11.4 | | | 13.5 | | | 14.3 | |
| Approach LOS | | A | | | B | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 12.4 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.65 | | |
| Actuated Cycle Length (s) | 48.7 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 70.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 11: S. King St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.81 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 0.95 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 7490 | | | | | | 1863 | 1496 | 1770 | 1863 | |
| Flt Permitted | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 7490 | | | | | | 1863 | 1496 | 1770 | 1863 | |
| Volume (vph) | 245 | 1292 | 37 | 0 | 0 | 0 | 0 | 393 | 203 | 303 | 408 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 263 | 1389 | 40 | 0 | 0 | 0 | 0 | 423 | 218 | 326 | 439 | 0 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 263 | 1423 | 0 | 0 | 0 | 0 | 0 | 423 | 198 | 326 | 439 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | | | |
| Turn Type | Split | | | | | | | | Perm | Prot | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | | | |
| Actuated Green, G (s) | 25.4 | 25.4 | | | | | | 20.9 | 20.9 | 14.5 | 40.4 | |
| Effective Green, g (s) | 26.4 | 26.4 | | | | | | 21.9 | 21.9 | 15.5 | 41.4 | |
| Actuated g/C Ratio | 0.35 | 0.35 | | | | | | 0.29 | 0.29 | 0.20 | 0.55 | |
| Clearance Time (s) | 5.0 | 5.0 | | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 616 | 2609 | | | | | | 538 | 432 | 362 | 1018 | |
| v/s Ratio Prot | 0.15 | c0.19 | | | | | | c0.23 | | c0.18 | 0.24 | |
| v/s Ratio Perm | | | | | | | | | 0.13 | | | |
| v/c Ratio | 0.43 | 0.55 | | | | | | 0.79 | 0.46 | 0.90 | 0.43 | |
| Uniform Delay, d1 | 18.9 | 19.9 | | | | | | 24.8 | 22.1 | 29.4 | 10.2 | |
| Progression Factor | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.5 | 0.2 | | | | | | 7.4 | 0.8 | 24.5 | 0.3 | |
| Delay (s) | 19.4 | 20.1 | | | | | | 32.2 | 22.9 | 53.9 | 10.5 | |
| Level of Service | B | C | | | | | | C | C | D | B | |
| Approach Delay (s) | | 20.0 | | | 0.0 | | | 29.1 | | | 29.0 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 24.1 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.71 | | |
| Actuated Cycle Length (s) | 75.8 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 66.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 1: Kinau & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.96 | 1.00 | | 1.00 | | 1.00 | 0.91 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 0.97 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | | 0.85 | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1770 | 1863 | 1514 | 1718 | | 1583 | | 3539 | 1447 | | 5061 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.70 | | 1.00 | | 1.00 | 1.00 | | 0.76 | |
| Satd. Flow (perm) | 1770 | 1863 | 1514 | 1270 | | 1583 | | 3539 | 1447 | | 3874 | |
| Volume (vph) | 298 | 78 | 470 | 60 | 0 | 234 | 0 | 1300 | 86 | 54 | 574 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 320 | 84 | 505 | 65 | 0 | 252 | 0 | 1398 | 92 | 58 | 617 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 163 | 0 | 0 | 16 | 0 | 0 | 43 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 320 | 84 | 342 | 65 | 0 | 236 | 0 | 1398 | 49 | 0 | 675 | 0 |
| Confl. Peds. (#/hr) | | | 50 | 50 | | | | | 50 | 50 | | |
| Turn Type | Perm | | Perm | custom | | custom | | | Perm | Perm | | |
| Protected Phases | | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | 6 | | |
| Actuated Green, G (s) | 17.4 | 17.4 | 17.4 | 17.4 | | 17.4 | | 29.2 | 29.2 | | 29.2 | |
| Effective Green, g (s) | 18.4 | 18.4 | 18.4 | 18.4 | | 18.4 | | 30.2 | 30.2 | | 30.2 | |
| Actuated g/C Ratio | 0.33 | 0.33 | 0.33 | 0.33 | | 0.33 | | 0.53 | 0.53 | | 0.53 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 575 | 606 | 492 | 413 | | 515 | | 1888 | 772 | | 2067 | |
| v/s Ratio Prot | | 0.05 | | | | | | c0.40 | | | | |
| v/s Ratio Perm | 0.18 | | c0.23 | 0.05 | | 0.15 | | | 0.03 | | 0.17 | |
| v/c Ratio | 0.56 | 0.14 | 0.70 | 0.16 | | 0.46 | | 0.74 | 0.06 | | 0.33 | |
| Uniform Delay, d1 | 15.7 | 13.5 | 16.7 | 13.6 | | 15.1 | | 10.2 | 6.4 | | 7.5 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 1.2 | 0.1 | 4.3 | 0.2 | | 0.6 | | 1.6 | 0.0 | | 0.1 | |
| Delay (s) | 16.9 | 13.6 | 20.9 | 13.8 | | 15.8 | | 11.8 | 6.4 | | 7.5 | |
| Level of Service | B | B | C | B | | B | | B | A | | A | |
| Approach Delay (s) | | 18.8 | | | 15.4 | | | 11.4 | | | 7.5 | |
| Approach LOS | | B | | | B | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 13.0 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 56.6 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 79.9% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 2: S. Beretania St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | 1.00 | 0.86 | | 1.00 | 0.95 | | | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.93 |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 0.98 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1770 | 6204 | | 1768 | 3539 | | | 3539 | 1473 |
| Flt Permitted | | | | 0.95 | 1.00 | | 0.12 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1770 | 6204 | | 223 | 3539 | | | 3539 | 1473 |
| Volume (vph) | 0 | 0 | 0 | 188 | 2041 | 348 | 356 | 1043 | 0 | 0 | 859 | 132 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 202 | 2195 | 374 | 383 | 1122 | 0 | 0 | 924 | 142 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 202 | 2538 | 0 | 383 | 1122 | 0 | 0 | 924 | 122 |
| Confl. Peds. (#/hr) | | | | | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | | | | Split | | | pm+pt | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | 2 | | | | | 6 |
| Actuated Green, G (s) | | | | 31.2 | 31.2 | | 46.1 | 46.1 | | | 29.0 | 29.0 |
| Effective Green, g (s) | | | | 31.2 | 31.2 | | 47.1 | 47.1 | | | 30.0 | 30.0 |
| Actuated g/C Ratio | | | | 0.36 | 0.36 | | 0.55 | 0.55 | | | 0.35 | 0.35 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 640 | 2243 | | 356 | 1931 | | | 1230 | 512 |
| v/s Ratio Prot | | | | 0.11 | c0.41 | | c0.16 | 0.32 | | | 0.26 | |
| v/s Ratio Perm | | | | | | | c0.42 | | | | | 0.08 |
| v/c Ratio | | | | 0.32 | 1.13 | | 1.08 | 0.58 | | | 0.75 | 0.24 |
| Uniform Delay, d1 | | | | 19.9 | 27.6 | | 23.7 | 13.0 | | | 24.9 | 20.0 |
| Progression Factor | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.3 | 65.5 | | 69.4 | 0.4 | | | 2.6 | 0.2 |
| Delay (s) | | | | 20.1 | 93.0 | | 93.1 | 13.5 | | | 27.5 | 20.3 |
| Level of Service | | | | C | F | | F | B | | | C | C |
| Approach Delay (s) | | 0.0 | | | 87.7 | | | 33.7 | | | 26.5 | |
| Approach LOS | | A | | | F | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 60.3 | HCM Level of Service | E |
| HCM Volume to Capacity ratio | 1.08 | | |
| Actuated Cycle Length (s) | 86.3 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 89.4% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 3: Young St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.98 | | | 0.98 | | 1.00 | 0.98 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 0.95 | | | 0.94 | | 1.00 | 0.98 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1745 | 1743 | | | 3192 | | 1754 | 3405 | | 1750 | 3508 | |
| Flt Permitted | 0.30 | 1.00 | | | 0.75 | | 0.18 | 1.00 | | 0.15 | 1.00 | |
| Satd. Flow (perm) | 545 | 1743 | | | 2408 | | 340 | 3405 | | 276 | 3508 | |
| Volume (vph) | 107 | 169 | 82 | 151 | 213 | 255 | 58 | 943 | 165 | 100 | 968 | 41 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 115 | 182 | 88 | 162 | 229 | 274 | 62 | 1014 | 177 | 108 | 1041 | 44 |
| RTOR Reduction (vph) | 0 | 22 | 0 | 0 | 57 | 0 | 0 | 22 | 0 | 0 | 5 | 0 |
| Lane Group Flow (vph) | 115 | 248 | 0 | 0 | 608 | 0 | 62 | 1169 | 0 | 108 | 1080 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 18.9 | 18.9 | | | 18.9 | | 28.7 | 28.7 | | 28.7 | 28.7 | |
| Effective Green, g (s) | 19.9 | 19.9 | | | 19.9 | | 29.7 | 29.7 | | 29.7 | 29.7 | |
| Actuated g/C Ratio | 0.35 | 0.35 | | | 0.35 | | 0.52 | 0.52 | | 0.52 | 0.52 | |
| Clearance Time (s) | 5.0 | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 188 | 602 | | | 832 | | 175 | 1756 | | 142 | 1809 | |
| v/s Ratio Prot | | 0.14 | | | | | | 0.34 | | | 0.31 | |
| v/s Ratio Perm | 0.21 | | | | c0.25 | | 0.18 | | | c0.39 | | |
| v/c Ratio | 0.61 | 0.41 | | | 0.73 | | 0.35 | 0.67 | | 0.76 | 0.60 | |
| Uniform Delay, d1 | 15.6 | 14.4 | | | 16.5 | | 8.3 | 10.3 | | 11.1 | 9.8 | |
| Progression Factor | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 5.8 | 0.5 | | | 3.3 | | 1.2 | 1.0 | | 21.0 | 0.5 | |
| Delay (s) | 21.4 | 14.9 | | | 19.8 | | 9.5 | 11.3 | | 32.1 | 10.3 | |
| Level of Service | C | B | | | B | | A | B | | C | B | |
| Approach Delay (s) | | 16.8 | | | 19.8 | | | 11.2 | | | 12.3 | |
| Approach LOS | | B | | | B | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 13.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 57.6 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 88.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 4: S. King St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | | | | 4.0 | 4.0 | | 4.0 | |
| Lane Util. Factor | | 0.76 | | | | | | 0.95 | 1.00 | | 0.91 | |
| Frpb, ped/bikes | | 1.00 | | | | | | 1.00 | 0.94 | | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Frt | | 0.99 | | | | | | 1.00 | 0.85 | | 1.00 | |
| Flt Protected | | 1.00 | | | | | | 1.00 | 1.00 | | 0.99 | |
| Satd. Flow (prot) | | 8399 | | | | | | 3539 | 1486 | | 5003 | |
| Flt Permitted | | 1.00 | | | | | | 1.00 | 1.00 | | 0.65 | |
| Satd. Flow (perm) | | 8399 | | | | | | 3539 | 1486 | | 3310 | |
| Volume (vph) | 180 | 2417 | 97 | 0 | 0 | 0 | 0 | 779 | 216 | 351 | 986 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 194 | 2599 | 104 | 0 | 0 | 0 | 0 | 838 | 232 | 377 | 1060 | 0 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 2890 | 0 | 0 | 0 | 0 | 0 | 838 | 209 | 0 | 1437 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | | 37.1 | | | | | | 40.5 | 40.5 | | 40.5 | |
| Effective Green, g (s) | | 38.1 | | | | | | 41.5 | 41.5 | | 41.5 | |
| Actuated g/C Ratio | | 0.43 | | | | | | 0.47 | 0.47 | | 0.47 | |
| Clearance Time (s) | | 5.0 | | | | | | 5.0 | 5.0 | | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | | 3653 | | | | | | 1677 | 704 | | 1568 | |
| v/s Ratio Prot | | c0.34 | | | | | | 0.24 | | | | |
| v/s Ratio Perm | | | | | | | | | 0.14 | | c0.43 | |
| v/c Ratio | | 0.79 | | | | | | 0.50 | 0.30 | | 2.18dl | |
| Uniform Delay, d1 | | 21.3 | | | | | | 15.9 | 14.1 | | 21.4 | |
| Progression Factor | | 1.00 | | | | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | | 1.2 | | | | | | 0.2 | 0.2 | | 8.7 | |
| Delay (s) | | 22.5 | | | | | | 16.1 | 14.4 | | 30.2 | |
| Level of Service | | C | | | | | | B | B | | C | |
| Approach Delay (s) | | 22.5 | | | 0.0 | | | 15.7 | | | 30.2 | |
| Approach LOS | | C | | | A | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 23.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.86 | | |
| Actuated Cycle Length (s) | 87.6 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 84.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

## 5: S. Beretania St & Kalakaua St

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | | 0.81 | 0.81 | 0.97 | |
| Frpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | | 1.00 | 1.00 | 1.00 | |
| Frt | | | 1.00 | 1.00 | 1.00 | |
| Flt Protected | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (prot) | | | 1433 | 6035 | 3433 | |
| Flt Permitted | | | 0.95 | 1.00 | 0.95 | |
| Satd. Flow (perm) | | | 1433 | 6035 | 3433 | |
| Volume (vph) | 0 | 0 | 399 | 1949 | 919 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 429 | 2096 | 988 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 429 | 2096 | 988 | 0 |
| Confl. Peds. (#/hr) | | | 20 | | | |
| Turn Type | | | Split | | | |
| Protected Phases | | | 8 | 8 | 2 | |
| Permitted Phases | | | | | | |
| Actuated Green, G (s) | | | 38.8 | 38.8 | 28.1 | |
| Effective Green, g (s) | | | 39.8 | 39.8 | 29.1 | |
| Actuated g/C Ratio | | | 0.52 | 0.52 | 0.38 | |
| Clearance Time (s) | | | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | | 742 | 3123 | 1299 | |
| v/s Ratio Prot | | | 0.30 | c0.35 | c0.29 | |
| v/s Ratio Perm | | | | | | |
| v/c Ratio | | | 0.58 | 0.67 | 0.76 | |
| Uniform Delay, d1 | | | 12.8 | 13.7 | 20.9 | |
| Progression Factor | | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | | 1.1 | 0.6 | 2.7 | |
| Delay (s) | | | 13.9 | 14.3 | 23.5 | |
| Level of Service | | | B | B | C | |
| Approach Delay (s) | 0.0 | | | 14.2 | 23.5 | |
| Approach LOS | A | | | B | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 16.8 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.71 | | |
| Actuated Cycle Length (s) | 76.9 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 61.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 6: Young St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.99 | | 1.00 | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.97 | | | 0.96 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1773 | | | 1758 | | 1734 | 3463 | | 1740 | 3501 | |
| Flt Permitted | | 0.91 | | | 0.90 | | 0.49 | 1.00 | | 0.24 | 1.00 | |
| Satd. Flow (perm) | | 1633 | | | 1604 | | 886 | 3463 | | 443 | 3501 | |
| Volume (vph) | 48 | 218 | 77 | 59 | 210 | 96 | 100 | 736 | 75 | 27 | 407 | 23 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 52 | 234 | 83 | 63 | 226 | 103 | 108 | 791 | 81 | 29 | 438 | 25 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 15 | 0 | 0 | 15 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 0 | 357 | 0 | 0 | 377 | 0 | 108 | 857 | 0 | 29 | 455 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 16.5 | | | 16.5 | | 17.4 | 17.4 | | 17.4 | 17.4 | |
| Effective Green, g (s) | | 17.5 | | | 17.5 | | 18.4 | 18.4 | | 18.4 | 18.4 | |
| Actuated g/C Ratio | | 0.40 | | | 0.40 | | 0.42 | 0.42 | | 0.42 | 0.42 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 651 | | | 639 | | 371 | 1451 | | 186 | 1467 | |
| v/s Ratio Prot | | | | | | | | c0.25 | | | 0.13 | |
| v/s Ratio Perm | | 0.22 | | | c0.24 | | 0.12 | | | 0.07 | | |
| v/c Ratio | | 0.55 | | | 0.59 | | 0.29 | 0.59 | | 0.16 | 0.31 | |
| Uniform Delay, d1 | | 10.2 | | | 10.4 | | 8.4 | 9.8 | | 7.9 | 8.5 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.9 | | | 1.4 | | 0.4 | 0.7 | | 0.4 | 0.1 | |
| Delay (s) | | 11.1 | | | 11.8 | | 8.9 | 10.5 | | 8.3 | 8.6 | |
| Level of Service | | B | | | B | | A | B | | A | A | |
| Approach Delay (s) | | 11.1 | | | 11.8 | | | 10.3 | | | 8.6 | |
| Approach LOS | | B | | | B | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 10.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.59 | | |
| Actuated Cycle Length (s) | 43.9 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 65.7% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 7: S. King St & Kalakaua St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.86 | 1.00 | | | | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | | | | | 1.00 | 0.94 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 6408 | 1474 | | | | | 3539 | 1488 | 1767 | 3539 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 0.15 | 1.00 | |
| Satd. Flow (perm) | 1770 | 6408 | 1474 | | | | | 3539 | 1488 | 274 | 3539 | |
| Volume (vph) | 145 | 2693 | 373 | 0 | 0 | 0 | 0 | 681 | 222 | 56 | 628 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 156 | 2896 | 401 | 0 | 0 | 0 | 0 | 732 | 239 | 60 | 675 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 54 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 156 | 2896 | 347 | 0 | 0 | 0 | 0 | 732 | 205 | 60 | 675 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | Perm | pm+pt | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | 4 | | | | | | 2 | 6 | | |
| Actuated Green, G (s) | 45.4 | 45.4 | 45.4 | | | | | 22.2 | 22.2 | 30.3 | 30.3 | |
| Effective Green, g (s) | 46.4 | 46.4 | 46.4 | | | | | 23.2 | 23.2 | 31.3 | 31.3 | |
| Actuated g/C Ratio | 0.54 | 0.54 | 0.54 | | | | | 0.27 | 0.27 | 0.37 | 0.37 | |
| Clearance Time (s) | 5.0 | 5.0 | 5.0 | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 958 | 3469 | 798 | | | | | 958 | 403 | 171 | 1293 | |
| v/s Ratio Prot | 0.09 | c0.45 | | | | | | c0.21 | | 0.02 | c0.19 | |
| v/s Ratio Perm | | | 0.24 | | | | | | 0.14 | 0.11 | | |
| v/c Ratio | 0.16 | 0.83 | 0.44 | | | | | 0.76 | 0.51 | 0.35 | 0.52 | |
| Uniform Delay, d1 | 9.9 | 16.4 | 11.8 | | | | | 28.7 | 26.4 | 19.7 | 21.3 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.1 | 1.9 | 0.4 | | | | | 3.7 | 1.0 | 1.2 | 0.4 | |
| Delay (s) | 10.0 | 18.3 | 12.2 | | | | | 32.4 | 27.5 | 21.0 | 21.7 | |
| Level of Service | A | B | B | | | | | C | C | C | C | |
| Approach Delay (s) | | 17.2 | | | 0.0 | | | 31.2 | | | 21.7 | |
| Approach LOS | | B | | | A | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 20.5 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.81 | | |
| Actuated Cycle Length (s) | 85.7 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 73.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 8: I-1 Off-Ramp & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | | | | | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.88 | | | | | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.91 | | | | | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | | | | | 0.99 | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1718 | 2539 | | | | | 3449 | | 1770 | 3539 | |
| Flt Permitted | 0.95 | 0.97 | 1.00 | | | | | 1.00 | | 0.11 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1718 | 2539 | | | | | 3449 | | 207 | 3539 | |
| Volume (vph) | 558 | 145 | 571 | 0 | 0 | 0 | 0 | 1262 | 118 | 71 | 678 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 600 | 156 | 614 | 0 | 0 | 0 | 0 | 1357 | 127 | 76 | 729 | 0 |
| RTOR Reduction (vph) | 0 | 0 | 294 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 368 | 388 | 320 | 0 | 0 | 0 | 0 | 1474 | 0 | 76 | 729 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | 50 | | |
| Turn Type | Split | | Perm | | | | | | | Perm | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | | 6 | |
| Permitted Phases | | | 4 | | | | | | | 6 | | |
| Actuated Green, G (s) | 18.8 | 18.8 | 18.8 | | | | | 35.0 | | 35.0 | 35.0 | |
| Effective Green, g (s) | 18.8 | 18.8 | 18.8 | | | | | 36.0 | | 36.0 | 36.0 | |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.30 | | | | | 0.57 | | 0.57 | 0.57 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | | | | | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 503 | 514 | 760 | | | | | 1977 | | 119 | 2029 | |
| v/s Ratio Prot | 0.22 | c0.23 | | | | | | c0.43 | | | 0.21 | |
| v/s Ratio Perm | | | 0.13 | | | | | | | 0.37 | | |
| v/c Ratio | 0.73 | 0.75 | 0.42 | | | | | 0.75 | | 0.64 | 0.36 | |
| Uniform Delay, d1 | 19.7 | 19.9 | 17.6 | | | | | 10.0 | | 9.0 | 7.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | | | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 5.4 | 6.2 | 0.4 | | | | | 1.6 | | 10.7 | 0.1 | |
| Delay (s) | 25.2 | 26.1 | 18.0 | | | | | 11.6 | | 19.8 | 7.3 | |
| Level of Service | C | C | B | | | | | B | | B | A | |
| Approach Delay (s) | | 22.2 | | | 0.0 | | | 11.6 | | | 8.5 | |
| Approach LOS | | C | | | A | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 14.9 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.75 | | |
| Actuated Cycle Length (s) | 62.8 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 72.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 9: S. Beretania St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | | 0.86 | | 1.00 | 0.95 | | | 0.95 | 0.88 |
| Frpb, ped/bikes | | | | | 0.99 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Flpb, ped/bikes | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | | 0.98 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | | 6221 | | 1770 | 3539 | | | 3539 | 2787 |
| Flt Permitted | | | | | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | | 6221 | | 1770 | 3539 | | | 3539 | 2787 |
| Volume (vph) | 0 | 0 | 0 | 106 | 1662 | 239 | 123 | 692 | 0 | 0 | 727 | 779 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 114 | 1787 | 257 | 132 | 744 | 0 | 0 | 782 | 838 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 120 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 2132 | 0 | 132 | 744 | 0 | 0 | 782 | 718 |
| Confl. Peds. (#/hr) | | | | 50 | | 50 | | | | | | |
| Turn Type | | | | Split | | | Prot | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | | | | | 33.2 | | 8.6 | 37.9 | | | 24.3 | 24.3 |
| Effective Green, g (s) | | | | | 34.2 | | 9.6 | 38.9 | | | 25.3 | 25.3 |
| Actuated g/C Ratio | | | | | 0.42 | | 0.12 | 0.48 | | | 0.31 | 0.31 |
| Clearance Time (s) | | | | | 5.0 | | 5.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | | 2623 | | 210 | 1697 | | | 1104 | 869 |
| v/s Ratio Prot | | | | | c0.34 | | c0.07 | 0.21 | | | 0.22 | |
| v/s Ratio Perm | | | | | | | | | | | | c0.26 |
| v/c Ratio | | | | | 0.81 | | 0.63 | 0.44 | | | 0.71 | 0.83 |
| Uniform Delay, d1 | | | | | 20.6 | | 34.1 | 13.9 | | | 24.6 | 25.9 |
| Progression Factor | | | | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | | 2.0 | | 5.8 | 0.2 | | | 2.1 | 6.5 |
| Delay (s) | | | | | 22.7 | | 39.8 | 14.1 | | | 26.7 | 32.3 |
| Level of Service | | | | | C | | D | B | | | C | C |
| Approach Delay (s) | | 0.0 | | | 22.7 | | | 18.0 | | | 29.6 | |
| Approach LOS | | A | | | C | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 24.2 | HCM Level of Service | C |
| HCM Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 81.1 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 74.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 10: Young St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | |
| Frt | | 0.98 | | | 0.98 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1784 | | | 1808 | | 1727 | 3491 | | 1732 | 3462 | |
| Flt Permitted | | 0.83 | | | 0.94 | | 0.33 | 1.00 | | 0.29 | 1.00 | |
| Satd. Flow (perm) | | 1500 | | | 1703 | | 603 | 3491 | | 533 | 3462 | |
| Volume (vph) | 94 | 183 | 44 | 37 | 261 | 44 | 24 | 651 | 40 | 71 | 571 | 59 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 101 | 197 | 47 | 40 | 281 | 47 | 26 | 700 | 43 | 76 | 614 | 63 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 6 | 0 | 0 | 8 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 0 | 339 | 0 | 0 | 362 | 0 | 26 | 735 | 0 | 76 | 663 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | 50 | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | Perm | | | Perm | | | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | | 17.7 | | | 17.7 | | 15.3 | 15.3 | | 15.3 | 15.3 | |
| Effective Green, g (s) | | 18.7 | | | 18.7 | | 16.3 | 16.3 | | 16.3 | 16.3 | |
| Actuated g/C Ratio | | 0.43 | | | 0.43 | | 0.38 | 0.38 | | 0.38 | 0.38 | |
| Clearance Time (s) | | 5.0 | | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 652 | | | 741 | | 229 | 1323 | | 202 | 1312 | |
| v/s Ratio Prot | | | | | | | | c0.21 | | | 0.19 | |
| v/s Ratio Perm | | c0.23 | | | 0.21 | | 0.04 | | | 0.14 | | |
| v/c Ratio | | 0.52 | | | 0.49 | | 0.11 | 0.56 | | 0.38 | 0.51 | |
| Uniform Delay, d1 | | 8.9 | | | 8.7 | | 8.7 | 10.5 | | 9.7 | 10.3 | |
| Progression Factor | | 1.00 | | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.7 | | | 0.5 | | 0.2 | 0.5 | | 1.2 | 0.3 | |
| Delay (s) | | 9.6 | | | 9.2 | | 8.9 | 11.0 | | 10.8 | 10.6 | |
| Level of Service | | A | | | A | | A | B | | B | B | |
| Approach Delay (s) | | 9.6 | | | 9.2 | | | 10.9 | | | 10.6 | |
| Approach LOS | | A | | | A | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 10.3 | HCM Level of Service | B |
| HCM Volume to Capacity ratio | 0.54 | | |
| Actuated Cycle Length (s) | 43.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 70.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 11: S. King St & Punahou St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | | | | | | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | 1.00 | 0.81 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 0.94 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | | | | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1770 | 7521 | | | | | | 1863 | 1486 | 1770 | 1863 | |
| Flt Permitted | 0.95 | 1.00 | | | | | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1770 | 7521 | | | | | | 1863 | 1486 | 1770 | 1863 | |
| Volume (vph) | 349 | 2517 | 29 | 0 | 0 | 0 | 0 | 426 | 160 | 445 | 378 | 0 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 375 | 2706 | 31 | 0 | 0 | 0 | 0 | 458 | 172 | 478 | 406 | 0 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 375 | 2735 | 0 | 0 | 0 | 0 | 0 | 458 | 161 | 478 | 406 | 0 |
| Confl. Peds. (#/hr) | 50 | | 50 | | | | | | 50 | | | |
| Turn Type | Split | | | | | | | | Perm | Prot | | |
| Protected Phases | 4 | 4 | | | | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | 2 | | | |
| Actuated Green, G (s) | 32.0 | 32.0 | | | | | | 23.9 | 23.9 | 17.0 | 45.9 | |
| Effective Green, g (s) | 33.0 | 33.0 | | | | | | 24.9 | 24.9 | 18.0 | 46.9 | |
| Actuated g/C Ratio | 0.38 | 0.38 | | | | | | 0.28 | 0.28 | 0.20 | 0.53 | |
| Clearance Time (s) | 5.0 | 5.0 | | | | | | 5.0 | 5.0 | 5.0 | 5.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | | | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 665 | 2824 | | | | | | 528 | 421 | 362 | 994 | |
| v/s Ratio Prot | 0.21 | c0.36 | | | | | | c0.25 | | c0.27 | 0.22 | |
| v/s Ratio Perm | | | | | | | | | 0.11 | | | |
| v/c Ratio | 0.56 | 0.97 | | | | | | 0.87 | 0.38 | 1.32 | 0.41 | |
| Uniform Delay, d1 | 21.7 | 26.9 | | | | | | 29.9 | 25.3 | 35.0 | 12.2 | |
| Progression Factor | 1.00 | 1.00 | | | | | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.1 | 10.5 | | | | | | 14.0 | 0.6 | 162.4 | 0.3 | |
| Delay (s) | 22.8 | 37.5 | | | | | | 43.9 | 25.9 | 197.3 | 12.5 | |
| Level of Service | C | D | | | | | | D | C | F | B | |
| Approach Delay (s) | | 35.7 | | | 0.0 | | | 39.0 | | | 112.4 | |
| Approach LOS | | D | | | A | | | D | | | F | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 50.8 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 1.02 | | |
| Actuated Cycle Length (s) | 87.9 | Sum of lost time (s) | 12.0 |
| Intersection Capacity Utilization | 86.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# EXISTING PLUS PROJECT
# INTERSECTION LEVEL OF SERVICE CALCULATIONS

## 2: S. Beretania St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | 1.00 | 0.86 | | 1.00 | 0.95 | | | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.93 |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1770 | 6298 | | 1770 | 3539 | | | 3539 | 1480 |
| Flt Permitted | | | | 0.95 | 1.00 | | 0.14 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1770 | 6298 | | 266 | 3539 | | | 3539 | 1480 |
| Volume (vph) | 0 | 0 | 0 | 306 | 2563 | 223 | 247 | 406 | 0 | 0 | 1026 | 407 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 329 | 2756 | 240 | 266 | 437 | 0 | 0 | 1103 | 438 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 329 | 2979 | 0 | 266 | 437 | 0 | 0 | 1103 | 424 |
| Confl. Peds. (#/hr) | | | | | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | | | | Split | | | pm+pt | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | 2 | | | | | 6 |
| Actuated Green, G (s) | | | | 36.0 | 36.0 | | 35.0 | 35.0 | | | 23.0 | 23.0 |
| Effective Green, g (s) | | | | 36.0 | 36.0 | | 36.0 | 36.0 | | | 24.0 | 24.0 |
| Actuated g/C Ratio | | | | 0.45 | 0.45 | | 0.45 | 0.45 | | | 0.30 | 0.30 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 797 | 2834 | | 270 | 1593 | | | 1062 | 444 |
| v/s Ratio Prot | | | | 0.19 | c0.47 | | c0.10 | 0.12 | | | 0.31 | |
| v/s Ratio Perm | | | | | | | c0.34 | | | | | 0.29 |
| v/c Ratio | | | | 0.41 | 1.05 | | 0.99 | 0.27 | | | 1.04 | 0.95 |
| Uniform Delay, d1 | | | | 14.9 | 22.0 | | 18.9 | 13.8 | | | 28.0 | 27.5 |
| Progression Factor | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.3 | 32.3 | | 50.3 | 0.1 | | | 38.1 | 31.2 |
| Delay (s) | | | | 15.2 | 54.3 | | 69.2 | 13.9 | | | 66.1 | 58.6 |
| Level of Service | | | | B | D | | E | B | | | E | E |
| Approach Delay (s) | | 0.0 | | | 50.4 | | | 34.8 | | | 64.0 | |
| Approach LOS | | A | | | D | | | C | | | E | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 52.2 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 1.00 | | |
| Actuated Cycle Length (s) | 80.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 94.0% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

## 2: S. Beretania St & Keeaumoko St

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | 4.0 |
| Lane Util. Factor | | | | 1.00 | 0.86 | | 1.00 | 0.95 | | | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | 1.00 | 0.99 | | 1.00 | 1.00 | | | 1.00 | 0.93 |
| Flpb, ped/bikes | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Frt | | | | 1.00 | 0.98 | | 1.00 | 1.00 | | | 1.00 | 0.85 |
| Flt Protected | | | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | 1770 | 6206 | | 1768 | 3539 | | | 3539 | 1475 |
| Flt Permitted | | | | 0.95 | 1.00 | | 0.14 | 1.00 | | | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | 1770 | 6206 | | 251 | 3539 | | | 3539 | 1475 |
| Volume (vph) | 0 | 0 | 0 | 177 | 1952 | 332 | 307 | 979 | 0 | 0 | 800 | 127 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 0 | 0 | 0 | 190 | 2099 | 357 | 330 | 1053 | 0 | 0 | 860 | 137 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 31 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 190 | 2426 | 0 | 330 | 1053 | 0 | 0 | 860 | 106 |
| Confl. Peds. (#/hr) | | | | | | 50 | 50 | | 50 | 50 | | 50 |
| Turn Type | | | | Split | | | pm+pt | | | | | Perm |
| Protected Phases | | | | 8 | 8 | | 5 | 2 | | | 6 | |
| Permitted Phases | | | | | | | 2 | | | | | 6 |
| Actuated Green, G (s) | | | | 31.2 | 31.2 | | 44.0 | 44.0 | | | 27.0 | 27.0 |
| Effective Green, g (s) | | | | 31.2 | 31.2 | | 45.0 | 45.0 | | | 28.0 | 28.0 |
| Actuated g/C Ratio | | | | 0.37 | 0.37 | | 0.53 | 0.53 | | | 0.33 | 0.33 |
| Clearance Time (s) | | | | 4.0 | 4.0 | | 4.0 | 5.0 | | | 5.0 | 5.0 |
| Vehicle Extension (s) | | | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | 656 | 2300 | | 368 | 1891 | | | 1177 | 490 |
| v/s Ratio Prot | | | | 0.11 | c0.39 | | c0.14 | 0.30 | | | 0.24 | |
| v/s Ratio Perm | | | | | | | c0.34 | | | | | 0.07 |
| v/c Ratio | | | | 0.29 | 1.05 | | 0.90 | 0.56 | | | 0.73 | 0.22 |
| Uniform Delay, d1 | | | | 18.7 | 26.5 | | 19.9 | 13.0 | | | 24.8 | 20.2 |
| Progression Factor | | | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | 0.2 | 35.2 | | 23.3 | 0.4 | | | 2.4 | 0.2 |
| Delay (s) | | | | 18.9 | 61.7 | | 43.2 | 13.3 | | | 27.1 | 20.4 |
| Level of Service | | | | B | E | | D | B | | | C | C |
| Approach Delay (s) | | 0.0 | | | 58.6 | | | 20.5 | | | 26.2 | |
| Approach LOS | | A | | | E | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM Average Control Delay | 41.7 | HCM Level of Service | D |
| HCM Volume to Capacity ratio | 0.95 | | |
| Actuated Cycle Length (s) | 84.2 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 83.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# APPENDIX C:
# APPROVED AND PENDING PROJECTS

## Kalakaua Affordable Housing Approved Projects

### Intersection: Keeaumoku/Kinau

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 4 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **7** | **0** | **0** | **37** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

### Intersection: Keeaumoku/Kinau

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 19 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **25** | **0** | **0** | **27** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Keeaumoku/Beretania

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 28 | 4 | 0 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Aloha Island Self Storage | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **28** | **7** | **0** | **0** | **37** | **0** | **0** | **0** | **0** | **0** | **1** | **0** |

### Intersection: Keeaumoku/Beretania

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 37 | 19 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Aloha Island Self Storage | 0 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **37** | **25** | **0** | **0** | **27** | **0** | **0** | **0** | **0** | **0** | **4** | **0** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Keeaumoku/Young

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 0 | 69 | 36 | 0 | 0 | 0 | 5 | 0 | 20 | 4 | 32 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| **Total** | **0** | **0** | **69** | **37** | **0** | **0** | **0** | **5** | **0** | **20** | **4** | **35** |

### Intersection: Keeaumoku/Young

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 0 | 117 | 26 | 0 | 0 | 0 | 8 | 0 | 44 | 9 | 56 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 6 |
| **Total** | **0** | **0** | **117** | **27** | **0** | **0** | **0** | **9** | **0** | **44** | **11** | **62** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Keeaumoku/King

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 16 | 0 | 10 | 10 | 0 | 53 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **16** | **0** | **10** | **10** | **0** | **53** | **7** | **0** | **0** | **0** | **0** |

### Intersection: Keeaumoku/King

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 37 | 0 | 31 | 13 | 0 | 80 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **37** | **0** | **31** | **13** | **0** | **80** | **9** | **0** | **0** | **0** | **0** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Kalakaua/Beretania

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| **Total** | **20** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **5** | **51** | **0** |

### Intersection: Kalakaua/Beretania

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 54 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **22** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **7** | **54** | **0** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Kalakaua/Young

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 21 | 20 | 0 | 0 | 0 | 0 | 0 | 22 | 11 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 3 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| **Total** | **24** | **20** | **0** | **0** | **5** | **0** | **0** | **22** | **12** | **0** | **0** | **0** |

### Intersection: Kalakaua/Young

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 22 | 22 | 0 | 0 | 0 | 0 | 0 | 30 | 19 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 8 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| **Total** | **30** | **22** | **0** | **0** | **7** | **0** | **0** | **30** | **21** | **0** | **0** | **0** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Kalakaua/King

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 42 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 2 | 0 | 4 | 2 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **44** | **0** | **4** | **13** | **0** | **4** | **3** | **0** | **0** | **0** | **0** |

### Intersection: Kalakaua/King

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 44 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 4 | 0 | 7 | 4 | 0 | 6 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **48** | **0** | **7** | **23** | **0** | **6** | **3** | **0** | **0** | **0** | **0** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Punahou/H1 Off-Ramp

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| **Total** | **0** | **19** | **0** | **0** | **0** | **0** | **0** | **0** | **70** | **0** | **0** | **0** |

### Intersection: Punahou/H1 Off-Ramp

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 |
| **Total** | **0** | **43** | **0** | **0** | **0** | **0** | **0** | **0** | **70** | **0** | **0** | **0** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Punahou/Beretania

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 14 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 | 31 | 0 |
| Shriner's Hospital | 0 | 3 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 10 |
| Aloha Island Self Storage | 0 | 2 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 2 | 0 |
| **Total** | **0** | **19** | **0** | **0** | **2** | **57** | **0** | **0** | **0** | **0** | **33** | **10** |

### Intersection: Punahou/Beretania

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 19 | 0 | 0 | 0 | 54 | 0 | 0 | 0 | 0 | 32 | 0 |
| Shriner's Hospital | 0 | 3 | 0 | 0 | 17 | 4 | 0 | 0 | 0 | 0 | 0 | 7 |
| Aloha Island Self Storage | 0 | 3 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 3 | 0 |
| **Total** | **0** | **25** | **0** | **0** | **17** | **65** | **0** | **0** | **0** | **0** | **35** | **7** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Punahou/Young

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 8 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **5** | **0** | **0** | **2** | **0** | **14** | **0** | **8** | **0** | **0** | **0** |

### Intersection: Punahou/Young

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 11 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 3 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **6** | **0** | **0** | **17** | **0** | **19** | **0** | **11** | **0** | **0** | **0** |

## Kalakaua Affordable Housing Approved Projects

### Intersection: Punahou/King

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **AM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 2 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | **10** | **0** | **0** | **5** | **2** | **0** | **0** | **0** | **0** |

### Intersection: Punahou/King

| | Northbound | | | Southbound | | | Eastbound | | | Westbound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| **PM Peak Hour** | | | | | | | | | | | | |
| Kapiolani MOB | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shriner's Hospital | 0 | 0 | 0 | 13 | 4 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Aloha Island Self Storage | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | **24** | **4** | **0** | **6** | **4** | **0** | **0** | **0** | **0** |

# Appendix G
# Noise Assessment Report

D. L. ADAMS ASSOCIATES, LTD.
Consultants in Acoustics and Performing Arts Technologies

# Environmental Noise Assessment Report
# Holomua
## Honolulu, Oahu, Hawaii

May 2008

DLAA Project No. 08-08

Prepared for:
THM Partners LLC
Honolulu, Hawaii

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## 1.0 EXECUTIVE SUMMARY

**1.1** The proposed Holomua residential development is located on Kalakaua Avenue, between Beretania Street and Young Street. Approximately 176 residential units, 242 parking stalls, and 2 loading spaces are planned for the 23 story multi-family complex, consisting of one and two bedroom units. The project site is currently vacant and is flanked by commercial buildings.

**1.2** The project area currently experiences noise levels typical of an urban environment. Noise measurements taken on the existing project property show a day-night level, $L_{dn}$, of 65 dBA. These noise levels are at the threshold of the EPA and HUD exterior noise design goal of $L_{dn} \leq 65$ dBA. It is recommended that the design of the condominium building incorporate increased sound attenuation measures at the exterior of the building facing Kalakaua Avenue.

**1.3** During the project construction, the dominant noise sources will likely be earth moving equipment, such as bulldozers and diesel powered trucks. Noise from construction activities will occur on the project site. Noise from construction activities should be short term and must comply with State of Hawaii Community Noise Control Rules and a construction noise permit issued by the Department of Health.

**1.4** After construction is complete, noise generated from stationary mechanical equipment on the project site must meet the State of Hawaii property line noise regulations. Noise mitigation options should be considered during the design of the condominium building.

**1.5** The results of the vehicular traffic noise analysis show negligible increases in traffic noise levels due to the project. In addition, all existing and future predicted noise levels are expected to be below the FHWA/HDOT maximum noise limit of 67 dBA at the project site. Therefore, the project is not expected to produce a significant traffic noise impact.

**1.6** Noise from the planned parking garage may be audible at the neighboring buildings. The design of the garage should incorporate noise control measures.

## 2.0 PROJECT DESCRIPTION

The proposed Holomua residential development is located on Kalakaua Avenue, between Beretania Street and Young Street. Approximately 176 residential units, 245 parking stalls, and 2 loading spaces are planned for the 23 story multi-family complex, consisting of one and two bedroom units. The project site is currently vacant and is flanked by commercial buildings.

## 3.0 NOISE STANDARDS

Various local and federal agencies have established guidelines and standards for assessing environmental noise impacts and set noise limits as a function of land use. A brief description of common acoustic terminology used in these guidelines and standards is presented in Appendix A.

### 3.1 State of Hawaii, Community Noise Control

The State of Hawaii Community Noise Control Rule [Reference 1] defines three classes of zoning districts and specifies corresponding maximum permissible sound levels due to *stationary* noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, etc. The Community Noise Control Rule does not address most *moving* sources, such as vehicular traffic noise, air traffic noise, or rail traffic noise. However, the Community Noise Control Rule does regulate noise related to agricultural, construction, and industrial activities, which may not be stationary.

The maximum permissible noise levels are enforced by the State Department of Health (DOH) for any location at or beyond the property line and shall not be exceeded for more than 10% of the time during any 20-minute period. The specified noise limits which apply are a function of the zoning and time of day as shown in Figure 1. With respect to mixed zoning districts, the rule specifies that the primary land use designation shall be used to determine the applicable zoning district class and the maximum permissible sound level. In determining the maximum permissible sound level, the background noise level is taken into account by the DOH.

### 3.2 U.S. Federal Highway Administration (FHWA)

The FHWA defines four land use categories and assigns corresponding maximum hourly equivalent sound levels, $L_{eq(h)}$, for traffic noise exposure [Reference 2], which are listed in Figure 2. For example, Category B, defined as picnic and recreation areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals, has a corresponding maximum exterior $L_{eq}$ of 67dBA and a maximum interior $L_{eq}$ of 52 dBA. These limits are viewed as design goals, and all projects meeting these limits are deemed in conformance with FHWA noise standards. Calculation of traffic noise levels should be conducted using a Federal Highway Administration traffic noise model [Reference 3].

### 3.3 Hawaii Department of Transportation (HDOT)

The HDOT has adopted FHWA's design goals for traffic noise exposure in its noise analysis and abatement policy [Reference 4]. According to the policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's design goals or when the predicted traffic noise levels "substantially exceed the existing noise levels." The policy also states that "approach" means at least 1 dB less than FHWA's design goals and "substantially exceed the existing noise levels" means an increase of at least 15 dB.

### 3.4 U.S. Environmental Protection Agency (EPA)

The U.S. EPA has identified a range of yearly day-night equivalent sound levels, $L_{dn}$, sufficient to protect public health and welfare from the effects of environmental noise [Reference 5]. The EPA has established a goal to reduce exterior environmental noise to an $L_{dn}$ not exceeding 65 dBA and a future goal to further reduce exterior environmental noise to an $L_{dn}$ not exceeding 55 dBA. The EPA has also identified an interior noise level goal of 45 dBA to protect public health from indoor activity interference and annoyance. Additionally, the EPA states that these goals are not intended as regulations as it has no authority to regulate noise levels, but rather they are intended to be viewed as levels below which the general population will not be at risk from any of the identified effects of noise.

### 3.5 U.S. Department of Housing and Urban Development (HUD)

HUD's environmental noise criteria and standards in 24 CFR 51 [Reference 6] were established for determining housing project site acceptability. These standards are based on day-night equivalent sound levels, $L_{dn}$, and are not limited to traffic noise exposure. However, for project sites in the vicinity of highways, the $L_{dn}$ may be estimated to be equal to the design hour $L_{eq}(h)$, provided "heavy trucks (vehicles with three or more axles) do not exceed 10 percent of the total traffic flow in vehicles per 24 hours and the traffic flow between 10:00 p.m. and 7:00 a.m. does not exceed 15 percent of the average daily traffic flow in vehicles per 24 hours." For these same conditions, $L_{dn}$, may also be estimated as 3 dB less than the design hour $L_{10}$.

HUD site acceptability criteria rank sites as Acceptable, Normally Unacceptable, or Unacceptable. "Acceptable" sites are those where exterior noise levels do not exceed an $L_{dn}$ of 65 dBA. Proposed housing projects on "Acceptable" sites do not require additional noise attenuation other than that provided by customary building techniques. "Normally Unacceptable" sites are those where the $L_{dn}$ is above 65 dBA, but does not exceed 75 dBA. Housing on "Normally Unacceptable" sites requires some form of noise abatement, either at the property line or in the building construction, to ensure the interior noise levels are acceptable. "Unacceptable" sites are those where the $L_{dn}$ is 75 dBA or higher. The term "Unacceptable" does not necessarily mean that housing cannot be built on those sites; however, more elaborate sound attenuation will likely be needed.

HUD's regulations do not contain standards for interior noise levels, rather attenuation requirement to achieve a goal of 45 dBA. This assumes that standard construction of any building will provide sufficient attenuation such that if the exterior $L_{dn}$ is 65 dBA or less (i.e., an "acceptable site"), the interior $L_{dn}$ will be 45 dBA or less.

## 4.0 EXISTING ACOUSTICAL ENVIRONMENT

Two types of noise measurements were conducted to assess the existing acoustical environment in the vicinity of the project location, as shown in Figure 3. The first noise measurement type consisted of continuous long-term ambient noise level measurements (Location L1). The second type of noise measurement was short-term and included traffic counts (Location S1 and S2). The purpose of the short-term noise measurements and corresponding traffic counts were to validate a traffic noise prediction model. All noise measurements were conducted between May 1, 2008 and May 5, 2008.

### 4.1 Noise Measurement Procedure

Long-Term Noise Measurement Procedure

Continuous, hourly, statistical sound levels were recorded for 5 days. The measurements were taken using a Larson-Davis Laboratories, Model 820, Type-1 Sound Level Meter together with a Larson-Davis, Model 2560 Type-1 Microphone. Calibration was checked before and after the measurements with a Larson-Davis Model CAL200 calibrator. Both the sound level meter and the calibrator have been certified by the manufacturer within the recommended calibration period. The microphone was mounted on a tripod, approximately 5 feet above grade. A windscreen covered the microphone during the entire measurement period. The sound level meter was secured in a weather resistant case.

Short-Term Noise Measurement Procedure

An approximate 30-minute equivalent sound level, $L_{eq}$, was measured. Vehicular traffic counts and traffic mix were documented during the measurement period. The noise measurement was taken using a Larson-Davis Laboratories, Model 824, Type-1 Sound Level Meter together with a Larson-Davis, Model 2541 Type-1 Microphone. Calibration was checked before and after the measurements with a Larson-Davis Model CAL200 calibrator. Both the sound level meter and the calibrator have been certified by the manufacturer within the recommended calibration period. The microphone and sound level meter were mounted on a tripod, approximately 5 feet above grade. A windscreen covered the microphone during the entire measurement period.

### 4.2 Noise Measurement Locations

Long-Term Noise Measurement Location

Location L1: Positioned at the northern edge of the proposed development site, approximately 40 feet east of the edge-of-pavement of Kalakaua Avenue.

Short-Term Noise Measurement Locations

Location S1: Positioned adjacent to Beretania Street, between Punahou Street and Alexander Street, approximately 50 feet north of the edge-of-pavement.

Location S2: Positioned adjacent to Kalakaua Avenue, between King Street and Kanunu Street, approximately 30 feet west of the edge-of-pavement.

### 4.3 Long-Term Noise Measurement Results

The measured ambient sound levels are representative of an urban environment and depend significantly on the vehicular traffic patterns of Kalakaua Avenue. The hourly equivalent sound levels, $L_{eq,}$ at Location L1 generally range from 60 to 64 dBA during the day. At night, noise levels drop off and the hourly $L_{eq}$ ranges from 53 to 60 dBA. The average day-night Level, $L_{dn}$, was calculated from the measured noise levels to be 65 dBA.

The results from the long-term noise measurement are graphically presented in Figure 4, which shows the measured equivalent sound level, $L_{eq}$, in A-weighted decibels (dBA) as a function of the measurement date and time. During the noise measurement period, heavy construction vehicles may have visited the project site to deliver or pick up materials. Clean-up activities may have also occurred on site. It was not possible to obtain a schedule or confirmation of these activities, however, the Figure 4 shows seven abnormal spikes in sound level that may have been caused by these construction vehicles.

The dominant and secondary noise sources are described below:

Noise Sources

| | |
|---|---|
| Dominant: | Vehicular traffic noise from Kalakaua Avenue, intermittent construction noise. |
| Secondary: | Typical urban noises such as sirens, car horns, pedestrians etc., birds, mechanical equipment from neighboring buildings. |

## 5.0 POTENTIAL NOISE IMPACTS DUE TO THE PROJECT

### 5.1 Project Construction Noise

Development of project areas will involve excavation, grading, and other typical construction activities during construction. The various construction phases of the project may generate significant amounts of noise. The actual noise levels produced during construction will be a function of the methods employed during each stage of the construction process. Typical ranges of construction equipment noise are shown in Figure 5. Earthmoving equipment, e.g., bulldozers and diesel-powered trucks, will probably be the loudest equipment used during construction.

## 5.2 Project Generated Stationary Mechanical Noise & Compliance with State of Hawaii Community Noise Control Rule

The proposed condominium building may incorporate stationary mechanical equipment that is typical for residential buildings. Expected mechanical equipment may include air handling equipment, condensing units, chillers, emergency generators, etc. Noise from this mechanical equipment and other stationary equipment must meet the State DOH noise rules, which stipulate maximum permissible noise limits at the property line. These noise limits are 60 dBA during the daytime hours (7:00 am to 10:00 pm) and 50 dBA during the night time hours (10:00 pm to 7:00 am) for multi-family housing. Mitigation of mechanical noise to meet the State DOH noise rules should be incorporated into the project design.

## 5.3 Compliance with FHWA/HDOT Noise Limits

A vehicular traffic noise analysis was completed for the existing conditions and the expected future year of completion (2010) projections with the "No Build" and "Build" conditions using the FHWA Traffic Noise Model Look-up Tables Software Version 2.5 (2004) [Reference 7]. The traffic noise analysis is based on the traffic counts provided by the Traffic Consultant [Reference 8]. Vehicular traffic noise levels were calculated for 2 locations (Locations A and B) along Kalakaua Avenue and Beretania Street in the vicinity of the Holomua project site, as shown in Figure 3. The results of the traffic noise analysis are described below and summarized in Table 1.

### 5.3.1 Vehicular Traffic Noise Impacts on the Surrounding Community

The traffic noise analysis shows that residences and commercial buildings located adjacent to Kalakaua Avenue and Beretania Street are expected to experience a negligible increase in traffic noise level due to the project. Likewise, the slight increases in traffic volume on other roads in the area due to the project are not expected to increase traffic noise by a considerable amount. Therefore, a significant noise impact on the surrounding community due to project generated traffic noise is not expected.

### 5.3.2 Vehicular Traffic Noise Impacts on the Project

Noise level projections at the façade of the proposed condominium on Kalakaua Avenue are predicted to be below the FHWA/HDOT maximum noise limit of 67 dBA. Therefore, a significant noise impact on the project due to vehicular traffic noise is not expected.

## 5.4 Compliance with HUD and EPA Noise Guidelines

The HUD noise guidelines state an exterior design goal of $L_{dn} \leq 65$. Similarly, the EPA has an existing design goal of $L_{dn} \leq 65$ dBA and a future design goal $L_{dn} \leq 55$ dBA for exterior noise levels. The results from the long-term noise measurements conducted at the proposed project site show a calculated day-night

level, $L_{dn}$, of 65 dBA. Therefore, the exterior noise levels at the façade of the proposed building facing Kalakaua are expected to meet the current EPA design goal as well as the HUD noise criteria for “Acceptable” housing sites.

It is important to note that the EPA noise guidelines are design goals and are not enforceable regulations. However, these guidelines and design goals are useful tools for assessing the noise environment.

### 5.5 Project Generated Noise from the Parking Garage

Noise generated from the proposed parking garage, i.e., car alarms, engine startup noise, and noisy mufflers, may cause excessive reverberation within the garage and could cause complaints from the neighboring buildings. Another source of annoyance may come from the squeal of tires around corners and on the garage ramps. These noises can be mitigated with an effective parking garage design.

## 6.0 NOISE IMPACT MITIGATION

### 6.1 Mitigation of Construction Noise

In cases where construction noise exceeds, or is expected to exceed the State’s "maximum permissible" property line noise levels [Reference 1], a permit must be obtained from the State DOH to allow the operation of vehicles, cranes, construction equipment, power tools, etc., which emit noise levels in excess of the "maximum permissible" levels.

In order for the State DOH to issue a construction noise permit, the Contractor must submit a noise permit application to the DOH, which describes the construction activities for the project. Prior to issuing the noise permit, the State DOH may require action by the Contractor to incorporate noise mitigation into the construction plan. The DOH may also require the Contractor to conduct noise monitoring or community meetings inviting the neighboring residents and business owners to discuss construction noise. The Contractor should use reasonable and standard practices to mitigate noise, such as using mufflers on diesel and gasoline engines, using properly tuned and balanced machines, etc. However, the State DOH may require additional noise mitigation, such as temporary noise barriers, or time of day usage limits for certain kinds of construction activities.

Specific permit restrictions for construction activities [Reference 1] are:

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels ... before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday."
>
> “No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels... before 9:00 a.m. and after 6:00 p.m. on Saturday."

> "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

The use of hoe rams and jack hammers 25 lbs. or larger, high pressure sprayers, chain saws, and pile drivers are restricted to 9:00 a.m. to 5:30 p.m., Monday through Friday. In addition, construction equipment and on-site vehicles or devices whose operations involve the exhausting of gas or air, excluding pile hammers and pneumatic hand tools weighing less than 15 pounds, must be equipped with mufflers [Reference 1].

The DOH noise permit does not limit the noise level generated at the construction site, but rather the times at which noisy construction can take place. Therefore, noise mitigation for construction activities should be addressed using project management, such that the time restrictions within the DOH permit are followed.

## 6.2 Mitigation of Project Generated Mechanical Noise

The design of the proposed Holomua condominium building should give consideration to controlling the noise emanating from stationary mechanical equipment, such as emergency generators, chillers, compressors, air conditioning units, etc. so as to comply with the State of Hawaii Community Noise Control rules [Reference 1]. Noisy equipment should be located away from neighbors and residential units, as much as is practical. Enclosed mechanical rooms may be required for some equipment.

## 6.3 Mitigation of Vehicular Traffic Noise

The traffic noise analysis shows no significant noise impacts to the project or the surrounding community. Therefore, noise mitigation for vehicular traffic noise is not required.

Although traffic noise levels from Kalakaua Avenue do no exceed the FHWA maximum noise limits at the project site, the calculated day-night level is at the threshold of the EPA and HUD noise guidelines. During the design phase of the building, we recommend that sound rated or insulated windows be considered for the units facing Kalakaua Avenue such that interior noise levels do not exceed the EPA and HUD noise goal of 45 dBA.

## 6.4 Mitigation of Project Generated Noise from the Parking Garage

Noise emanating from the parking garage to the neighboring buildings may be audible and cause for complaint. Noise reduction measures should be considered during the design of the garage. Design could consider treating the floor of the garage to reduce tire squeal and treating the ceiling to reduce the build-up of noise within the garage.

## REFERENCES


1. Chapter 46, *Community Noise Control*, Department of Health, State of Hawaii, Administrative Rules, Title 11, September 23, 1996.

2. *Department of Transportation, Federal Highway Administration Procedures for Abatement of Highway Traffic Noise*, Title 23, CFR, Chapter 1, Subchapter J, Part 772, 38 FR 15953, June 19, 1973; Revised at 47 FR 29654, July 8, 1982.

3. *Federal Highway Administration's Traffic Noise Model*, FHWA-RD-77-108; U.S. Department of Transportation, December 1978.

4. *Noise Analysis and Abatement Policy*, Department of Transportation, Highways Division, State of Hawaii, June 1977.

5. *Toward a National Strategy for Noise Control*, U.S. Environmental Protection Agency, April 1977.

6. *Department of Housing and Urban Development Environmental Criteria and Standards*, Title 24 CFR, Part 51, 44 FR 40860, July 12, 1979, Amended by 49 FR 880, January 6, 1984.

7. Federal Highway Administration's Traffic Noise Model Look-up Tables Software, Ver. 2.5; U.S. Department of Transportation, December 17, 2004.

8. *Draft Report - Holomua Transportation Impact Analysis*, Fehr and Peers Transportation Consultants, April 2008.

**TABLE 1:**
**Predicted Traffic Noise Levels With and Without the Project and Resulting Increases Due to the Project[+]**

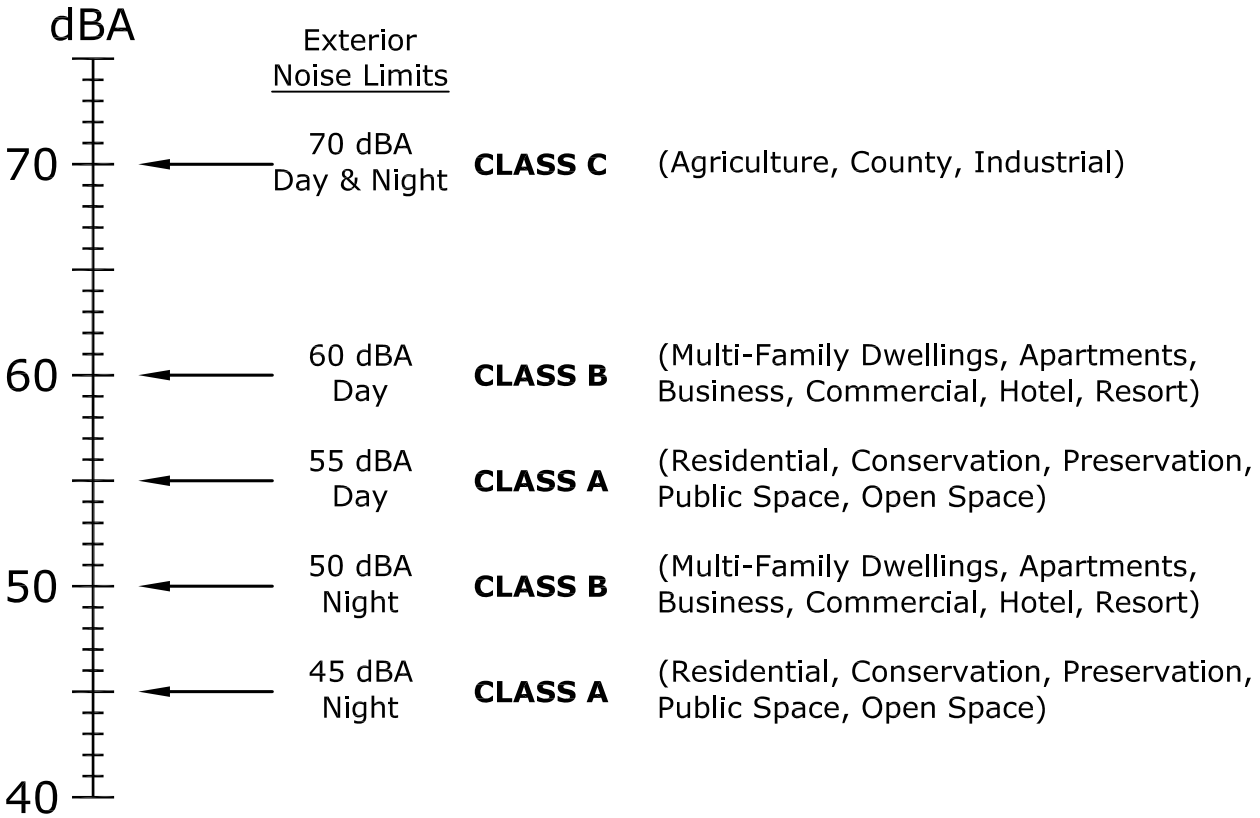
Noise levels shown in the table are based on peak-hour traffic volumes, and are expressed in A-weighted decibels (dBA).

| | **Location A[*]** | | **Location B[*]** | |
|---|---|---|---|---|
| | **AM** | **PM** | **AM** | **PM** |
| Existing (Calculated) | 66.5 | 66.3 | 66.8 | 65.8 |
| Future Without Project (2010) | 66.8 | 66.6 | 67.0 | 66.0 |
| Future With Project (2010) | 67.0 | 66.7 | 67.0 | 66.0 |
| | | | | |
| Future Increase Without Project (2010) | 0.3 | 0.3 | 0.2 | 0.2 |
| Future Increase With Project (2010) | 0.5 | 0.3 | 0.2 | 0.2 |
| **Future Increase Due to Project (2010)** | **0.2** | **0.1** | **0.0** | **0.0** |

[+] The noise level calculations were based on the traffic study provided by the Traffic Consultant [Reference 8].

[*] Location A - 30 feet east of Kalakaua Avenue edge-of-pavement
Location B - 60 feet mauka of Beretania Street edge-of-pavement

| Zoning District | Day Hours (7 AM to 10 PM) | Night Hours (10 PM to 7 AM) |
|---|---|---|
| **CLASS A** Residential, Conservation, Preservation, Public Space, Open Space | 55 dBA (Exterior) | 45 dBA (Exterior) |
| **CLASS B** Multi-Family Dwellings, Apartments, Business, Commercial, Hotel, Resort | 60 dBA (Exterior) | 50 dBA (Exterior) |
| **CLASS C** Agriculture, Country, Industrial | 70 dBA (Exterior) | 70 dBA (Exterior) |

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Hawaii Maximum Permissible Sound Levels for Various Zoning Districts

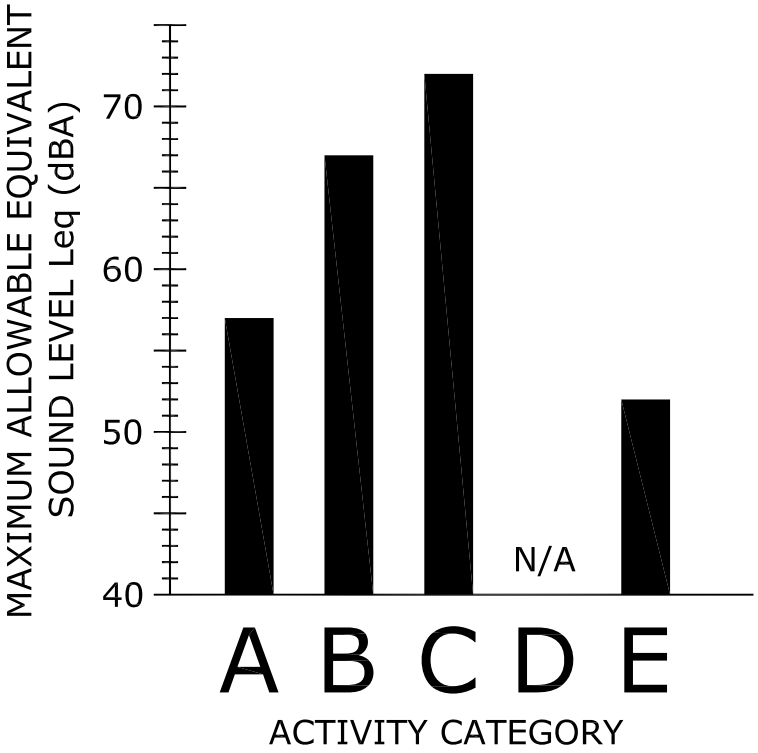
Holomua

Not to Scale

| Date | Project No. | Drawn By |
|---|---|---|
| May 2008 | 08-08 | TRB |

Figure No 1

| ACTIVITY CATEGORY | ACTIVITY CATEGORY DESCRIPTION | MAXIMUM EQUIVALENT SOUND LEVEL $L_{eq(h)}$ |
|---|---|---|
| A | LANDS ON WHICH SERENITY AND QUIET ARE OF EXTRAORDINARY SIGNIFICANCE AND SERVE AN IMPORTANT PUBLIC NEED AND WHERE THE PRESERVATION OF THOSE QUALITIES IS ESSENTIAL IF THE AREA IS TO CONTINUE TO SERVE ITS INTENDED PURPOSE. | 57 dBA (EXTERIOR) |
| B | PICNIC AREAS, RECREATION AREAS, PLAYGROUNDS, ACTIVE SPORT AREAS, PARKS, RESIDENCES, MOTELS, HOTELS, SCHOOLS, CHURCHES, LIBRARIES, AND HOSPITALS. | 67 dBA (EXTERIOR) |
| C | DEVELOPED LANDS, PROPERTIES, OR ACTIVITIES NOT INCLUDED IN ACTIVITY CATEGORIES A OR B ABOVE. | 72 dBA (EXTERIOR) |
| D | UNDEVELOPED LAND | N/A |
| E | RESIDENCES, MOTELS, HOTELS, PUBLIC MEETING ROOMS, SCHOOLS, CHURCHES, LIBRARIES, HOSPITALS, AND AUDITORIUMS. | 52 dBA (INTERIOR) |

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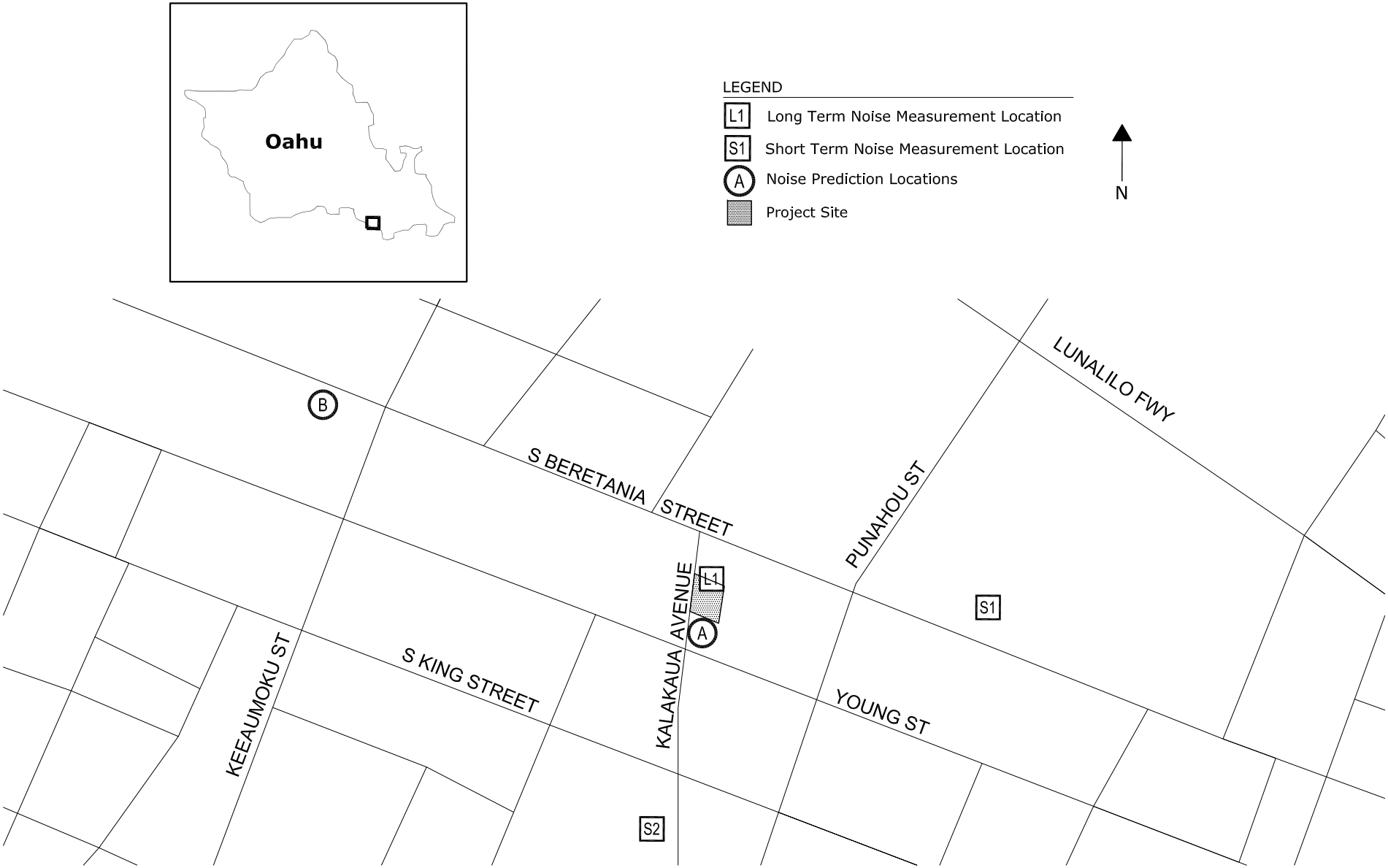
Federal Highways Administration Recommended Equivalent Hourly Sound Levels Based on Land Use

Holomua

Not to Scale

| Date | Project No. | Drawn By |
|---|---|---|
| May 2008 | 08-08 | TRB |

Figure No 2




# Noise Measurement and Prediction Locations

Holomua

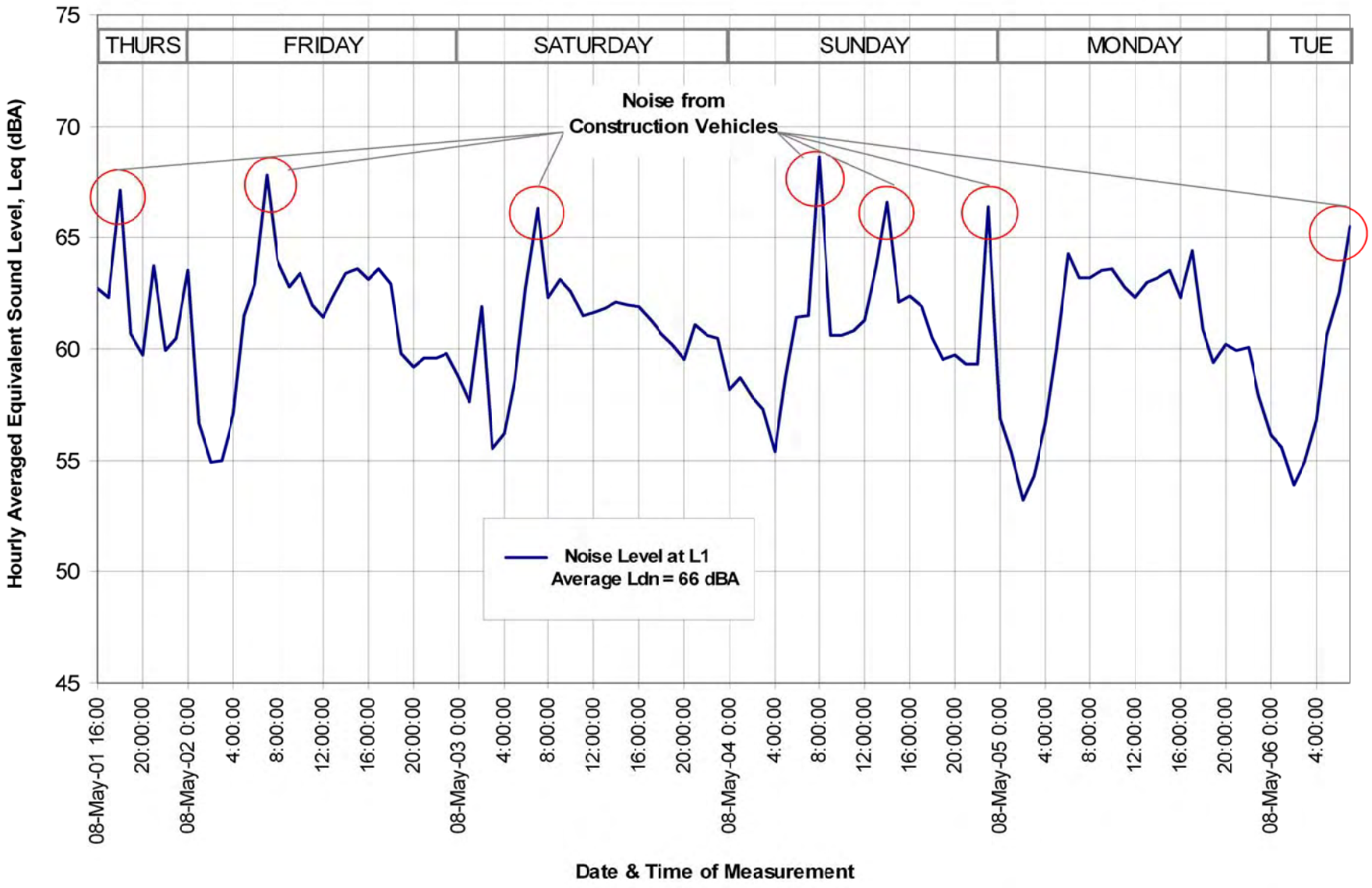
Not to Scale

| Date | Project No. | Drawn By |
|---|---|---|
| May 2008 | 08-08 | DFD |

Figure No

3

D. L. ADAMS ASSOCIATES, LTD.
970 N. KALAHEO AVE, A-311
KAILUA, HAWAII 96734
808/254-3318 FAX 808/254-5295

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# Graph of Long Term Noise Measurements

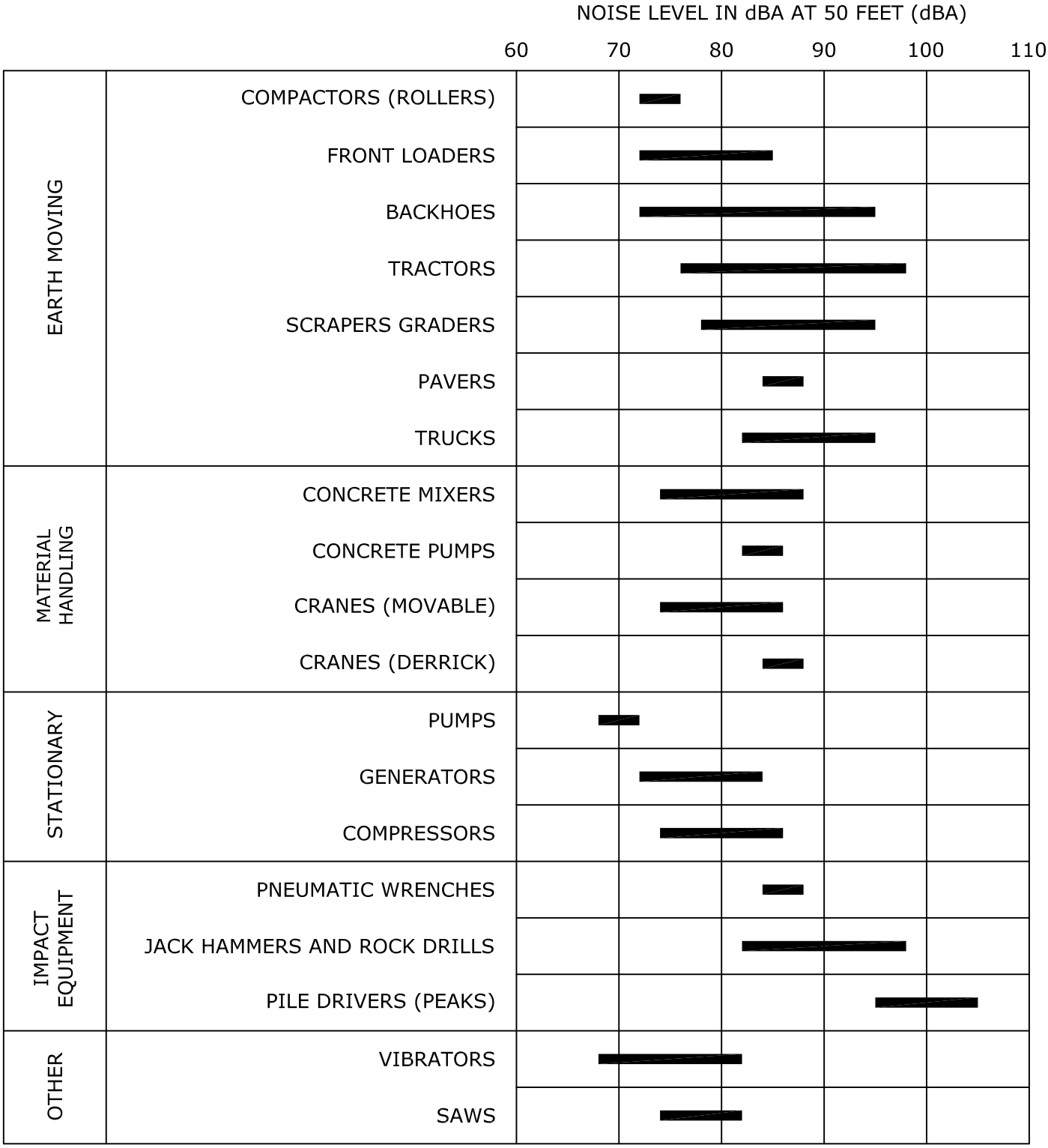
Holomua

Not to Scale

| Date | Project No. | Drawn By |
|---|---|---|
| May 2008 | 08-08 | DFD |

Figure No

4




NOTE: BASED ON LIMITED AVAILABLE DATA SAMPLES

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# Typical Sound Levels from Construction Equipment

Holomua

Not to Scale

| Date | Project No. | Drawn By |
|---|---|---|
| May 2008 | 08-08 | TRB |

Figure No

5

# APPENDIX A

## Acoustic Terminology

# Acoustic Terminology

Sound Pressure Level

Sound, or noise, is the term given to variations in air pressure that are capable of being detected by the human ear. Small fluctuations in atmospheric pressure (sound pressure) constitute the physical property measured with a sound pressure level meter. Because the human ear can detect variations in atmospheric pressure over such a large range of magnitudes, sound pressure is expressed on a logarithmic scale in units called decibels (dB). Noise is defined as "unwanted" sound.

Technically, sound pressure level (SPL) is defined as:

$$SPL = 20 \log (P/P_{ref}) \text{ dB}$$

where P is the sound pressure fluctuation (above or below atmospheric pressure) and $P_{ref}$ is the reference pressure, 20 µPa, which is approximately the lowest sound pressure that can be detected by the human ear. For example:

If P = 20 µPa, then SPL = 0 dB
If P = 200 µPa, then SPL = 20 dB
If P = 2000 µPa, then SPL = 40 dB

The sound pressure level that results from a combination of noise sources is not the arithmetic sum of the individual sound sources, but rather the logarithmic sum. For example, two sound levels of 50 dB produce a combined sound level of 53 dB, not 100 dB. Two sound levels of 40 and 50 dB produce a combined level of 50.4 dB.

Human sensitivity to changes in sound pressure level is highly individualized. Sensitivity to sound depends on frequency content, time of occurrence, duration, and psychological factors such as emotions and expectations. However, in general, a change of 1 or 2 dB in the level of sound is difficult for most people to detect. A 3 dB change is commonly taken as the smallest perceptible change and a 6 dB change corresponds to a noticeable change in loudness. A 10 dB increase or decrease in sound level corresponds to an approximate doubling or halving of loudness, respectively.

A-Weighted Sound Level

Studies have shown conclusively that at equal sound pressure levels, people are generally more sensitive to certain higher frequency sounds (such as made by speech, horns, and whistles) than most lower frequency sounds (such as made by motors and engines)[1] at the same level. To address this preferential response to frequency, the A-weighted scale was developed. The A-weighted scale adjusts the sound level in each frequency band in much the same manner that the

[1] D.W. Robinson and R.S. Dadson, "A Re-Determination of the Equal-Loudness Relations for Pure Tones," *British Journal of Applied Physics*, vol. 7, pp. 166 - 181, 1956. (Adopted by the International Standards Organization as Recommendation R-226.

human auditory system does. Thus the A-weighted sound level (read as "dBA") becomes a single number that defines the level of a sound and has some correlation with the sensitivity of the human ear to that sound. Different sounds with the same A-weighted sound level are perceived as being equally loud. The A-weighted noise level is commonly used today in environmental noise analysis and in noise regulations. Typical values of the A-weighted sound level of various noise sources are shown in Figure A-1.

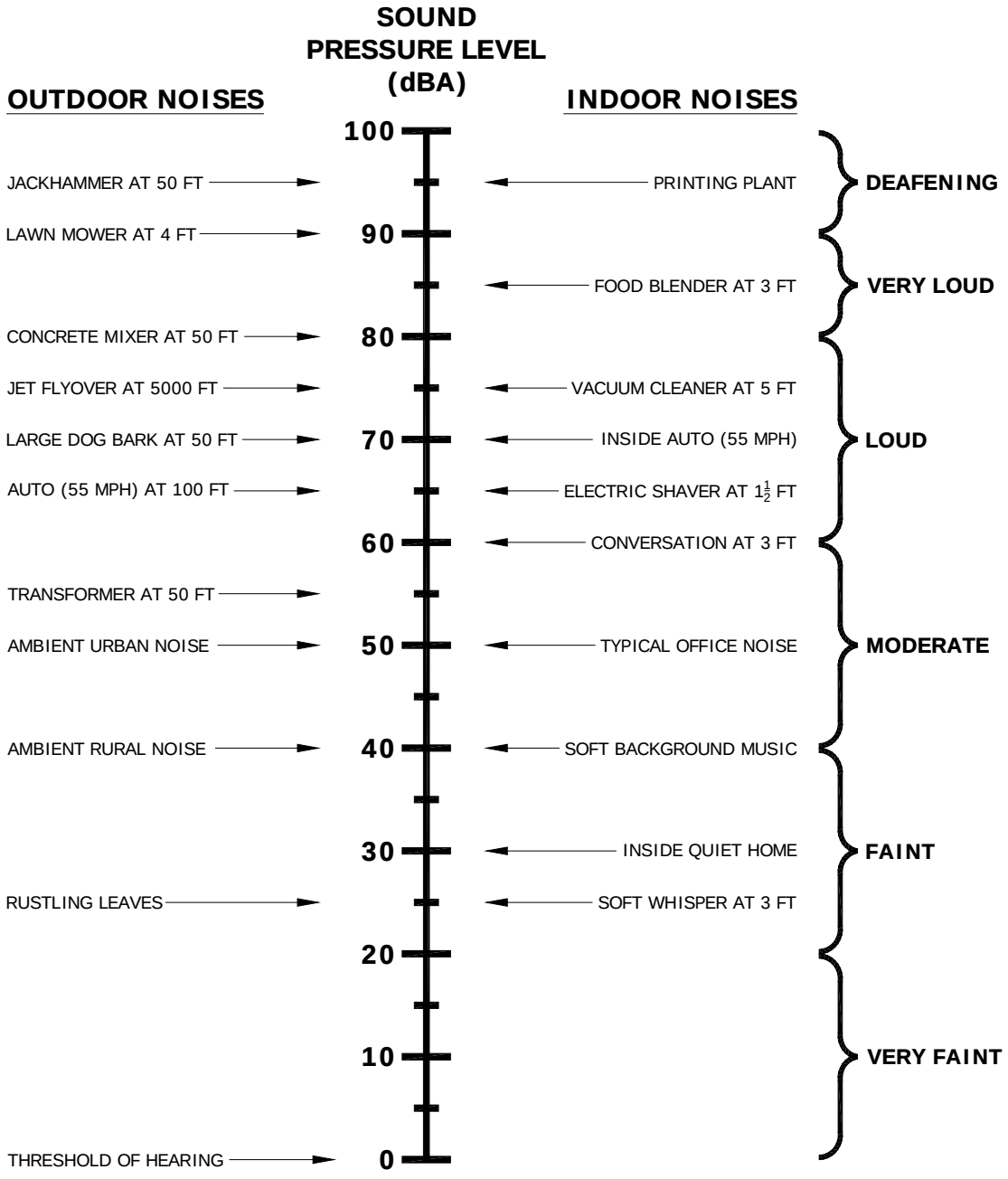


**Figure A-1. Common Outdoor/Indoor Sound Levels**

Equivalent Sound Level

The Equivalent Sound Level ($L_{eq}$) is a type of average which represents the steady level that, integrated over a time period, would produce the same energy as the actual signal. The actual *instantaneous* noise levels typically fluctuate above and below the measured $L_{eq}$ during the measurement period. The A-weighted $L_{eq}$ is a common index for measuring environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

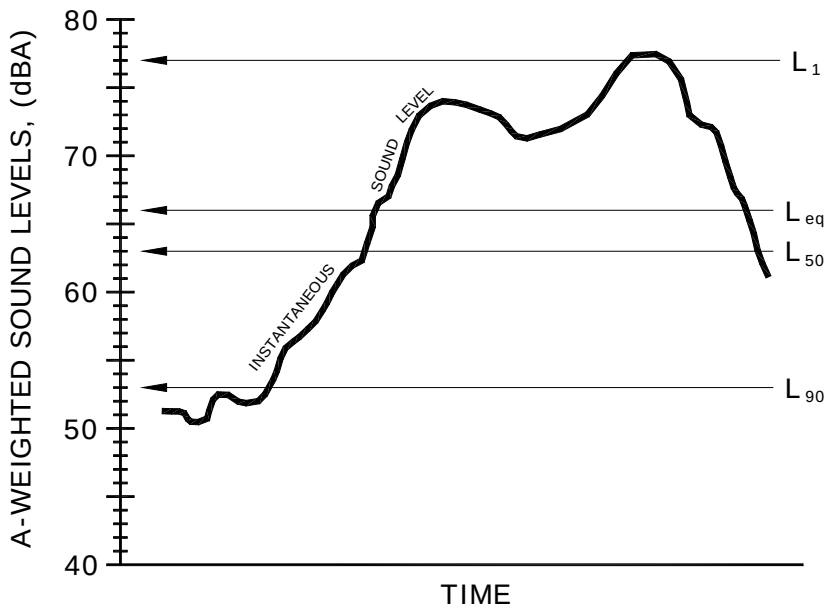


**Figure A-2. Example Graph of Equivalent and Statistical Sound Levels**

Statistical Sound Level

The sound levels of long-term noise producing activities such as traffic movement, aircraft operations, etc., can vary considerably with time. In order to obtain a single number rating of such a noise source, a statistically-based method of expressing sound or noise levels has been developed. It is known as the Exceedence Level, $L_n$. The $L_n$ represents the sound level that is exceeded for n% of the measurement time period. For example, $L_{10}$ = 60 dBA indicates that for the duration of the measurement period, the sound level exceeded 60 dBA 10% of the time. Typically, in noise regulations and standards, the specified time period is one hour. Commonly used Exceedence Levels include $L_{01}$, $L_{10}$, $L_{50}$, and $L_{90}$, which are widely used to assess community and environmental noise. A graphical description of the equivalent sound level is shown in Figure A-2.

Day-Night Equivalent Sound Level

The Day-Night Equivalent Sound Level, $L_{dn}$, is the Equivalent Sound Level, $L_{eq}$, measured over a 24-hour period. However, a 10 dB penalty is added to the noise levels recorded between 10 p.m. and 7 a.m. to account for people's higher sensitivity to noise at night when the background noise level is typically lower. The $L_{dn}$ is a commonly used noise descriptor in assessing land use compatibility, and is widely used by federal and local agencies and standards organizations.

# Appendix H

# Site Infrastructure Assessment

**PRELIMINARY SITE INFRASTRUCTURE ASSESSMENT**

For

# HOLOMUA

at

Honolulu, Oahu, Hawaii

TMK 1st 2-4-006: 017 & 018

Prepared by:

**Engineering Dynamics Corp.**
Honolulu Office
126 Queen Street, Suite 307A
Honolulu, HI 96813
Tel: (808) 523-6930
Fax: (808) 523-6933

This work was prepared by me
or under my supervision.

**Engineering Dynamics Corp.**

Ty Miyabuchi
Registered Professional Engineer
State of Hawaii Certificate #9378

This report is an "instrument of service". This work is part of an integrated process of technical design. Use outside this process is inappropriate and transfer of its observations, conclusions, or methodology to any other work may have serious consequences. Definitions used have only the meanings assigned to them by Engineering Dynamics Corp. in the context employed.

## 1.1 INFRASTRUCTURE

### 1.1.1 Water

Water for the Honolulu metropolitan area is drawn from the Metropolitan 180' System by the City and County of Honolulu, Board of Water Supply (BWS), and conveyed to communities through a network of distribution lines spanning from the Pearl Harbor basin out to East Honolulu.

Records at the BWS, Engineering Maintenance Unit, indicate an existing 8-inch water main within the vicinity of the project area located along the westerly side of Kalakaua Avenue and the southerly side of Young Street.

***Potential Impacts and Mitigation Measures***

Based on the apartment density, preliminary apartment unit plans, and *Tables 100-18 and 100-20, Board of Water Supply, Water System Standards, dated 2002, and Uniform Plumbing Code*, the proposed domestic water consumption flows are as follows:

**Table 1: Proposed Domestic Water Consumption Computation**

| Flow Demand | Proposed Domestic Water Consumption |
|---|---|
| Average Daily Demand (gpd) | 52,800 |
| Maximum Daily Demand (gpd) | 79,200 |
| Peak Hour (gpd) | 158,400 |
| Peak Hour Design Flowrate (gpm) | 277 |

Approval from BWS to connect to the system will be requested during the building permit process. The project will be subject to Cross-Connection Control and Backflow Prevention requirements prior to approval of the building permit.

Preliminary consultation with the BWS Customer Care Division indicated sufficient fire protection and domestic

capacity to serve the proposed multi-family high-rise development[1].

Throughout the design and construction of the proposed development, coordination with BWS shall be maintained as necessary to ensure proper operation of existing water distribution and to mitigate potential interruptions of existing water service that may occur.

### 1.1.2 Wastewater

The existing municipal wastewater system serving the project vicinity consists of a 6-inch gravity main along Kalakaua Avenue. Wastewater collected and managed by the sewer main is conveyed to the Ala Moana Pump Station for treatment and disposal.

Records at the Department of Planning and Permitting (DPP), Wastewater Branch (WWB), indicate that an existing 6-inch sewer lateral extending from the 6-inch sewer main along the easterly side of Kalakaua Avenue serves the proposed project site. A Site Development Application Form for Sewer Connection was applied for and approved by the DPP, WWB[2].

***Potential Impacts and Mitigation Measures***

Based on the apartment density, preliminary apartment unit plans, and *Chapter 20 Design Standards of the Department of Wastewater Management, Volume 1, dated July 1993*, the proposed wastewater flows are as follows:

---

[1] Existing water system adequacy was based upon current BWS data. Final decision on the availability of water will be confirmed when the building permit is submitted for approval (Refer to attached letter).

[2] Approved Sewer Connection Application (2008/SCA-0215) dated 4/03/08 was based on a unit density comprising of 80 one-bedroom units and 96 two-bedroom units (Refer to attached letter).

**Table 2: Proposed Wastewater Flow Computation**

| Design Flowrate | Proposed Wastewater Flow |
|---|---|
| Average Flow (gpd) | 39,424 |
| Maximum Flow (gpd) | 197,120 |
| Design Average Flow (gpd) | 56,672 |
| Design Maximum Flow (gpd) | 214,368 |
| Design Peak Flow (gpd) | 215,716 |

Throughout the design and construction of the proposed development, coordination with the City Wastewater Branch, Inspection Section and/or State Department of Health shall be maintained as necessary to ensure proper operation of the existing wastewater system and to mitigate potential interruptions of existing wastewater service that may occur.

### 1.1.3 Drainage

Stormwater surface runoff from the project site is generally directed towards the Kalakaua Avenue gutter system where it is collected and managed by the catch basin at the southerly intersection of Kalakaua Avenue and Young Street. Storm runoff collected at the catch basin is conveyed by a 12’x8’ concrete box culvert traversing beneath Kalakaua Avenue up to a reinforced concrete culvert at the intersection of Kalakaua Avenue and South King Street. The concrete culvert eventually spills downstream into the Ala Wai Canal.

***Potential Impacts and Mitigation Measures***

The proposed storm runoff pattern will generally follow that of the existing. A new onsite drainage system comprising of drain inlets and drain lines would be utilized to discharge storm runoff into the existing concrete box drain. As the existing site is predominately comprised of AC pavement an increase in storm runoff is not anticipated as a result of the proposed improvements.

Pollutants due to construction activities would be managed by Best Management Practices (BMPs) such as silt fences, construction accesses, dust fences, etc. Permanent BMPs may include drain inlet filter inserts, grassing of exposed soils, etc.

### 1.1.4 Electrical/Telecommunication

Existing overhead electrical lines and power poles are located within the vicinity of the project area frontage along Kalakaua Avenue.

An existing telecom box is located within the sidewalk fronting the project area along Kalakaua Avenue.

***Potential Impacts and Mitigation Measures***

Consultation shall be initiated with HECO and Hawaiian Telcom to verify adequacy of utility services for the proposed development.

Throughout the design and construction of the proposed development, coordination with the respective authorities shall be maintained as necessary to ensure proper operation of existing utility service and to mitigate potential interruptions of existing utility service that may occur.

# Appendix I

# Preconsultation Letters & Responses

## Appendix I: Pre-Consultation Letters

Pre-consultation request letters were sent to the following list of agencies, organizations, and individuals. Where indicated, the agency, organization, or individual provided comments. The comment letters and responses follow this table.

| AGENCY | REQUEST SENT | COMMENT RECEIVED |
|---|---|---|
| **STATE OF HAWAI'I** | | |
| Department of Education | 2-29-08 | 3-18-08 |
| Department of Land and Natural Resources | 2-29-08 | |
| Hawaii Housing Finance & Development Corporation | 2-29-08 | |
| Office of Environmental Quality Control | 2-29-08 | |
| **CITY & COUNTY OF HONOLULU** | | |
| Board of Water Supply | 2-29-08 | 3-6-08 |
| Department of Community Services | 2-29-08 | 3-10-08 |
| Department of Design and Construction | 2-29-08 | 3-20-08 |
| Department of Environmental Services | 2-29-08 | |
| Department of Facility Maintenance | 2-29-08 | 3-20-8 |
| Department of Parks and Recreation | 2-29-08 | 3-4-08 |
| Department of Transportation Services | 2-29-08 | 3-25-08 |
| Department of Planning and Permitting | 2-29-08 | |
| DPP - Land Use Approval Branch | 2-29-08 | 3-13-08 |
| DPP - Traffic Review Branch | 2-29-08 | |
| DPP - Zoning Plan Review Branch | 2-29-08 | |
| DPP -Civil Engineering Branch | 2-29-08 | |
| DPP-Subdivision Branch | 2-29-08 | |
| DPP-Wastewater Branch | 2-29-08 | |
| Fire Department | 2-29-08 | 3-13-08 |
| Police Department | 2-29-08 | 3-5-08 |
| **PRIVATE ORGANIZATIONS & INDIVIDUALS** | | |
| Hawaiian Electric Company | 2-29-08 | 4-24-08 |
| Councilmember Ann Kobayashi | 2-29-08 | |

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

**STATE OF HAWAI'I**
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF SCHOOL FACILITIES AND SUPPORT SERVICES

March 18, 2008

Mr. Tom Schnell, AICP, Senior Associate
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawai'i 96813

Dear Mr. Schnell:

SUBJECT: Pre-Consultation for Holomua Condominiums
Honolulu, O'ahu, Hawai'i, TMK: (1) 2-4-06: 17 & 18

The Department of Education (DOE) has reviewed your request for pre-consultation on the potential impacts of the 168-unit Holomua Condominiums.

The 2007 Legislature passed a bill establishing school impact fees. The bill became Act 245 and is in the process of being implemented. Under this new law, it is possible the project will be required to pay an impact fee. We currently do not know whether this area will be in an impact district, or the amount of the fee per residential unit. If the project falls within an impact district, the DOE will meet with the developers of the project to discuss an agreement to mitigate the impacts of enrollment growth generated by this project.

We request more detailed information on the general price range, size and number of bedrooms for each residence plan.

Should you have any questions, please call George Casen of the Facilities Development Branch at 377-8308.

Sincerely yours,

Duane Y. Kashiwai
Public Works Administrator
Facilities Development Branch

DYK:to

c: Randolph Moore, Assistant Superintendent, OSFSS
Clayton Kaninau, Acting CAS, McKinley/Roosevelt Complex Areas

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*Associate*

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**WAILUKU OFFICE**
1787 Wili Pā Loop, Suite 4
Wailuku, Hawai'i 96793-1271
Tel: (808) 242-2878

May 27, 2008

Mr. Duane Y. Kashiwai
Public Works Administrator, Facilities Development
State of Hawai'i, Department of Education
P.O. Box 2360
Honolulu, HI 96804

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Mr. Kashiwai,

Thank you for your letter dated March 18, 2008 regarding Holomua. Holomua will be a residential condominium with approvals processed under Chapter 201H, Hawaii Revised Statutes (HRS).

We acknowledge that it is possible that Holomua may be subject to an impact fee under HRS, Section 302A-1601 et. seq. As part of the 201H process, THM Partners LLC is requesting an exemption to any school impact fees.

The participation of the Department of Education in the environmental review process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

O:\Job26\2686.01 Holomua EA\EA\Pre-Consultation\Preconsultation Response Letters\DOE Preconsultation Response.doc

**BOARD OF WATER SUPPLY**

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

March 6, 2008

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MARC C. TILKER

CRAIG I. NISHIMURA, Ex-Officio
BRENNON T. MORIOKA, Ex-Officio

CLIFFORD P. LUM
Manager and Chief Engineer

DEAN A. NAKANO
Deputy Manager and Chief Engineer

Mr. Tom Schnell, AICP, Senior Associate
PBR Hawaii & Associates, Incorporated
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

Subject: Your Letter Dated February 29, 2008 on the Pre-Consultation for Holomua Condominiums, TMK: 2-4-6:17, 18

Thank you for your letter on the proposed 168-unit condominium development.

The existing water system is presently adequate to accommodate the proposed development. However, please be advised that this information is based upon current data and, therefore, the Board of Water Supply reserves the right to change any position or information stated herein up until the final approval of your building permit application. The final decision on the availability of water will be confirmed when the building permit application is submitted for approval.

When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

The proposed project is subject to Board of Water Supply Cross-Connection Control and Backflow Prevention requirements prior to the issuance of the Building Permit Applications.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

K. Shida

KEITH S. SHIDA
Program Administrator
Customer Care Division

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May 27, 2008

Mr. Keith S. Shida
Board of Water Supply
630 S. Beretania St.
Honolulu, HI 96843

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Mr. Shida,

Thank you for your letter dated March 6, 2008 regarding Holomua. We offer the following responses to your preliminary comments:

1. Thank you for confirmation that the existing water supply is adequate at this time. Construction drawings will be submitted for review and approval prior to the issuance of the building permit.

2. As will be described in the draft EA, Holomua will be affordable housing subject to Section 201H, Hawaii Revised Statues. As such, exemptions to ROH 14-6.1 and 14-6.4 relating to water and sewer connection fees will be requested.

3. Board of Water Supply Cross-Connection Control and Backflow Prevention requirements will be fulfilled prior to the issuance of the building permit.

4. On-site fire protection requirements will be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

The participation of the Board of Water Supply in the Environmental Assessment process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

O:\Job26\2686.01 Holomua EA\EA\Pre-Consultation\Preconsultation Response Letters\BWS Preconsultation Response.doc

DEPARTMENT OF COMMUNITY SERVICES
CITY AND COUNTY OF HONOLULU
715 SOUTH KING STREET, SUITE 311 • HONOLULU, HAWAII 96813 • AREA CODE 808 • PHONE: 768-7762 • FAX: 768-7792

MUFI HANNEMANN
MAYOR

DEBORAH KIM MORIKAWA
DIRECTOR

ERNEST Y. MARTIN
DEPUTY DIRECTOR

March 10, 2008

Mr. Tom Schnell, AICP
PBR Hawaii
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

Subject: Preconsultation for Holomua Condominiums
Honolulu, Oahu, Hawaii, TMK: 2-4-06-17 and 18

The former Department of Housing and Community Development previously processed a request for exemptions from development requirements for a proposed rental project at this site. Resolution 97-341, CD1, adopted by the Honolulu City Council on December 3, 1997, authorized exemptions for Kulana Hale II Senior Living Residence. We understand that the current condominium proposal will involve exemptions to be processed under the Hawaii Housing Finance and Development Corporation rules and may involve financing as well.

We look forward to reviewing the Environmental Assessment when it becomes available. Thank you for the opportunity to provide these comments.

Sincerely,

Deborah Kim Morikawa

Deborah Kim Morikawa
Director

DKM:gk

# PBR HAWAII
& ASSOCIATES, INC.

May 27, 2008

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Ms. Deborah Kim Morikawa
City and County of Honolulu
Department of Community Services
715 S. King Street, Suite 311
Honolulu, HI 96813

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Ms. Morikawa,

Thank you for your letter dated March 10, 2008 regarding Holomua. A copy of the Environmental Assessment will be provided for your department's review and comment.

The participation of the Department of Community Services in the Environmental Assessment process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell,
Senior Associate, AICP

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DEPARTMENT OF DESIGN AND CONSTRUCTION
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MUFI HANNEMANN
MAYOR

EUGENE C. LEE, P.E.
DIRECTOR

RUSSELL H. TAKARA, P.E.
DEPUTY DIRECTOR

March 20, 2008

Mr. Tom Schnell, AICP
Senior Associate
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

Subject: Pre-Consultation for Holomua Condominiums
Honolulu, Oahu, Hawaii, TMK: (1) 2-4-06:17 & 18

Thank you for giving us the opportunity to comment on the above Pre-Consultation.

The Department of Design and Construction (DDC) has the following comments:

- A sewer connection application will need to be filed with the Department of Planning and Permitting, Wastewater Branch to determine adequacy of existing sewer lines.
- DDC would like to be provided a copy of the Draft Environmental Assessment to review when it is published.

Should you have any questions, please contact Jay Hamai, Assistant Chief of our Wastewater Division, at 768-8799.

Very truly yours,

Eugene C. Lee, P.E.
Director

ECL:lt (251289)

c: DDC Wastewater Division
DDC Facilities Division

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& ASSOCIATES, INC.

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Tel: (808) 242-2878

May 27, 2008

Eugene C. Lee P.E.
Department of Design and Construction
City and County of Honolulu
650 S. King Street, 11th Floor
Honolulu, HI 96813

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Mr. Lee,

Thank you for your letter dated March 20, 2008 regarding Holomua.

A sewer connection application has been filed and approved as of April 3, 2008. We look forward to continuing to work with you and your staff. To that end, a copy of the draft EA will be provided for your review.

Thank you again for your participation in the preparation of the upcoming Environmental Assessment.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

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DEPARTMENT OF FACILITY MAINTENANCE

**CITY AND COUNTY OF HONOLULU**

1000 Uluohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

MUFI HANNEMANN
MAYOR

CRAIG I. NISHIMURA, P.E.
ACTING DIRECTOR AND CHIEF ENGINEER

GEORGE "KEOKI" MIYAMOTO
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 08-229

March 20, 2008

Mr. Tom Schnell, AICP
PBR Hawaii & Associates, Inc.
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

Subject: Pre-Consultation for Holomua Condominiums
Honolulu, Oahu, Hawaii, TMK: (1) 2-4-06: 17 & 18

Thank you for the opportunity to review and comment on the pre-consultation for the subject proposed Holomua Condominiums project.

We have no immediate or future work planned along City roadways or facilities in the vicinity of the subject project.

The majority of the proposed improvements will probably be located within privately-owned property and have negligible impact on our facilities and operations. Any associated improvements within adjacent City roadway right-of-way will have to be constructed in accordance with the City and County of Honolulu Standard Details.

Should you have any questions, please call Charles Pignataro of the Division of Road Maintenance, at 768-3697.

Sincerely,

Craig I. Nishimura P.E.
Acting Director and Chief Engineer

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& ASSOCIATES, INC.

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May 27, 2008

Mr. Craig I. Nishimura, P.E.
Department of Facility Maintenance
1000 Uluohia Street, Suite 215
Kapolei, HI 96707

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Mr. Nishimura,

Thank you for your letter dated March 20, 2008 regarding the above referenced project.

We acknowledge that the Department of Facility Maintenance has no immediate or future work planned along City roadways or facilities in the vicinity of Holomua.

Any improvements associated with Holomua within adjacent City roadway right-of-way will be constructed in accordance with the City and County of Honolulu Standard Details.

A copy of the Draft Environmental Assessment will be provided to your office.

The participation of the Department of Facility Maintenance in the environmental review process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

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**DEPARTMENT OF PARKS AND RECREATION**

# CITY AND COUNTY OF HONOLULU

KAPOLEI HALE, 1000 ULUOHIA STREET, STE. 309 • KAPOLEI, HAWAII 96707
Phone: (808) 768-3003 • FAX: 768-3053 • Internet: www.honolulu.gov

MUFI HANNEMANN
MAYOR

LESTER K. C. CHANG
DIRECTOR

GAIL Y. HARAGUCHI
DEPUTY DIRECTOR

March 4, 2008

Mr. Tom Schnell, AICP
PBR HAWAII
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Schnell:

Subject: Pre-Consultation for Holomua Condominiums
Honolulu, Oahu, Hawaii TMK (1) 2-4-06: 17 & 18

Thank you for the opportunity to review and comment at the Pre-consultation stage of the Environmental Assessment for the Holomua Condominiums project.

The Department of Parks and Recreation is of the opinion that any new 168 unit residential condominium in this neighborhood has the potential to impact existing recreation facilities and programs and recommends that the developer incorporate plans for on site recreational facilities whether or not the project seeks an exemption from the Park Dedication Ordinance because of its affordable characteristics.

Should you have any questions, please contact Mr. John Reid, Planner, at 768-3017.

LESTER K. C. CHANG
Director

LKCC:jr
(251357)

cc: Serge Krivatsy, THM Partners LLC

# PBR HAWAII
& ASSOCIATES, INC.

May 27, 2008

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Mr. Lester Chang
City and County of Honolulu
Kapolei Hale
1000 Uluohia Street, Suite 309
Kapolei, HI 96707

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Mr. Chang,

Thank you for your letter dated March 3, 2008 regarding Holomua. Holomua will be a residential condominium with approvals processed under Chapter 201H, Hawaii Revised Statutes (HRS).

Holomua on-site amenities are proposed to be limited, to both hold the purchase price down as well as limit maintenance fees for residents. The developer plans to ask for an exemption to park dedication requirements (Chapter 22, Article 7, Revised Ordinances of Honolulu) through the 201H process.

Although the developer proposes to request an exemption to park dedication requirements, it should be noted that several parks are within walking distance (less than one mile) from the project site, providing both active and passive recreational opportunities for residents, including:

- Ala Moana Regional Park, 1201 Ala Moana Boulevard
- Ala Wai Community Park, 2015 Kapiolani Boulevard
- Ala Wai Promenade, 1828 Kalakaua Avenue
- Cartwright Neighborhood Park, 1314 Makiki Street
- Makiki District Park,1527 Keeaumoku Street
- McCully District Park, 831 Pumehana Street
- Moiliili Neighborhood Park, 1115 Isenberg Street
- Old Stadium Park, 2237 King Street
- Sheridan Community Park, 833 Piikoi Street
- Stevenson Recreation Center, community, 615 Auwaiolimu Street
- Thomas Square, 1102 Victoria Street

The participation of the Department of Parks and Recreation in the Environmental Assessment process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

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DEPARTMENT OF TRANSPORTATION SERVICES

**CITY AND COUNTY OF HONOLULU**

650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 523-4730 • Internet: www.honolulu.gov

MUFI HANNEMANN
MAYOR

WAYNE Y. YOSHIOKA
DIRECTOR

RICHARD F. TORRES
DEPUTY DIRECTOR

TP3/08-251271R

March 25, 2008

Mr. Tom Schnell, AICP
PBR Hawaii & Associates, Inc.
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

Subject: Holomua Condominiums

Thank you for your February 29, 2008, letter requesting our pre-assessment comments on the subject project.

We have the following comments for your consideration as you prepare the draft environmental assessment (EA):

1. Consideration should be given to incorporating facilities for a bus stop along the Kalakaua Avenue frontage of the project.

2. Project plans should include Americans with Disabilities Act accessible dropoff/pickup main entry and other site improvements to facilitate accessibility for persons with disabilities.

We look forward to reviewing the draft EA. Should you have any questions regarding these comments, please contact Ms. Faith Miyamoto at 768-8350.

Very truly yours,

WAYNE Y. YOSHIOKA
Director

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& ASSOCIATES, INC.

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May 27, 2008

Mr. Wayne Y. Yoshioka, Director
Department of Transportation Services
650 S. King Street, 3rd Floor
Honolulu, HI 96813

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Mr. Yoshioka,

Thank you for your letter dated March 25, 2008 regarding Holomua. We offer the following responses to your preliminary comments:

1. The site is well served by transportation options including The Bus as well as a bike route. Due to the proximity of existing stops and site's limited frontage, a transit stop is not proposed on Kalakaua Avenue in front of Holomua. Please note that 11 bus stops for multiple bus routes are located within ¼ mile walking distance from the Holomua site.

2. Holomua is intended to serve the community with needed housing options. As such, Holomua will be constructed in compliance with the Americans with Disabilities Act, ensuring accessibility for its residents and visitors.

A copy of the Draft Environmental Assessment will be provided to your office.

The participation of the Department of Transportation Services in the environmental review process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

DEPARTMENT OF PLANNING AND PERMITTING
**CITY AND COUNTY OF HONOLULU**

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MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

2008/ELOG-538(pd)

March 13, 2008

Mr. Tom Schnell
PBR Hawaii & Associates, Inc.
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

Subject: Pre-Consultation for Holomua Condominiums
1311 Kalakaua Avenue - Punahou
Tax Map Key 2-4-6: 17 and 18

This is in response to your February 29, 2008 letter, requesting pre-consultation comments on the above-referenced project.

The project involves development of a 168-unit residential condominium building, with 51 percent (51%) of the units designated as affordable. You indicate that you will be preparing an application to obtain exemptions for affordable housing under 201H, Hawaii Revised Statutes (HRS).

The site consists of two (2) lots with a combined lot area of 21,339 square-feet, zoned BMX-3 Community Business Mixed Use District, where multifamily dwellings are a permitted principal use with conditions. The site exceeds the 5,000-square-foot minimum lot area. If the development will span the common property line, a conditional use permit for joint development may be required. (We note that 2001/CUP-76 was approved for joint development of Parcels 5, 17, and 18. However, that permit lapsed on December 12, 2003, because the applicant did not comply with the approval conditions within the specified time limits.)

Should you have any questions, please contact Pamela Davis of our staff at 768-8017.

Very truly yours,

Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:cs

Doc 602665

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& ASSOCIATES, INC.

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May 27, 2008

Mr. Henry Eng, FAICP
City and County of Honolulu
Department of Planning and Permitting
650 S. King Street, 7th Floor
Honolulu, HI 96813

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Mr. Eng,

Thank you for your letter dated March 13, 2008 regarding Holomua.

As you identify in your correspondence, the project site consists of two lots with a building intended to span the property line. The project developer intends to pursue a permit for joint development to ensure compliance with DPP requirements.

A copy of the Draft Environmental Assessment will be provided to your office.

The participation of the Department of Planning and Permitting in the environmental review process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

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HONOLULU FIRE DEPARTMENT

**CITY AND COUNTY OF HONOLULU**

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

MUFI HANNEMANN
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ALVIN K. TOMITA
DEPUTY FIRE CHIEF

March 13, 2008

Mr. Tom Schnell, AICP
Senior Associate
PBR Hawaii & Associates, Inc.
American Savings Bank Tower
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

Subject: Preconsultation for Holomua Condominiums
Honolulu, Oahu, Hawaii
Tax Map Key: 2-4-006: 017 and 018

In response to your letter dated February 29, 2008, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) reviewed the material provided and requires that the following be complied with:

1. Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from a fire apparatus access road as measured by an approved route around the exterior of the building or facility. (1997 Uniform Fire Code, Section 902.2.1.)

2. Provide a water supply, approved by the county, capable of supplying required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

   On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of the 150 feet (45 720 mm) from a water supply on a fire

apparatus access road, as measured by an approved route around the exterior of the facility or building. (1997 Uniform Fire Code, Section 903.2, as amended.)

3. Submit civil drawings to the HFD for review and approval.

Should you have any questions, please call Battalion Chief Socrates Bratakos of our Fire Prevention Bureau at 723-7151.

Sincerely,

KENNETH G. SILVA
Fire Chief

KGS/SY:jl

cc: Serge Krivatsy, THM Partners LLC

# PBR HAWAII
& ASSOCIATES, INC.

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May 27, 2008

Chief Kenneth G. Silva
Honolulu Fire Department
636 South Street
Honolulu, HI 96813-5007

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Chief Silva,

Thank you for your letter dated March 13, 2008 regarding Holomua. We offer the following responses to your preliminary comments:

1. Fire apparatus access roads shall be designed and constructed in accordance with the Uniform Fire Code, Section 9002.2.1, as amended.

2. Water infrastructure shall be designed and installed in accordance with the Uniform Fire Code, Section 903.2, as amended.

3. Civil drawings will be submitted to your department for your review and approval at the appropriate time.

We will provide a copy of the Draft EA for your review.

The participation of the Honolulu Fire Department in the Environmental Assessment process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

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**Hawaiian Electric Company, Inc.** • PO Box 2750 • Honolulu, HI 96840-0001

EIS

April 24, 2008

Tom Schnell, AICP
PBR Hawaii & Associates, Inc.
ASB Tower - Suite 650
1001 Bishop Street
Honolulu, HI 96813-3384

Dear Mr. Schnell:

**Re: Holomua Condominiums**
**Honolulu, Oahu**
**(TMK: (1) 2-4-06: 17 & 18)**

Thank you for the pre-consultation materials and the opportunity to comment on this project. We apologize for the lateness of our response. Hawaiian Electric Company, Inc. (HECO) has no objections at this time. The following comments were received from our Engineering and Construction & Maintenance Departments:

(1) Engineering/Transmission & Distribution (Marc Miyaki, 543-7207). HECO currently has no existing electrical facilities within the proposed project area. We appreciate your efforts to keep us apprised of the planning process. As new project plans develop, please continue to keep us informed. We will be better able to evaluate any effects on our system facilities further along in the project's development. We request that development plans show all affected HECO facilities and address any conflicts between the proposed plans and HECO's existing facilities. Please forward the pre-final development plans to HECO for review.

Should it become necessary to relocate or redesign HECO's facilities, or to add new facilities, please submit a request in writing immediately upon that determination, and we will work with you so that construction of the project may proceed as smoothly as possible to minimize any delays in or impacts on the project schedule. HECO shall not be responsible for any delay or damage that may arise as a result of insufficient notice for relocation of our facilities. Please note that there may be costs associated with any relocation work, and that such costs may be borne by the requestor.

(2) Engineering/Project Management (Kerstan Wong, 543-7059). In the event that existing facilities need to be moved and/or new facilities are required as a result of this project, a brief description and environmental analysis of such requirements should be included in the draft/final EIS.

(3) Construction & Maintenance (Paul Nakagawa, 543-7062). For operation and maintenance purposes, HECO will require continued access to any of our facilities that may be impacted by the proposed project, as covered by existing easements or agreements regarding location or operation within the public rights-of-way. Should any relocation or addition of our facilities become necessary as a result of this project, please submit a formal request and coordinate these activities with the appropriate HECO department(s).

To ensure HECO's continuing input, I suggest dealing directly with the points of contact noted above. Thank you again for the opportunity to comment.

Sincerely,

Kirk S. Tomita
Senior Environmental Scientist

cc: M. Miyaki/S. Uyehara/M. Lum
K. Wong
P. Nakagawa

# PBR HAWAII
& ASSOCIATES, INC.

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*Principal*

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May 27, 2008

Mr. Kirk S. Tomita
Hawaiian Electric Company, Inc.
PO Box 2750
Honolulu, HI 96840-0001

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, HONOLULU, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Mr. Tomita,

Thank you for your letter dated April 24, 2008 regarding Holomua. We offer the following responses to your preliminary comments:

We have researched the site and have found electrical facilities on adjacent TMKs 4 and 16, as well as overhead lines at the site's frontage on Kalakaua Avenue. The developer will continue to work with your staff to service Holomua as the project moves forward.

We appreciate your department's research and will provide a copy of the Draft EA for your review.

The participation of Hawaiian Electric Company in the Environmental Assessment process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

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POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

MUFI HANNEMANN
MAYOR

BOISSE P. CORREA
CHIEF

PAUL D. PUTZULU
MICHAEL D. TUCKER
DEPUTY CHIEFS

OUR REFERENCE BS-KP

March 5, 2008

Mr. Tom Schnell, AICP
PBR Hawaii & Associates, Inc.
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

This is in response to your letter of February 29, 2008, requesting comments on a Pre-Consultation for the Holomua Condominiums project in Honolulu.

This project should have no significant impact on the facilities or operations of the Honolulu Police Department.

If there are any questions, please call Major Clayton Saito of District 1 at 529-3386 or Mr. Brandon Stone of the Executive Office at 529-3644.

Sincerely,

BOISSE P. CORREA
Chief of Police

By
DEBORA A. TANDAL
Assistant Chief of Police
Support Services Bureau

# PBR HAWAII
& ASSOCIATES, INC.

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May 27, 2008

Chief Boisse P. Correa
Honolulu Police Department
801 S. Beretania Street
Honolulu, HI 96813

**SUBJECT: PRE-CONSULTATION FOR HOLOMUA, O'AHU, HAWAI'I, TMK: (1) 2-4-06: 17 & 18**

Dear Chief Correa,

Thank you for your letter dated March 5, 2008 regarding Holomua.

We acknowledge your comment that the project should have not significant impact on the facilities or operations of the Honolulu Police Department.

We will provide a copy of the Draft EA for your review.

The participation of the Honolulu Police Department in the Environmental Assessment process is appreciated.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Senior Associate

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