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# Draft Environmental Assessment

for

## Fire Administration Support Complex

Hilo, Island of Hawai'i, Hawai'i  
TMK (3)2-4-001:168 [Portion]

**FEBRUARY 2008**

*Prepared for:*

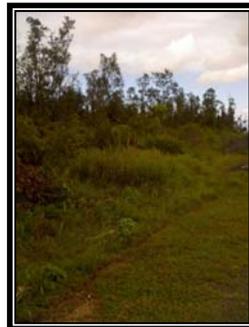
County of Hawai'i  
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*Prepared by:*

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Appendix B:	Record of Cultural Impact Assessment Consultation
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## SECTION 1

### PROJECT SUMMARY

Project Name: Fire Administration Support Complex

Applicable Law: Hawai'i Revised Statutes (HRS) Chapter 343

Type of Document: Draft Environmental Assessment

Island: Island of Hawai'i

District: South Hilo

Tax Map Key (TMK): 3<sup>rd</sup> Tax Division (3)2-4-001:168 [Portion]

Status: Draft Environmental Assessment (DEA) notice pending 30-day public comment. Address comments to the Proposing Agency with copies to the Consultant and OEQC.

Public Comment Deadline: April 7, 2008

Permits Required: County of Hawai'i, Planning Department: Special Permit

Proposing Agency: (Applicant) County of Hawai'i  
Department of Public Works  
Aupuni Center, 101 Pauahi Street, Suite 7  
Hilo, Hawai'i 96720-4224  
Contact: Mr. David Yamamoto, Project Manager  
Phone: (808) 961-8331 Fax: (808) 961-8410

Determination Agency: (Approving Agency) (Accepting Authority) Same as above.

Consultant: (Applicant Agent) M&E Pacific, Inc.  
Davies Pacific Center  
841 Bishop Street, Suite 1900  
Honolulu, Hawai'i 96813  
Contact: Mr. Michael Nishimura, Project Manager  
Phone: (808) 521-3051 Fax: (808) 524-0246

Location: Waiākea Pasture Land  
Waiākea, South Hilo, Island of Hawai'i, Hawai'i

Property Owner: State of Hawai'i

State Land Use Classification: Agricultural

County Zoning: A-1a (Agricultural -1 acre)

County Plan: Medium Density Urban

Proposed Action: This project proposes the construction of a Fire Administration Support Complex to serve as the main, centralized base of operations for the County of Hawai'i Fire Department for the area. The first phase of the proposed complex, anticipated for construction commencement in mid- to late-2008, includes a Fire Administration Building and an Emergency Dispatch Building. Future phases will involve construction of a Fire Preparation & Training Building, parking, an open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. Site lighting, potable water, sewer, electrical service, telecommunications, and other miscellaneous fencing, signage, grading and drainage will be included in the design as required. The facilities will be designed to be ADA accessible. The proposed project will centralize the administrative units, emergency dispatch, and personnel training for the Fire Department. A radio tower may also be required for use by the emergency dispatch.

Determination: Anticipated Finding of No Significant Impact (FONSI)

**SECTION 2**  
**CONSULTATION LIST**

**2.1 FEDERAL**

**2.1.1 AGENCY LIST**

Natural Resource Conservation Service (NRCS)  
U.S. Department of the Interior, U.S. Fish and Wildlife Service (FWS)  
U.S. Environmental Protection Agency (EPA), Region 9

**2.1.2 CONTACT INFORMATION AND SUMMARY**

<b>Natural Resource Conservation Service (NRCS)</b>	
Contact:	Mr. Lawrence T. Yamamoto, Director
Address:	P.O. Box 50004 Honolulu, HI 96850
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>U.S. Department of the Interior, U.S. Fish and Wildlife Service (FWS)</b>	
Contact:	Mr. Patrick Leonard, Field Supervisor
Address:	300 Ala Moana Boulevard, #3-122 Honolulu, HI 96850
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>U.S. Environmental Protection Agency (EPA), Region 9</b>	
Contact:	Mr. Dean Higuchi, Administrator
Address:	Pacific Islands Contact Office U.S. EPA, Region 9 P.O. Box 50003 Honolulu, HI 96850
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

## 2.2 STATE OF HAWAII

### 2.2.1 AGENCY LIST

Department of Business, Economic Development and Tourism (DBEDT), Office of Planning

Department of Hawaiian Home Lands (DHHL)

Department of Health (DOH), County of Hawaii District Health Office

Department of Land and Natural Resources (DLNR), Historic Preservation Division (SHPD)

Department of Transportation (SDOT)

Office of Hawaiian Affairs (OHA)

State Office of Environmental Quality Control (OEQC)

### 2.2.2 CONTACT INFORMATION AND SUMMARY

<b>Department of Business, Economic Development and Tourism (DBEDT), Office of Planning</b>	
Contact:	Mr. Theodore Liu, Director
Address:	P.O. Box 2359 Honolulu, HI 96804
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Department of Hawaiian Home Lands (DHHL)</b>	
Contact:	Mr. Ken Taguchi, Information & Community Relations
Address:	1099 Alakea Street, Suite 2000 Honolulu, HI 96813
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Department of Health (DOH), County of Hawaii District Health Office</b>	
Contact:	Mr. Newton Inouye, Acting District Environmental Health Program Chief
Address:	P.O. Box 916 Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Department of Land and Natural Resources (DLNR), Historic Preservation Division (SHPD)</b>	
Contact:	Ms. Melanie A. Chinen, Administrator
Address:	Kakuhihewa Building, Room 555 601 Kamokila Boulevard Kapolei, HI 96707
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Department of Transportation (SDOT)</b>	
Contact:	Mr. Barry Fukunaga, Interim Director
Address:	869 Punchbowl Street Honolulu, HI 96813-5097
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Office of Hawaiian Affairs (OHA)</b>	
Contact:	Ms. Ululani Sherlock, Community Resource Coordinator
Address:	Office of Hawaiian Affairs 162-A Baker Avenue Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence.
31 Dec 2007	Response signed by Clyde W. Namuo received. Refer to <b>Appendix B</b> for response.
Summary:	OHA requested that a Cultural Impact Assessment (CIA) to be included in the EA in accordance with Chapter 343 of the Hawai'i Revised Statutes (HRS). OHA also mentioned that in accordance with Section 6E-46.6, HRS and Chapter 13-300, Hawai'i Administrative Rules (HAR), work shall stop in the immediate vicinity and the SHPD contacted should any significant cultural deposit of human skeletal remains are encountered during construction.

<b>State Office of Environmental Quality Control (OEQC)</b>	
Contact:	Mr. Genevieve Salmonson, Director
Address:	235 South Beretania Street, Suite 702 Honolulu, HI 96813
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

**2.3 COUNTY OF HAWAII**

**2.3.1 AGENCY LIST**

Civil Defense  
 Department of Environmental Management (DEM)  
 Department of Parks and Recreation  
 Department of Water Supply  
 Fire Department  
 Hawaii'i County Council  
 Mayor Harry Kim  
 Police Department  
 Planning Department

**2.3.2 CONTACT INFORMATION AND SUMMARY**

<b>Civil Defense</b>	
Contact:	Administrator
Address:	County of Hawaii'i, Civil Defense 920 Ululani Street Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Department of Environmental Management (DEM)</b>	
Contact:	Ms. Bobby Jean Leithead-Todd, Director
Address:	County of Hawaii'i, Department of Environmental Management 25 Aupuni Street, Room 210 Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence.
4 Jan 2008	Response received. Refer to <b>Appendix B</b> for response.
Summary:	The Wastewater Division (WWD) indicated the following: (1) COH WW collection system is located on Kahikini Street, (2) WWD checklist should be used as a guide when connecting to the system, (3) a meeting with WWD staff is recommended prior to WW system connection planning and design and (4) a WW master plan submittal to the WWD is required for the entire parcel is required prior to the start of planning and design.  The Solid Waste Division (SWD) indicated the following: (1) transfer stations may be used for disposal of solid waste, (2) aggregates and other construction waste should be reused when possible, (3) space should be provided for rubbish and recycling, (4) green waste sites may be used, (5) disposal of construction waste at COH transfer stations is prohibited and (6) a solid waste management plan submittal to the SWD is required.

<b>Department of Parks and Recreation</b>	
Contact:	Ms. Patricia G. Engelhard , Director
Address:	Aupuni Center 101 Pauahi Street, Suite 6 Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Department of Water Supply</b>	
Contact:	Mr. Milton Pavao, Department Head
Address:	345 Kekuanaoa Street, Suite 20 Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Fire Department</b>	
Contact:	Mr. Darryl J. Oliveira, Fire Chief
Address:	25 Aupuni Street Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence.
30 Dec 2007	Response received. Refer to <b>Appendix B</b> for response.
Summary:	The reviewing agency responded with no comments.

<b>Hawai'i County Council</b>	
Contact:	Mr. Pete Hoffman, Council Chair
Address:	64-1067 Mamalahoa Hwy, Suite C-5 Kamuela, HI 96743
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Mayor Harry Kim</b>	
Contact:	Mayor Harry Kim
Address:	25 Aupuni Street, Room 215 Hilo, Hawai'i 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Police Department</b>	
Contact:	Mr. Lawrence K. Mahuna, Police Chief
Address:	349 Kapiolani Street Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence.
20 Dec 2008	Response received. Refer to <b>Appendix B</b> for response.
Summary:	Proposed project does not appear to impact any of the existing or proposed Police Department projects, plans, police, or programs. Only concern is to ensure adequate parking for staff as the plan calls for in the Communications-Dispatch staff to be relocated to the proposed Dispatch Building.

<b>Planning Department</b>	
Contact:	Mr. Chris Yuen, Department Head
Address:	Aupuni Center 101 Pauahi Street, Suite 3 Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

**2.4 COMMUNITY**

**2.4.1 ORGANIZATION LIST**

Hawaiian Telcom  
 Hawai'i Electric Light Company (HELCO)  
 Hawai'i Natural Heritage Foundation (HNHF)  
 Hawai'i's 1000 Friends  
 Historic Hawai'i Foundation (HHF)  
 The Nature Conservancy (TNC)  
 Oceanic Time Warner Cable  
 The Outdoor Circle  
 University of Hawai'i at Manoa Environmental Center  
 Mrs. Pualani "Pua" Kanaka'ole Kanahele  
 Mr. Punahele "Puna" Lerma  
 Mrs. Chiyomi Leina'ala Fukino, M.D.  
 Hilo Hawaiian Civic Club  
 Native Hawaiian Legal Corporation

**2.4.2 CONTACT INFORMATION AND SUMMARY**

<b>Hawaiian Telcom</b>	
Contact:	Director
Address:	1177 Bishop Street Honolulu, HI 96813
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Hawai'i Electric Light Company</b>	
Contact:	Director
Address:	1200 Kilauea Avenue Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Hawai'i Natural Heritage Foundation</b>	
Contact:	Mr. Roy Kam, Database Manager
Address:	3050 Maile Way, Gilmore Hall, Suite 406 Honolulu, HI 96822
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Hawaii's 1000 Friends</b>	
Contact:	Donna Wong, Executive Director
Address:	25 Maluniu Avenue, Suite 102#282 Kailua, HI 96734
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Historic Hawai'i Foundation</b>	
Contact:	Ms. Kiersten Faulkner, Executive Director
Address:	680 Iwilei Road, Suite 690 Honolulu, HI 96817
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>The Nature Conservancy</b>	
Contact:	Mr. Jeff Mikulina, Director
Address:	923 Nuuanu Avenue Honolulu, HI 96817
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Oceanic Time Warner Cable</b>	
Contact:	Director
Address:	1257 Kilauea Avenue Hilo, HI 96720
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>The Outdoor Circle</b>	
Contact:	Ms. Kathy Whitmire, President
Address:	1314 South King St., Suite 306 Honolulu, HI 96814
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>University of Hawai'i at Manoa Environmental Center</b>	
Contact:	Dr. John T. Harrison, Ph.D., Environmental Coordinator
Address:	2500 Dole St., Krauss Annex 19 Honolulu, HI 96822
17 Dec 2007	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Mrs. Pualani "Pua" Kanaka'ole Kanahele</b>	
Contact:	Mrs. Pualani "Pua" Kanaka'ole Kanahele
Address:	Ke Po'ohala (Hawaiian Life Styles Department) Hawai'i Community College Building 380, Room 34 200 West Kāwili Street Hilo, HI 96720
8 Jan 2008	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Mr. Punahale "Puna" Lerma</b>	
Contact:	Mr. Punahale "Puna" Lerma
Address:	Pua Lane 71 Banyan Drive Hilo, HI 96720
9 Jan 2008	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Mrs. Chiyomi Leina'ala Fukino, M.D.</b>	
Contact:	Mrs. Chiyomi Leina'ala Fukino, M.D.
Address:	1250 Punchbowl St. Honolulu, Hawai'i 96813
8 Jan 2008	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Hilo Hawaiian Civic Club</b>	
Contact:	President
Address:	PO Box 543 Hilo HI 96721
11 Jan 2008	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

<b>Native Hawaiian Legal Corporation</b>	
Contact:	Native Hawaiian Legal Corporation
Address:	1164 Bishop Street, Suite 1205 Honolulu, HI 96813
11 Jan 2008	Consultation Request Letter sent, refer to <b>Appendix A</b> for copy of correspondence. Response pending.

## SECTION 3

### PROJECT DESCRIPTION

#### 3.1 PROJECT NEED AND OBJECTIVE

The County of Hawai'i Fire Department (HFD) is responsible for a wide range of services critical and essential to the well-being of people of the County. These services include fire protection and prevention, on-site emergency medical services, land and sea search and rescue and hazardous materials response. As part of its public services responsibilities, the HFD takes an active role in reducing risk and minimizing hazards in general in the County by providing public education, awareness and emergency preparedness programs.

The HFD consists of a number of operation units in two main divisions with facilities spread out over different locations that act to support its responsibilities. Those two divisions and operational units are:

- (1) Emergency Operations Division and
- (2) Support Services Division consisting of the Emergency Medical Services (EMS) Bureau, Training Bureau (includes the Company/Training Recruit Section and Volunteer Training Section), Fire Prevention Bureau, Auxiliary Services Bureau (includes the Communication Section, Logistics/Supply Section and Apparatus/Equipment maintenance Section) and Administrative Services.

The HFD currently employs a staff of about 43 personnel in its administrative units among several facilities units throughout Hilo. This administrative staff estimated to increase to about 52 personnel by the year 2027. Inherent coordination and operational difficulties arise due to the dispersed nature of the administrative facilities. The HFD prides itself with being a progressive and proactive agency that seeks news ways to better serve the County community.

The HFD proposes to consolidate its facilities by developing a Fire Administration Support Complex (FASC). Such a facility would help to eliminate the existing inefficiencies from having separate facilities, and would provide a centralized access point for the public to share its concerns with the HFD.

This Environmental Assessment (EA) discusses possible environmental impacts the proposed project may have on the existing site and presents prospective mitigative strategies for any potential adverse impacts the project may generate. The proposed development covered in this EA represents the initial and future phases of the development of the administration support complex. The information discussed in this document is based upon the findings presented in previous reports including published annual reports by the HFD and other offices of the COH and the COH Preliminary Architectural Program for the proposed FASC.

#### 3.2 PROJECT HISTORY AND DESCRIPTION

##### 3.2.1 PROJECT HISTORY

The various facilities housing the different HFD administrative units were constructed over a number of years, and staff levels have steadily grown over that period of time. The HFD recently recognized a need to consolidate its administration personnel into a single complex located in Hilo. General planning and allocation of funds for the FASC

began in July 2007. The more detailed planning and the design phase of the project began in September 2007. The final design phase of the project will occur concurrently with the environmental review process. Construction will not commence until the completion of the environmental review process.

### **3.2.2 PROJECT DESCRIPTION**

M&E Pacific, Inc. (M&E) was contracted by the lead consultant Anbe, Aruga & Ishizu, Architects, Inc. (AAI) in December 2007 on behalf of the COH to conduct an EA, conduct a Traffic Impact Assessment Report (TIAR) and to complete the Special Permit (SP) for the proposed FASC.

The proposed site for the FASC is on the Mohouli Street extension just west of the Komohana Street in Hilo ultimately consisting of the following buildings and facilities:

- (1) Fire Administration Building
- (2) Emergency Dispatch Building
- (3) Fire Preparation & Training Building
- (4) Museum
- (5) Covered Training Area
- (6) Warehouse
- (7) Fire Station
- (8) Radio Tower for Emergency Dispatch Use

Existing County water service is available along Mohouli Street, and a County wastewater main and service is available in an adjacent subdivision north of the site. A location map of the project area is shown in **Figure 3.1**. A photograph of the existing project site is shown in **Figure 3.2**.

Only the Fire Administration Building and Emergency Dispatch are planned for the initial phase of the project. A conceptual site map of the project area for this initial phase is shown in **Figure 3.3**. The other facilities are planned as a future expansion of the complex. This environmental assessment will determine the impacts of the entire site buildout.

An accessible route will be provided for access to all proposed facilities. Accessible parking will be provided near the all three proposed buildings.

Insert Figure 3.1

**Figure 3.1: Project Vicinity Map**

Insert Figure 3.2

**Figure 3.2: Existing Project Site**

Insert Figure 3.3

**Figure 3.3: Conceptual Site Plan**

### **3.3 PROJECT COST AND DURATION**

The budget of the initial phase of project construction is currently \$14.6 million. The construction budget for access roadway and sewerline installation is anticipated to be 1.5 million. The consulting budget at the time this report is being written is anticipated to be \$1 million. This project is wholly funded by the COH with no funding from the State of Hawai'i or the federal government. Construction is expected to commence in mid- to late 2008 and last 18 months.

### **3.4 PURPOSE OF ENVIRONMENTAL ASSESSMENT**

This EA results from the use of State lands and County funds, and the location of the project site within an agricultural-use area.

In accordance with Chapter 343 of the Hawai'i Revised Statutes and the Department of Health's Hawai'i Administrative Rules Title 11-200, an EA is required to provide a written evaluation of environmental, technical, social, and economic aspects of the proposed FASC development. The EA identifies potential project impacts and their significance, and develops strategies to mitigate those impacts. The EA then compares all aspects and impacts against 13 significance criteria listed in §11-200-12 to provide a determination as to whether an Environmental Impact Statement EIS is required.

The EA process includes periods of public review, in which the affected community may voice their comments and concerns to the proposed work. If the EA establishes that the proposed activity will not affect the surrounding environment to a significant degree, the agency will issue a Finding of No Significant Impact (FONSI). Should the analysis indicate that a significant impact will be experienced due to the proposed activity; the agency must then prepare an EIS, which is a more detailed evaluation of the proposed action and alternatives.

### **3.5 ALTERNATIVES CONSIDERED**

#### **3.5.1 NO ACTION**

The "No Action" alternative entails the decision to not construct the proposed FASC. Therefore, this alternative will not incur any physical or social effects on the environment or benefits to the County Community and would not require further costs for planning, design, and construction by the State.

This project is part of the HFD plan for improved efficiency and quality of public service to the people of the County and is proposed because the current condition of a fractured geography of facilities brings inherent inefficiencies to HFD operations. Quality of service especially in the areas of emergency dispatch and public interaction and feedback would benefit greatly from the development of the FASC. Construction of the proposed facility is anticipated to increase efficiency in HFD and HPD service to the community and improve their response time by providing a centralized base of operations. The benefits from constructing the proposed FASC are greater than any negative issue identified in this EA. Therefore, the "No Action" alternative is not the preferred alternative.

#### **3.5.2 CONSTRUCTION OF THE FIRE ADMINISTRATION, EMERGENCY DISPATCH AND FIRE PREPARATION & TRAINING BUILDINGS**

A possible alternative construction alternative could entail the decision to develop the three primary buildings of the site (i.e. the Fire Administration, Emergency Dispatch and Fire Preparation & Training Buildings) in phases. In terms of public safety the emergency dispatch facility could be ranked as the most important followed by the fire administration

facility. However, the infrastructure of the site, that is the parking, lighting and utilities, should be constructed with the first building of any possible scenario to keep overall environmental effects to the area to a minimum.

### **3.5.3 ALTERNATIVE SITE**

The last alternative is the construction of the FASC at an alternate site. The potential impacts of the complex being relocated to an alternate site depend on the existing condition of the alternate site.

If the alternate site is at a previously developed site, then the site would probably have minimal environmental impacts. Existing infrastructure including driveways, water, sewer, electrical and TV/cable would probably be in place. The relocation of the FASC to a developed site would also have minimal impacts on drainage since the existing site would consist of impervious cover. Impacts on floral and fauna would also be reduced.

Relocation of the project to another undeveloped site would have similar impacts as the currently proposed site. An alternate site, either developed or undeveloped, would require funds to acquire the site rather than at the currently proposed location that will involve government land transfer. An alternate site location may also not be as ideal as the current site. The current site is centrally located and between existing Fire Department facilities.

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## SECTION 4

### DESCRIPTION OF ACTION'S TECHNICAL, ECONOMIC, SOCIAL AND ENVIRONMENTAL CHARACTERISTICS

#### 4.1 TECHNICAL

The proposed FASC site is currently undeveloped, and no development has previously occurred on the site. The portion of Mohouli Street extension fronting the site from Komohana Street up to Kukuau Street was constructed in 2000–2001. The proposed FASC will ultimately consist of the following main structures: Administration Building, Emergency Dispatch Building, Training Building, Museum, Outdoor Covered Training Area, Warehouse, Fire Station and Radio Tower.

Utilities to support the site shall consist of electricity, water, sewer, stormwater drainage, communication, cable television and telephone. The water service lateral is in place, but all other utility laterals or secondaries will have to be installed. All utility laterals will connect to their respective mains at the front of the site, but the sewer lateral connection will have to be connected at the back of the complex. A utility and access easement will be defined to protect and facilitate the maintenance of the proposed sewer lateral.

Other facilities including parking lot paving, site lighting and landscaping will be installed to support the complex. The parking lot shall be sufficient to handle the roughly forecasted number of 52 future employees and the visitors estimated to use the complex.

#### 4.2 ECONOMIC

This project is entirely funded by the County of Hawai'i. This project is not anticipated to cause an increase in taxes to the general public. The development of the proposed FASC shall provide the HFD with the opportunity to consolidate and improve the efficiency of their operations. The County of Hawai'i Police Department (HPD) will also benefit from the facilities in the Emergency Dispatch Building as they will be allowed to utilize the facilities.

#### 4.3 SOCIAL

The proposed FASC will enable the HFD to improve its operational efficiency and quality of services rendered to the public. The HFD should be able to streamline administrative responsibilities such as immediate and long-term planning. The FASC will also provide the public with a dedicated access point for it to share its concerns with the Department, thus making the social benefit mutual between the Department and the public. A great benefit for the public will be the new emergency dispatch facility which will be jointly used by both the HPD and HFD. Emergency response time may improve and the communication between the two emergency service providers and the party in need will be clearer. The long-term planned development including the HFD Museum will also improve the quality of the community by providing the public with an additional education venue. The proposed fire station would also provide a great public benefit to the surrounding area. The Central and Kaumana Fire Stations are nearest to the proposed site and are about 1½ miles away. The centralized base of operations that the project provides will improve the efficiency and response time for both the HFD and HPD. This results in better service and increased safety for the community.

#### **4.4 ENVIRONMENTAL**

As presented in subsequent sections of this Environmental Assessment, construction of the proposed FASC is not anticipated to adversely affect the overall environmental quality of the area. Potential impacts to the environmental integrity of the project site and the surrounding areas will be sufficiently mitigated through appropriate design methods, site grading and drainage features, the use of site-specific Best Management Practices (BMPs), the use of proper erosion control methods and environmentally-conscious construction methods.

Short-term construction related impacts are expected from this project. These impacts and the recommended approaches to mitigate their effects are discussed in the following sections of this EA.

No long-term adverse impacts due to FASC are expected. These issues are examined in detail in the subsequent sections of this EA.

## SECTION 5

### AFFECTED ENVIRONMENT, ANTICIPATED EFFECTS, AND PROPOSED MITIGATIVE MEASURES

#### 5 AFFECTED ENVIRONMENT

##### 5.1 PHYSICAL

##### 5.1.1 LOCATION

The project is located on eastern side of the Island of Hawai'i within the South Hilo District. The parcel is identified as the State of Hawai'i Third (3<sup>rd</sup>) Tax Division, Tax Map Key (TMK) 2-4-001: Portion (Por.) 168. The parcel is approximately thirty (30) acres and is subdivided into three (3) lots; Lot 1, Lot 2, and Lot 3. The Lots are approximately 9.1 acres, 5.0 acres, and 15.9 acres, respectively. The proposed project is located on Lot 2 (approximately 5 acres). The parcel borders Mohouli Street between Komohana Street to Kukuau Street.

The project is surrounded by Waiākea Pasture Land to the south, Sunrise Estates Subdivision to the west, Sunrise Ridge Subdivision and Pacific Heights Subdivision to the north, and University Heights Subdivision to the east. The University of Hawai'i at Hilo is southwest of the project site. The parcel borders Mohouli Street between Komohana Street to Kukuau Street as shown on the project location map (**Figure 3.1**).

##### 5.1.2 CLIMATE

###### **Description:**

According to the Western Regional Climate Center, the average temperature at the nearby Hilo 86A station is 72.9°F with average minimum and average maximum monthly temperatures ranging from 65.8°F and 80.0°F, respectively. The annual rainfall averages approximately 133 inches.

As described in the *Atlas of Hawai'i*, Third Edition (1998), there are two generally recognized seasons in Hawai'i, the *kau* or the warm season when the sun is almost directly overhead and northeasterly tradewinds are present, and the *ho'oilo* or the season of cooler temperatures, lower sun, more variable winds and extensive rains. The northeasterly tradewinds predominate during the summer months (May through September), and weaken during the winter (November through March) when southerly or westerly winds occur due to localized low pressure and frontal systems.

Located on the windward side of the Island of Hawai'i, Waiākea is exposed to northeasterly trade winds during the day and southwesterly winds in the evening. The mean wind speed is approximately seven (8) miles per hour.

###### **Impacts and Mitigative Measures:**

As the site is relatively, small and flat and does not represent a regional impact to the climate, no short-term or long-term adverse impacts to the climate are anticipated in the project area. Therefore, no mitigative measures are required.

##### 5.1.3 AIR QUALITY

Ambient air quality refers to the state of purity of the general outdoor atmosphere. Ambient air quality is regulated under the Clean Air Act. The US Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants as a measure of ambient air quality. These six criteria pollutants

include carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone and particulate matter less than or equal to 10 micrometers (PM<sub>10</sub>). In addition, the State of Hawai'i established standards for carbon monoxide and nitrogen dioxide that are more stringent than Federal standards as well as an additional ambient air standard for hydrogen sulfide (HIAAQS). **Table 5-1** summarizes the Federal and State Air Quality Standards.

**TABLE 5-1  
 NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS**

Pollutant	Averaging Time	NAAQS (µg/m <sup>3</sup> )	HI AAQS (µg/m <sup>3</sup> )
<b>Carbon Monoxide</b>	1-hour	40,000	10,000
	8-hour	10,000	5,000
<b>Nitrogen Dioxide</b>	Annual	100	70
<b>Sulfur Dioxide</b>	3-hour	No Standard	1,300
	24-hour	365	365
	Annual	80	80
<b>Lead</b>	Quarterly	1.5	1.5
<b>Ozone</b>	8-hour	157	157
<b>PM<sub>10</sub></b>	24-hour	150	150
	Annual	50	50
<b>Hydrogen Sulfide</b>	1-hour	No Standard	35

Source: Hawai'i Department of Health, December 2002

There are five air monitoring stations on the Island of Hawai'i; one of which is in Hilo. The Hilo station only monitors the air for sulfur dioxide (SO<sub>2</sub>). According to the State of Hawai'i Department of Health (DOH) 2006 Annual Summary of Hawai'i Air Quality Data, there have been no occurrences for the 3-hour sulfur dioxide readings that were greater than 1300 µg/m<sup>3</sup>. In fact, in recorded history, the top two readings within a single year were 451 µg/m<sup>3</sup> and 405 µg/m<sup>3</sup>. There were also no occurrences for the 24-hour sulfur dioxide readings that were greater than 365 µg/m<sup>3</sup>. The two highest readings were 161 µg/m<sup>3</sup> and 96 µg/m<sup>3</sup>. The average 3-hour and 24-hour sulfur dioxide daily reading is 8 µg/m<sup>3</sup>.

***Impacts and Mitigative Measures:***

The principle sources of air pollution associated with this project will be fugitive dust emissions resulting from construction activities. These effects are short-term in nature and will cease upon completion of the proposed project. No long-term effects on air quality due to the operation of construction equipment or vehicles are anticipated as their presence and use will be temporary. Dust mitigative measures, such as water spraying, dust fences and screens shall be considered under the Best Management Practices (BMPs) during the construction phase.

A temporary increase in exhaust emissions from construction equipment and vehicles is anticipated in the project area during construction; however, this increase is expected to be relatively insignificant due to the rapid dispersal caused by the local winds.

No cumulative effects on air quality are anticipated due to the temporary nature of the construction activity. No long-term mitigative measures are required.

#### 5.1.4 TOPOGRAPHY

**Description:**

The Lot 2 of the parcel is located in a mildly hilly area. The ground elevation ranges from approximately 330 ft to 345 ft above mean sea level.

**Impacts and Mitigative Measures:**

Construction work will involve some earthwork grading and paving. Although the proposed project will slightly modify the site's existing topography and increase the impermeable area due to pavement and concrete structures and buildings, the overall drainage pattern will be maintained. Any additional overland flow anticipated due to the site grading and/or paving will be addressed and appropriately discharged as per State and County requirements through the use of drywells that dispose runoff on-site. Thus the project will not increase runoff from the site from the existing condition.

#### 5.1.5 SOILS

**Description:**

According to the United States Department of Agriculture, Natural Resources Conservation Service's Web Soil Survey, the soil in the parcel is Keaukaha (rKFD) and Pahoeheo (rLW). Keaukaha is extremely rocky muck with 6 to 20 percent slopes and Pahoeheo is lava flows with slopes from 0 to 40 percent. Refer to the soils map, **Figure 5.1**. Generally, the land at the site consists of a very rocky soil capable of supporting a natural growth consisting primarily of 'ōhi'a trees and uluhe ferns.

The lava flow of 1881 covers most of the site. Only the back portion of the lot away from Mohouli Street is not covered by the flow.

**Impacts and Mitigative Measures:**

No short-term or long-term adverse impacts to the soils are anticipated in the project vicinity. Therefore, no mitigative measures are required. The proposed fixed structures will be designed in accordance with the existing soil condition as recommended by the Geotechnical Engineer. Soil erosion will be prevented during construction through the use of appropriate BMPs (grassing, mulching, silt fence, erosion mats, gravel, etc.) and construction methods. Excavated soil will be either utilized or disposed of in conformance with current Federal, State, and County regulations. Long-term soil erosion is not anticipated as a result of this project.

#### 5.1.6 WATER RESOURCES

**Description:**

The project area lies within the Hilo aquifer system, which has a sustainable yield of approximately 347 million gallons per day (mgd). A map of the aquifer systems and sustainable yields for the Island of Hawai'i is presented in **Figure 5.2**. According to the United States Environmental Protection Agency's "Sole Source Aquifer Designations," there are no sole source aquifers on the Island of Hawai'i.

According to the 2005 County of Hawai'i General Plan (General Plan), the Hilo Water System supplies South Hilo with three surface and groundwater sources. The three sources are Olaa Flume Source, Panaewa Well, and Piihonua Well. The General Plan states that an average of approximately 6.0 million gallons per day (mgd) is consumed and the total normal capacity is greater than 20 mgd.

An existing County of Hawai'i Department of Water Supply (DWS) water main runs along Mohouli Street just south of Lot 2 site. The existing ductile iron water main is 12-inches in diameter.

***Impacts and Mitigative Measures:***

The proposed facilities, showers, and other potable water sources will be serviced by the 12-inch water main. The proposed facilities are anticipated to have a minimal impact on the water supply or demand of other DWS customers in the Waiākea area.

**5.1.7 WATER QUALITY**

***Description:***

The project site is near two streams, Alenaio Stream and Waiākea Stream. Both streams are classified as Class 2 inland water. The Waiākea Stream flows into the Waiākea Fishpond, then Wailoa River State Park, and finally into the Hilo Bay. Waiākea Fishpond is classified as Class AA marine water, and Hilo Bay is classified as Class A marine water. These waters are not to receive any discharges that have not received the best degree of treatment or control compatible with the criteria established for this class.

***Impacts and Mitigative Measures:***

Construction activities described may temporarily affect the water quality of the streams. Construction debris will be properly collected and disposed of as required by current Federal, State, and County regulations.

To minimize and isolate any decrease in water quality, the construction Contractor may be instructed to monitor the water quality as required by the State of Hawai'i Department of Health, and will be required to install and maintain adequate BMPs and employ appropriate construction methods to prevent construction storm water discharge from entering the state waters.

The disturbed area during construction will exceed one acre; therefore, a National Pollution Discharge Elimination System (NPDES) Permit Notice of Intent (NOI) Form C for Stormwater Associated with Construction Activities from the State of Hawai'i Department of Health (DOH) will be required. Other NOIs will be obtained as required by construction methods used for this project. Stormwater runoff from the construction site will be controlled using the appropriate construction methods and BMPs, such as mulching, grassing, silt fences, graveled ingress and ingress and inlet filters at existing catch basins and drain inlets. Dust nuisance may be mitigated through the use of dust screens and regular watering with trucks.

Stormwater runoff at the project site is anticipated to increase with the installation of the proposed facilities, due to the site grading, pavement and concrete structures. Any increase in runoff will be appropriately discharged to unpaved areas with high percolation rates where feasible. Should local sump areas develop with the installation of the proposed improvements, they may be discharged through the use of shallow drywells. The existing overall drainage pattern, however, will be maintained with this project.

Any potential impacts to the water quality will be properly mitigated as recommended above.

**Insert Figure 5.1**

Figure 5.1: Soils Map

**Insert Figure 5.2**

Figure 5.2: Island of Hawai'i Aquifer Systems

### **5.1.8 NATURAL HAZARDS**

Natural hazards in Hawai'i include floods, hurricanes, volcanoes and earthquakes. Existing conditions about these natural hazards and potential effects on these hazards due to proposed project are described as follows.

#### **5.1.8.1 Floods**

***Description:***

The project site is located in Zones A and X, as determined by the US Federal Emergency Management Agency (FEMA) on the Flood Insurance Rate Map (FIRM) Community Panel 155166 0880C (revised September 16, 1988). Zone A regions are special flood hazard areas inundated by 100-year flood. Zone X regions are classified as other areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood or areas determined to be outside 500-year flood plain. See the FIRM map, **Figure 5.3**.

***Impacts and Mitigative Measures:***

The majority of the project area is within flood Zone X (500-year flood area) and a small portion of the project area is within flood Zone A (100-year coastal flooding zone). The proposed project will not have any short-term or long term impacts on existing flood zones. Therefore, no mitigation measures are required. The project will not worsen the potential for flooding of the site and its surrounding areas. The project is relatively flat and regionally small and will not impact the climate. Additionally, existing drainage patterns will be preserved and any increase in surface runoff will be contained within the site and disposed of in injection drywells. Thus runoff from the site to adjacent properties will not be increased from the existing condition.

**Insert Figure 5.3**  
Figure 5.3: FIRM

### 5.1.8.2 Hurricanes

#### **Description:**

Hawai'i is subject to the threat of approaching tropical storms and hurricanes. The first hurricane officially recorded in Hawai'i (Hiki) occurred in 1950. Newspaper accounts and meteorological data collection indicate that storm systems occur more frequently in Hawaiian waters than previously thought (Atlas of Hawai'i, 1998). More recently, Hurricanes 'Iwa (1982) and 'Iniki (1992) struck the Hawaiian Islands.

Hawai'i remains vulnerable to hurricanes, although they are rare events. These storms bring very heavy rains that may contribute to soil and slope instability, and high winds that contribute to surf hazards.

#### **Impacts and Mitigative Measures:**

Modifications to the project site will not affect the climate in the vicinity of the project area as discussed in Section 5.1.2 since the relative scale of the site is small and does not affect the region of the area. The proposed facility features will be designed and constructed to best minimize damage during tropical storm, hurricane, or strong wind events.

### 5.1.8.3 Volcanic Eruptions

#### **Description:**

There are four active volcanoes on the Island of Hawai'i. Kilauea is an active volcano that has been continuously erupting since January 1983. Kilauea is located outside of the project region to the north. Mauna Loa last erupted in 1984. The Lo'ihl volcano last erupted in 1996, and Hualalai last erupted in 1801 and is expected to erupt again within the next 100 years.

The project area is located on the northeast slope of Mauna Loa, roughly 36 miles northeast of the Mauna Loa summit and 26 miles southeast of the Mauna Kea summit. The lava hazard to the project site is posed by Mauna Loa. The project area is in lava hazard zone 3 on an ascending scale of risk from 9 to 1, as determined by the United States Geological Survey (USGS). The lava flow hazard zones are based on the location of eruptive vents, past lava flow coverage, and topography. A map of the lava hazard zones for the Island of Hawai'i is presented as **Figure 5.4**. Zone 3 areas are areas in which 15 to 25 percent of the area has been covered by lava since 1800 and 15 to 75 percent of the area have been covered by lava in the last 750 years.

#### **Impacts and Mitigative Measures:**

The probability of volcano eruption occurrence in the project region is slim as an eruption has not been recorded for the area for over 2 decades. Project construction will not affect or worsen the probability of volcanic eruption occurrence. The proposed facilities will comply with current regulatory design standards.

### 5.1.8.4 Earthquakes

#### **Description:**

Earthquakes in Hawai'i typically result from magmatic migration underground. As there are four volcanoes currently classified as "active," future earthquakes associated with underground lava movements are expected. There have been 23 large earthquakes with a magnitude of 6.0 or greater recorded since 1868 (Atlas of Hawai'i, Third Edition, 1998 and Volcanic and Seismic Hazards on the Island of Hawai'i, USGS, 1997), the most recent occurring in October 2006 (6.7 magnitude).

**Insert Figure 5.4**

Figure 5.4: Island of Hawai'i Lava Hazards

Large earthquakes of this magnitude can cause structural damage to non-reinforced buildings and can cause coastal subsidence. The entire Island of Hawai'i is designated as Seismic Zone 4, based upon the United Building Code's (UBC) seismic zone criteria that ranges from 0 to 4, with 0 being the lowest risk and 4 being the highest risk.

Research suggests that many of the significant earthquakes on the Island of Hawai'i have resulted from the seaward sliding of the south flanks of Kilauea and Mauna Loa along a nearly horizontal fault. This fault is thought to be the buried boundary between the ancient oceanic crust and the volcanic edifice, approximately 6 miles deep. Earthquakes resulting from fault include the November 1972 magnitude 7.2 Kalapana earthquake which resulted in the loss of two lives, caused considerable damage, and generated a tsunami that inundated the Kau and Puna coastlines.

***Impacts and Mitigative Measures:***

The project structures will be designed to meet seismic requirements for the region. Project construction will not affect or worsen the probability of earthquake occurrence or severity. The proposed project will comply with the current regulatory design standards.

**5.1.9 FLORA AND FAUNA**

***Description:***

Several flora and fauna surveys were conducted recently for undeveloped agriculturally zoned sites near the site. The closest and most recent survey was conducted for the Final Environmental Assessment (FEA) for the US Department of Agriculture (USDA) Pacific Basin Agricultural Research Center project. The USDA research center site is located about 2,000 feet to the south of the proposed FASC site. Both the USDA research center and FASC sites were undeveloped prior to development.

Char & Associates conducted the flora survey in May 2000 and March 2001 of the USDA research center site and is available from the OEQC for reference. The survey found large tracts of natural growth that consisted primarily of ohia lehua (*Metrosideros polymorpha*), uluhe ferns (*Dicranopteris linearis*), strawberry guava (*Psidium cattleianum*), and melastoma (*Melastoma candidum*). The undeveloped site also had guava (*Psidium guajava*), hala (*Pandanus tectorius*), gunpowder tree (*Trema orientalis*), melochia (*Melochia umbellata*), and king palm (*Archontophoenix alexandrea*). The ohia trees on the proposed FASC site appeared to be 15 to 30 feet tall, and the flora listed above are most likely present on the proposed site.

The survey for the USDA research center site noted that 23 native plants on the site. Seventeen were indigenous (native to the Hawaiian Islands and elsewhere) and the remaining 6 were endemic (native to the Hawaiian Islands and not found anywhere else). The endemic species were the ohia, amau (*Sadleria pallida*), hapuu (*Cibotium glaucum*), wahine noho mauna (*Adenophorus tamariscinus*), neneleau and ahaniu or uki (*Machaerina mariscoides ssp. meyenii*). These native species are not rare, threatened or endangered.

Rana Productions, Ltd. conducted the fauna survey for the USDA research center in December 2001. Eight bird species were observed during the survey. All species were alien in Hawai'i. Three species of mammal were observed during the survey, and as in the case of the bird species, all species were alien in Hawai'i. The Hawai'i Natural

Heritage Program (HNHP)<sup>1</sup> was also consulted (see **Appendix A**), and while a review of their database records determined that no threatened or endangered species have been recorded within the site.

Consultation with the United States Department of the Interior Fish and Wildlife Service (FWS) revealed that the federally endangered Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*) is known to occur in the vicinity of the project area. Additionally, the FWS indicated that several species which are not listed under the Endangered Species Act but are protected under the Migratory Bird Treaty Act may transit the area. These birds may fly through the area while traveling to or from their montane nesting areas, however they not known to inhabit the area encompassing the site. The FWS further suggested that the endangered Hawaiian hoary bat or 'ope'ape'a (*Myotis a. auropunctatus*) may use resources within the proposed FASC site even though they were not observed in the survey for the USDA research center. Likewise, endangered native bird species such as the Hawaiian hawk or i'o, short-eared owl or pueo, dark-rumped Petrel or ua'u (*Pterodroma phaeopygia sandwichensis*) and Newell's Shearwater or 'a'o (*Puffinus auricularis newelli*) not observed in the survey may also use the resources within the proposed site.

Correspondences related to the flora and faunal consultations are provided in **Appendix A**.

**Impacts and Mitigative Measures:**

The development of the proposed FASC would not have a significant adverse impact on the flora present within or in the vicinity of the project site. No rare, threatened or endangered species of plants were found.

The existing larger ohia tree could be incorporated into the proposed landscaping plans were feasible. Native plants could also be considered for the landscaping of the site. Botanists, horticulturalists or others familiar with growing native species in the Hilo area could be contacted for a list of native plants suitable for landscape use.

The FWS raised concerns that the night-flying birds, especially those protected by the Migratory Bird Treaty Act, may become disoriented from the bright lights of the proposed site lighting elements, which may cause them to land in an area where they are vulnerable to vehicle collisions and non-native predators. Additionally, the FWS is concerned that the migrating birds may collide with the light poles while in flight. To minimize the potential effect upon the birds, all lighting associated with the proposed facilities will be designed to be shielded downward so that the bulb is not visible at bulb height from the side. The lights will be mounted on the shortest poles possible, and the poles will not extend above the height of surrounding existing vegetation of approximately 30 feet. The design will also specify that bulbs with the lowest wattage possible be used with the lighting elements. The use of lights at night during the peak seabird fallout period from September 15 to December 15 will be avoided, and personnel will be educated regarding seabird fallout. These mitigative strategies will help to minimize the potential disorientation of the birds, and will minimize possible collision of the birds with the light poles, as recommended by the FWS. The radio tower being constructed in association with this project may pose a flight hazard to seabirds and we

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<sup>1</sup> The Hawai'i Natural Heritage Program database is compiled based upon on the research and observations of scientists and individuals, and is not necessarily a result of comprehensive site-specific field survey.

are in the process of consulting the FWS for further information. The 'ope'ape'a should not have a problem of colliding with vehicles buildings, communication towers or light poles as the mammals use ultrasonic echolocation to navigation.

Bat surveys will be conducted in areas where the project calls for the cutting or removal of trees. If Hawaiian hoary bats are found in the area, the FWS will be contacted for information on how to address potential impacts to the hoary bats. Disturbing trees in areas where bats occur during the April through August breeding season will be avoided, because bat pups can be found in nursery trees during those months. Use of barbed wire fences will be minimized, as bats can be harmed by them.

The FWS also raised concerns that vegetation clearing during the March through September Hawaiian hawk breeding season may result in impacts to hawk nests. If surveys of the area indicate the presence of nesting hawks where brush and tree clearing are proposed during the breeding season, the FWS will be contacted for information on how to avoid adversely impacting the hawks.

#### **5.1.10 VISUAL**

##### ***Description:***

The project site is located near several residential subdivisions and the Waiākea Forest Reserve. The project site is located on an undeveloped parcel near a few paved streets.

##### ***Impacts and Mitigative Measures:***

This project includes Fire Administration, Emergency Dispatch, and Fire Preparation and Training Buildings, offices, paved parking area and access road, a court yard, a training area, and a radio tower. These facilities and structures are relatively flat and will conform to agency height restrictions and guidelines.

Construction activities will disrupt aesthetic qualities temporarily. Disruptions will be minor and short term and will result primarily from activities associated with the installation of the proposed facilities. The facilities will be designed to minimize its impact on the natural beauty of the site.

## **5.2 SOCIAL**

### **5.2.1 CULTURAL RESOURCES**

##### ***Description:***

According to the State Historic Preservation Department's (SHPD's) Hawai'i National Register of Historic Places no historical or archeological site are located within the project area.

To supplement this finding, the following organizations were contacted. No comments or reservations have been received at this time.

Department of Hawaiian Homelands  
Hawai'i Natural Heritage Program  
Office of Hawaiian Affairs

Copies of the consultation requests and responses received are provided in **Appendix A**.

***Impacts and Mitigative Measures:***

The proposed project will not result in an adverse impact to the site as a historical cultural resource, nor will it impact the historical or cultural integrity of the surrounding areas. No significant short-term or long-term impacts are anticipated, therefore, no mitigative measures are required.

**5.2.2 CULTURAL IMPACT ASSESSMENT**

***Description:***

In accordance with policy of the State of Hawai'i under Chapter 343, HRS, a Cultural Impact Assessment (CIA) is included in this EA to promote responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the State require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

To assess the cultural practices, values and characteristics associated with the project area, informants knowledgeable with the history, use and culture of the area were interviewed. A total of 5 entities, referred by the Office of Hawaiian Affairs (OHA) in Hilo as being cultural resource contacts, were interviewed via correspondence in January 2008, to obtain a broad range of cultural resource perspectives about the area and acquire a wide range of viewpoints about the potential project impacts on cultural features. These interviewees are as follows:

- (1) Mrs. Pualani "Pua" Kanaka'ole Kanahale
- (2) Mr. Punahale "Puna" Lerma
- (3) Mrs. Chiyomi Leina'ala Fukino, M.D.
- (4) Hilo Hawaiian Civic Club
- (5) Native Hawaiian Legal Corporation

In addition to identifying cultural practices, relevance and history of the project site and its surrounding areas, the informants were asked about their knowledge of any native, endangered or threatened floral and faunal species; archaeological and historic properties or sites; aesthetic or visual resources; mauka-makai or other traditional accesses; and, socio economic value associated with the project site. The discussions helped to determine potential impacts to these resources that the proposed project may have, and identified any concerns that the individual has about the project undertaking and any of its features.

All informants anticipate minimal or no impacts on any cultural; visual; or native, threatened, or endangered floral or faunal resources by the project. Similarly, they also anticipate no impacts on any archaeological or historic properties or sites by the project. These findings are due to the project occurring in an area not know to be inhabited or used by Hawaiians.

The main concerns regarding the project that were identified by the informants are as follows:

- (1) Responses to questionnaires are pending.
- (2) Responses to questionnaires are pending.

***Impacts and Mitigative Measures:***

The above concerns described by the interviewees may be mitigated in the following manner:

- (1) Responses to questionnaires are pending.
- (2) Responses to questionnaires are pending.

**5.2.3 PUBLIC SERVICES/INFRASTRUCTURE**

***Description:***

Proposed vehicular access to and from the project site is through a proposed single dedicated driveway off of Mohouli Street. The right-of-way on the side of the road will be developed and the road paved for construction access and left for the future road. There are currently no paved surfaces within the project site.

Existing street lighting and a 12-inch waterline are located along Mohouli Street. There is currently a water service lateral for the project site. The project site does not have an existing electrical service secondary.

The two other County streets in the vicinity, Komohana and Kukuau Streets, have existing street lighting on utilities poles with overhead electrical and waterlines. A subdivision, Sunrise Ridge, located to the north of the project site has County sewer system.

***Impacts and Mitigative Measures:***

Water service for the proposed project will be provided from the existing lateral on Mohouli Street. The new water service line will be installed in an underground trench to protect it from damage. Fire hydrants will have to be installed on the proposed project site.

All wastewater shall be handled by the existing County wastewater system in the Sunrise Ridge subdivision just north of the project area. The Civil Engineer of record will calculate wastewater flow rates to determine the existing system can accommodate the added flow. The proposed wastewater lines shall be designed and constructed in accordance with the current County of Hawai'i codes and regulations. The proposed sewer later will be placed in a proposed utility and access easement. This utility line will also be installed in an underground trench. All wastewater generated should be a domestic-type wastewater with no significant amounts of oils or industrial chemicals.

Site lighting will be provided at the site to provide security and visibility. ADA parking stalls, loading zones, accessible routes, and pedestrian access ramps will be provided to the buildings. Appropriate lighting will also be provided at the comfort station. Electrical service will be provided by a connection to the existing underground power primary on Mohouli Street.

A new waterline, electrical duct, telephone/communication duct to support the full FASC build-out will be constructed during the initial phase of this project. The future utilities will connect to the existing utilities.

Disruption of existing public utilities is not anticipated due to construction of the proposed FASC. Residents and businesses located on near the project site should not experience a disruption of service.

#### **5.2.4 NOISE**

***Description:***

The project site is bordered by residential subdivisions. Residents are spread out on lots at least 1 acre in size on the mauka side of the site along Kukuau Street and are more densely packed on lots at least 10,000 square feet in size on the makai side along Komohana Street. Some ambient noise level may be generated from training activities on at the FASC and from vehicular movements along Mohouli Street. Ambient noise within the immediate project area is generally low, with the main noise sources being vehicular traffic. Additional background noise is provided from natural sources, such as the wind and rain. Emergency vehicles such as ambulances will be serviced by the FASC, but sirens should be silent. Ambulances will only be re-supplied and will not be transporting any patients while at the FASC.

During construction, noise levels will increase from the operation of heavy construction equipment. Typical heavy construction equipment will include but may not be limited to backhoes, front loaders, concrete trucks, flat bed trucks, etc. Typical noise levels generated by this equipment will range from 80-90 decibels (dBA). These will be short-term and regulated impacts.

***Impacts and Mitigative Measures:***

Noise generated by construction activities will comply with noise provisions established in Title 11, Chapter 46 (Community Noise Control) of the State Department of Health Administrative Rules, and no further measures are required to mitigate short-term impacts. Construction activities are short-term and localized in nature; therefore no long-term or cumulative impacts are anticipated.

The noise generated by the use of the proposed facilities is anticipated to be on the same level as the existing ambient noise and will not adversely impact to the surrounding environment. No mitigative measures are necessary.

#### **5.2.5 TRAFFIC**

***Description:***

The proposed project is expected to be occupied in two years or sooner and would be expanded over a 20-year period. Therefore, traffic forecasts were prepared for 2010, 2017 and 2027 study periods. A Traffic Impact Assessment Report (TIAR) was completed for the project, and is included with this EA as **Appendix C**.

Access to the project site would be through a 50-foot roadway right of way on the eastern boundary of the site. Other roadways in the area include Komohana Street and Kukuau Street. The major intersections in the vicinity that would be affected by project generated traffic include the Komohana Street and Kukuau Street intersections with Mohouli Street, and the Komohana Street/Kukuau intersection.

The proposed project is scheduled for occupancy in two years from 2007 and would be expanded over a 20-year planning horizon. During the 20-year period from the 2007 traffic count date to full development, ambient traffic on the area roadways can be expected to increase due to regional growth and new projects in the area. The traffic that would be generated from the proposed project was added to the ambient traffic forecast

to obtain the total with project traffic forecasts for the three study forecast years. A two-step process was used to develop the ambient traffic forecasts. The first step developed a background traffic forecast based on regional traffic growth and committed projects. The second step added traffic which would be generated by proposed development on the University of Hawai'i at Hilo (UHH) *mauka* property.

The traditional three-step process of trip generation, trip distribution, and trip assignment was used to forecast future traffic that would be generated by the proposed project. The trip generation step forecasts the number of new trips that would be produced in each of the two study periods. The trip distribution step allocates these new trips by direction of travel. Finally, the trip assignment step assigns the trips to the specific turning movements at the study intersections. The trip generation step forecasts the volume of vehicle trips that would be generated by the proposed project during the morning and afternoon peak periods. The trip generation rates for a government office complex were used for the proposed project, with the number of trips generated in 2010, 2017, and 2027 based on projected floor area.

The concept of level of service is used to quantify the quality of traffic flow on roadway facilities. The Transportation Research Board (TRB) has developed procedures to calculate level of service value(s) by measuring traffic volumes against the capacities of different types of roadway facilities. Two of the study intersections on Kukuau Street are currently unsignalized. The procedure used for analyzing unsignalized intersections calculates vehicle delays and levels of service based on the distribution of gaps in traffic on the major street and driver judgment in selecting gaps through which to execute turns. For two-way stop intersections where only the minor street traffic is controlled by a stop sign, levels of service are calculated for the critical turning movements including outbound movements from the stop-controlled approach, and left turns from the major street to the minor street. The procedure does not calculate an overall intersection level of service.

The Highway Capacity Manual defines the relationship between level of service and delay (in seconds/vehicle) for unsignalized intersections as shown below:

<b>LEVEL OF SERVICE</b>	<b>DELAY (Seconds/Vehicle)</b>
A	< 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	> 50.1

The County considers levels of service A to D as acceptable for unsignalized intersections. Level of service F (with average delays longer than 50 seconds) is considered undesirable for unsignalized intersections and would indicate the possible need for mitigation. Level of service F conditions could be tolerated if the delays are not much higher than 60 seconds, traffic queues are short, and there are no reasonable mitigating measures available.

The unsignalized Mohouli Street/Kukuau Street intersection approaches are currently operating at acceptable levels of service due to the lower traffic volumes on Mohouli Street. The intersection is forecast to continue operating at acceptable levels of service in 2010. The proposed project would generate small volumes of traffic such that it would not affect traffic operations in 2010.

The traffic generated by the UHH Mauka Lands and the ambient traffic volumes forecast for Mohouli, Komohana and Kukuau Streets would affect traffic operations at this intersection in 2017 and 2027. However, the small number of trips generated by the proposed project would not cause any changes in delay, indicating it would have not an adverse traffic impact.

The Komohana Street/Mohouli Street intersection is currently signalized. The methodology for analyzing signalized intersections calculates the levels of service for individual movements, approaches and the intersection as a whole based on the average stopped delay per vehicle. The results range from level of service A (best with average delays less than ten seconds) to F (worst with average delays longer than 80 seconds), described as follows;

LEVEL OF SERVICE	CONTROL DELAY PER VEHICLE (Seconds/Vehicle)
A	< 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	> 80.1

The County considers levels of service A to D as acceptable for signalized intersections, with levels of service E and F indicating the need for mitigating measures. For signalized intersections, the major streets can be designed to have a higher level of service than the minor streets or turning lanes. Level of service E conditions are sometimes tolerated for minor traffic movements such as left turn movements if they maintain acceptable levels of service on the major street.

The level of service analysis for the Komohana Street/Mohouli Street intersection is operating at a minimally acceptable level of service D in the morning peak. The two approaches with the highest volumes, Komohana Street northbound, and Mohouli Street eastbound, are operating at level of service E, indicating the possible need for mitigating measures. The northbound through movement is operating at level of service F due to the backup of traffic from the next traffic signal. The primary reasons for these poor levels of service are the high volumes of vehicles on a single lane of traffic.

The intersection level of service is forecast to decrease to E in 2010 with the current roadway system and increase in ambient traffic, indicating that the current problem movements would worsen.

The large increases in ambient traffic forecast for 2017 would cause the intersection operations to fail (as evidenced by the intersection level of service F with the ambient forecasts) without any roadway improvements. Therefore, the total with project forecasts were not analyzed. Mitigating measures analyzed for 2017 included widening Komohana Street to four lanes and combining the widening of Komohana Street and the Mohouli Street approaches.

The two previously described roadway widening improvements would not be able to accommodate the much higher ambient traffic volumes forecast for 2027. The intersection is forecast to operate at level of service E in the AM peak hour with level of service F on the Komohana Street northbound and southbound left turns, and the Mohouli Street westbound left turn. The intersection is forecast to operate at level of service F in the PM peak hour with level of service F on the Komohana Street northbound left and right turns, all the Mohouli Street westbound movements, and the eastbound left turn movement. The additional trips generated by the proposed project would not cause changes in levels of service on any movements at the intersection. This analysis suggests that additional mitigating measures would be required to meet the projected 2027 traffic volumes.

***Impacts and Mitigative Measures:***

The proposed County of Hawai'i Fire Administration Support Complex is forecast to generate a relatively small number of trips during the morning and afternoon commuter peak hours over its 20-year development period. This additional traffic in itself would not require mitigating measures. However, traffic on Komohana Street is already congested during the morning peak hour and the Mohouli Street intersection is in need of mitigation.

Major roadway improvements would be needed to accommodate the future traffic which would be generated from the UHH Mauka Lands. Both Komohana Street and its Mohouli Street approaches would have to be widened to four lanes by 2017 to accommodate this future land use. The *mauka* portion of Mohouli Street would need to be widened to four lanes between 2017 and 2027.

The currently unsignalized intersections at Mohouli Street/Kukuau Street and Komohana Street/Kukuau Street would require mitigation in the future due to the increases in ambient traffic. The first intersection would probably not warrant traffic signals in the future and a peak period ban on left turns/through movements should be considered. Traffic signals may be warranted at the latter intersection in the future.

The large ambient traffic increases forecast for this study and its subsequent major impacts were based on preliminary estimates of development of the UHH Mauka Lands. The traffic impacts should be reevaluated when the UHH Mauka Lands development proposals are better defined.

## **5.2.6 RECREATIONAL FACILITIES**

***Description:***

The nearest recreational facilities are three County parks. COH Mohouli Park is located about 1,800 feet northeast of the site in the Mohouli Subdivision at the intersection of Hilina and Kumukoa Streets. COH Univeristy Heights Park is located about 3,300 feet east in the University Heights Subdivision at the intersection of Kalili Place and Kalili Street. COH Ainako Park is located about 1 mile northwest in the Ainako Subdivision at the intersection of Laukona Street and Ainako Avenue.

***Impacts and Mitigative Measures:***

Construction of the FASC will have minimal impact, if any, on the nearby County parks. Mohouli Street can be used to access the parks, and Mohouli Street should remain open for the duration of the construction of the project.

The FASC should also have minimal impact on the nearby County parks once the complex is complete and in operation. Only possible impact will be increased traffic flow in the vicinity of the FASC. No Mitigative measures re necessary.

**5.3 SOCIO-ECONOMIC**

**5.3.1 DEMOGRAPHICS**

***Description:***

According to the 2000 census for the Hilo Census Designated Place (CDP), the total population of the area is 40,759 people. The Waimea CDP covers a total area of 58.44 square miles. The population density of the Waimea CDP is 750.8 per square mile while that of the entire island of Hawai'i is 36.9 (as 148,677 people reside on 4,028.02 square miles of land).

***Impacts and Mitigative Measures:***

The facility is not anticipated to induce or reduce the residential population in this area in the short-term or long-term. Therefore, no mitigative measures are required.

**5.3.2 SOCIO-ECONOMIC ENVIRONMENT**

***Description:***

The population of the South District has modestly increased since the 1980. By 2000, the district had seen an average growth of approximately 6.2 percent from its population in 1980 (County of Hawai'i, 2005).

The 2000 Census provided a profile of the general demographic and socio-economic environment of the Hilo CDP. While this may not apply to all the communities within Hilo, it does provide a glimpse of the social environment in the vicinity of the project area. The median age of the Hilo CDP resident is 38.6 years old. Of the population 16 years and older, 58.8% are employed, while 41.2% are either unemployed or not in the labor force (retired, disabled, etc.) Typical occupations include management, service, sales, and farming. The median household annual income for residents of the Hilo CDP is \$39,139. The per capita income for the CDP is \$18,220.

***Impacts and Mitigative Measures:***

The socio-economic environment, for all classes, is not expected to be adversely affected by the FASC project. Work related to the installation is not anticipated to significantly restrict traffic or require the closure of any businesses or recreation facilities. This work will also not cause the interruption of water service to current County of Hawai'i DWS customers. Therefore, no mitigative measures are required.

The proposed FASC will enhance the HFD's ability to serve the people of the County. The development of these and other similar possible economic opportunities will positively benefit the Hilo community.

### 5.3.3 ENVIRONMENTAL JUSTICE

***Description:***

No federal funding will be utilized for this project, therefore formal compliance with Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* is not required. However, this project complies with the intent of the EO which requires federal agencies to take appropriate steps to identify and avoid disproportionately high and adverse effects of federal projects on the health and welfare of minority and low-income populations.

***Impacts and Mitigative Measures:***

No negative impacts, long-term or cumulative, are anticipated. No persons will be displaced or adversely affected as a result of this project. Therefore, no mitigation measures are required.

### 5.4 LAND USES AND OWNERSHIP

#### 5.4.1 LAND USE DESIGNATIONS

The land use designations for TMK: (3) 2-4-001: Por. 168 are as follows:

State Land Use –	Agricultural
Hawai'i County General Plan –	Medium Density Urban
County Zoning –	Agricultural (A-1a)

These designations are shown on **Figures 5.5, 5.6, and 5.7**, respectively.

***Impacts and Mitigative Measures:***

The improvements proposed under this project will require the filing of a Special Permit due to the parcel being zoned as agricultural (A-1a) by the County. The Special Permit will also mitigate the inconsistency with the State Land Use "Agricultural" designation and the County General Plan Land Use Pattern Allocation Guide Map (LUPAG) designation "Important Agricultural Land." The improvement is consistent with the intended land uses under the County of Hawai'i General Plan "Medium Density Urban" designation.

The project site is not located within or in the vicinity of a designated Wilderness area, as determined from a review of the Bureau of Land Management, US Fish and Wildlife Service, USDA Forest Service, and the National Park Service Wilderness databases.

**Insert Figure 5.5**

Figure 5.5: State Land Use Map

Insert Figure 5.6  
Figure 5.6: County General Plan

**Insert Figure 5.7**

Figure 5.7: County of Hawaii Zoning

### Recreational Resources

Three County parks are located within about 1 mile from the project site. The proposed project is not anticipated to adversely impact the operation of or access to the County parks during or after the completion of construction. Access on all roads around the site will be maintained throughout the construction of the proposed project.

### Historical Resources

The project site includes undeveloped land which has not been surveyed by an Archaeologist. Consultation with the State DLNR-SHPD is ongoing. Construction of the proposed facilities will not irrevocably commit to loss or destruction of natural or cultural resources. No cultural resources have been identified within the project site. If previously unknown resources are uncovered during the course of construction, the Contractor will stop work immediately and notify the SHPD who will determine the appropriate treatment.

### Scenic and Open Space Resources

The FASC buildings and layout will be designed with an architectural style that is mindful of the immediate surroundings and will be consistent with other County projects that have been developed in the Hilo area. The buildings and layout of the complex will not adversely impact the aesthetics of the area. A radio tower may be installed at the site. The required height of the tower will depend on the line-of-sight restrictions based on the on-going project topographical survey. The radio tower could be stylized as a tree to help lessen its visual impact. Cell phone towers on O'ahu have been stylized as pine and palm trees to successfully lessen their visual impact.

### Economical Uses

The site is undeveloped and has no direct economical uses. The site will allow for expansion in HFD and HPD staffing that results in the provision of increased employment.

### Flooding Hazards

The portion of the parcel to be developed is designated as "Flood Zone A" as shown on the current Flood Insurance Rate Map (FIRM). The FIRM was updated on September 16, 1988, and was revised to reflect the Letter of Map Revision (LOMR), effective date December 21, 2006, as provided by the COH Department of Public Works. A designation of "Flood Zone A" indicates special flood hazard areas inundated by 100-year floods and no base flood elevation has been determined.

The development of the site will mitigate any possible hazards from flooding. Mitigative measures may include regarding of the site, rerouting confinement of flood water. Off-site finish drainage will not be increased from the existing condition. The amount of impermeable surface will be increased from pavement, concrete structures and buildings; however, any increase in surface runoff will be disposed of via dry wells and off-site drainage facilities.

### Managing Development

The proposed improvements require more than two permits or approvals. The permits and approvals required include the following:

- Department of Health NPDES Permit (NOI-C),
- Department of Health UIC Permit,
- Department of Health Water Quality Certification (Section 401),
- County of Hawai'i Building Permit,

- County of Hawai'i Grading, Grubbing and Stockpiling Permit,
- County of Hawai'i Planning Department Plan Approval,
- County of Hawai'i Special Permit.

The project does not conform to designated agricultural State land use designations for the site; however will require a Special Permit from the County.

The public will be notified of this project via consultation letters, letter notifications, and the publication of the Draft and Final versions of this EA.

#### Public Participation

The public will be will be informed about this project via written requests for consultation, several public meetings, and this EA.

### **5.4.2 HAWAII STATE PLAN**

#### ***Description:***

Chapter 226 of the Hawai'i Revised Statutes provides for long-range planning for the State of Hawai'i. The portions of the Hawai'i State Plan which apply to the proposed FASC project site are as follows:

#### **§226-14 Objectives and policies for facility systems — in general.**

**(b)(1):** "Accommodate the needs of Hawai'i's people through coordination of facility systems capital improvement priorities in consonance with state and county plans."

#### **§226-15 Objectives and policies for facility systems — solid and liquid wastes.**

**(a)(1):** "Maintenance of public health and sanitation standards relating to treatment and disposal of solid and liquid wastes."

**(a)(2):** "Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas."

#### **§226-16 Objectives and policies for facility systems — water.**

**(b)(1):** "Coordinate development of land use activities with existing and potential water supply."

#### ***Impacts and Mitigative Measures:***

The objectives of the Hawai'i State Plan are the maintenance and pursuit of improved quality in Hawai'i's water quality and the accommodation of Hawai'i's people through coordination of facility systems and capital improvement priorities in agreement with State and County Plans. The proposed actions are consistent with these objectives. Therefore, no mitigative measures are required.

### **5.4.3 STATE LAND USE LAW**

#### ***Description:***

The State Land Use Law, Chapter 205 of the HRS, classifies all State lands in one of four categories: Urban, Rural, Agricultural and Conservational. Permitted uses for each category are defined in the statute. The State assumes sole management responsibility in the Conservation District, County governments assume sole responsibility in the Urban District, and both share responsibilities in the Rural and Agricultural Districts.

The project site located at TMK (3) 2-4-001: Por. 168 and is within the Agricultural District, as classified by the State Land Use map. Use of this parcel is managed by both the State and County.

***Impacts and Mitigative Measures:***

The proposed action to develop the FASC is not consistent with the Hawai'i State Land Use Law. Therefore, as a Special Permit will be filed with the County as a mitigative measure.

**5.4.4 COUNTY OF HAWAII**

***Description:***

Under the County of Hawai'i's General Plan (2005), the main land use objectives are as follows:

- (1) Designate and allocate land uses in appropriate proportions and mix and in keeping with the social, cultural, and physical environments of the County
- (2) Protect and encourage the intensive and extensive utilization of the County's important agricultural lands
- (3) Protect forest, water, natural and scientific reserves and open areas

The project area General Plan land use designation is "Medium Density Urban."

The project site is located within the County of Hawai'i Agricultural - 1 acre (A-1a) zoning district, as shown on **Figure 5-5**. As described in the County of Hawai'i Zoning Code, the land within the agricultural zoning district is generally agricultural and very low density agricultural-based residential use. Additionally Section 25-5-72(c)(13) states "public uses and structures" are permitted uses in agricultural districts. Section 25-4-11(c) also states public uses, structures and buildings and community buildings are permitted in any district, provided the County has issued plan approval for such use.

***Impacts and Mitigative Measures:***

A Special permit will need to be obtained from the County of Hawai'i to allow the construction of the proposed facilities within the agricultural district.

**5.4.5 PROPERTY OWNERSHIP**

***Description:***

The property affected by the installation of the proposed FASC is identified as 3<sup>rd</sup> Tax Division TMK: 2-4-001: Por. 168. This parcel is owned by the State of Hawai'i.

***Impacts and Mitigative Measures:***

The State of Hawai'i currently owns the property identified by 3<sup>rd</sup> Tax Division 3<sup>rd</sup> Tax Division TMK: 2-4-001: Por. 168. The proposed facility does not require the taking of any private lands. The County is in discussion with the State to transfer ownership a portion of the parcel to the County for their exclusive development and use. Transferal of the requested lands and extent of land to be transferred are still being coordinated and have not been finalized at the time this EA is written. No mitigative measures are required.

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## SECTION 6

### DETERMINATION WITH SUPPORTING FINDINGS AND REASONS

In accordance with Chapter 343, Hawai'i Revised Statutes and the National Environmental Policy Act, this Environmental Assessment characterizes the technical, social and environmental issues related to the FASC Improvements project. It identifies potential project impacts to the environment and their significance. It is anticipated that the proposed project will not exert any significant impacts to the environment. Therefore, the County of Hawai'i is issuing a Finding of No Significant Impact (FONSI).

This determination of the FONSI is based upon thirteen (13) significance criteria listed in HRS §11-200-12 of the Environmental Impact Statement Rules. The specific criteria used in making this determination are addressed below:

1. *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource:*

Construction of the proposed facilities will not irrevocably commit to loss or destruction of natural or cultural resources. No cultural resources have been identified within the project site. If previously unknown resources are uncovered during the course of construction, the Contractor will stop work immediately and notify the SHPD who will determine the appropriate treatment.

2. *Curtails the range of beneficial uses of the environment:*

The proposed actions will not curtail the range of beneficial uses of the environment. The proposed actions to develop the FASC which will enhance the Fire Department's ability to serve and protect the community and environment.

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:*

The proposed FASC facility is consistent with the State's goals and objectives as described in the previous sections of this EA.

4. *Substantially affects the economic or social welfare of the community or state:*

The proposed actions will not adversely affect social welfare of the community. There will be no road or lane closures during the construction of the facilities. The proposed actions will improve the economic and social welfare of the affected communities by facilitating the public service the Fire Department provides. The site will allow for expansion in HFD and HPD staffing that results in the provision of increased employment.

5. *Substantially affects public health:*

The proposed activities will not adversely affect public health. The public health will benefit directly with improved public service provided by the Fire Department. During construction, environmental pollutants will be mitigated to regulated levels by using the appropriate BMPs and construction methods.

6. *Involves secondary impacts, such as population changes or effects on public facilities:*

The proposed FASC will not lead to secondary impacts such as population changes or adverse effects on public facilities beyond that of the County General Plan.

7. *Involves a substantial degradation of environmental quality:*

The proposed project will not significantly degrade the environmental quality of the area of the proposed project site.

8. *Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger action:*

Development of the proposed FASC will not have a cumulative effect on the environment. The facilities constructed with this project will not require commitment for larger action.

9. *Substantially affects a rare, threatened, or endangered species, or its habitat:*

The proposed project will not substantially affect any rare, threatened, or endangered species or its habitat. The project site is not a known critical or nesting or living habitat for rare, threatened, or endangered species.

10. *Detrimentially affects air or water quality or ambient noise levels:*

The proposed projects will not substantially degrade air and water quality or ambient noise levels. Any notable adverse effects on air and water quality and ambient noise levels will be short-term and construction-related only. Air quality and noise levels will not exceed State DOH standards. This project will not result in long-term adverse effects. Upon completion of construction activities, air and water qualities will revert to prior levels. Any increase in ambient noise levels is anticipated to be minor in comparison to the noise levels in the surrounding community, and is considered negligible.

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

The proposed project is located in an area defined by the FIRM to be undulated by 100-year rains. The proposed facilities may potentially be damaged should flooding occur. Damage to the building of the complex will be avoided by placing the building pad above the flood elevation. The project site is located in a volcanic hazard zone of 3 (areas with high risk), is in an area that may experience some seismic activity and may be susceptible to hurricanes and strong winds.

Although damage may occur to the facilities during occasions of severe hurricanes, earthquakes and lava flows, no practical mitigative measures are currently available for a project of this nature. The proposed project will comply

with the current regulatory design standards to mitigate any possible minor hurricanes or earthquakes.

12. *Substantially affects scenic vistas and view planes identified in County or State plans or studies:*

Activities associated with the installation of the proposed facilities will inherently and necessarily change or alter the character of the site, due to the undeveloped nature of the site. Heights of facilities will adhere to all government restrictions and requirements. Infringement upon view planes by construction will be temporary and short-term.

13. *Requires substantial energy consumption:*

The FASC facilities will not require substantial energy consumption. Energy will be required for site lighting and operation of the building on site. Only section of the Emergency Dispatch Building will be in continuous operation. Monthly energy consumption should typically be less than X,XXX kW-hrs.

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## **SECTION 7**

### **PERMITS AND APPROVALS REQUIRED**

#### **FEDERAL**

#### **STATE**

- Department of Health NPDES Permit (NOI-C)
- Department of Health UIC Permit
- Department of Health Water Quality Certification (Section 401)

#### **COUNTY OF HAWAI'I**

- Building Permit
- Grading, Grubbing and Stockpiling Permit
- Planning Department Plan Approval
- Special Permit

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## SECTION 8

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## **APPENDIX A**

### **PRE-ASSESSMENT CORRESPONDENCE AND COMMENTS RECEIVED**

- **Pre-Assessment Request Letters**
- **Pre-Assessment Comments Received**
- **Annotated Responses to Comments Received**

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## **PRE-ASSESSMENT REQUEST LETTERS**

### **Federal**

Natural Resource Conservation Service (NRCS)  
U.S. Department of the Interior, U.S. Fish and Wildlife Service (FWS)  
U.S. Environmental Protection Agency (EPA), Region 9

### **State of Hawai'i**

Department of Business, Economic Development and Tourism (DBEDT), Office of Planning  
Department of Hawaiian Home Lands (DHHL)  
Department of Health (DOH), County of Hawai'i District Health Office  
Department of Land and Natural Resources (DLNR), Historic Preservation Division (SHPD)  
Department of Transportation (SDOT)  
Office of Hawaiian Affairs (OHA)  
State Office of Environmental Quality Control (OEQC)

### **County of Hawai'i**

Civil Defense  
Department of Environmental Management (DEM)  
Department of Parks and Recreation  
Department of Water Supply  
Fire Department  
Hawai'i County Council  
Mayor Harry Kim  
Police Department  
Planning Department

### **Community**

Hawaiian Telcom  
Hawai'i Electric Light Company  
Hawai'i Natural Heritage Foundation  
Hawai'i's 1000 Friends  
Historic Hawai'i Foundation  
The Nature Conservancy  
Oceanic Time Warner Cable  
The Outdoor Circle  
University of Hawai'i at Manoa Environmental Center  
Mrs. Pualani "Pua" Kanaka'ole Kanahele  
Mr. Punahelu "Puna" Lerma  
Mrs. Chiyomi Leina'ala Fukino, M.D.  
Hilo Hawaiian Civic Club  
Native Hawaiian Legal Corporation

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**PRE-ASSESSMENT COMMENTS RECEIVED**

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**ANNOTATED RESPONSES TO COMMENTS RECEIVED**

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**APPENDIX B**

**RECORD OF CULTURAL IMPACT ASSESSMENT CONSULTATION**

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**APPENDIX C**

**TRAFFIC IMPACT ASSESSMENT REPORT**

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**APPENDIX D**

**SITE PHOTOS**

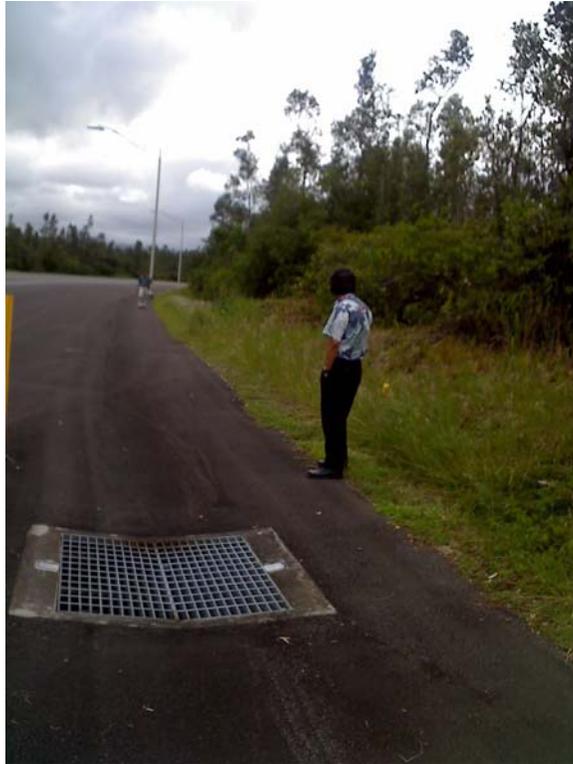
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View along Front of Parcel from the Intersection of Mohouli and Komohana Streets



Detail of Rocky Soil on Proposed Site



Grated Inlet Drywell in County ROW  
fronting the Proposed Site on Mohouli Street



Existing Vegetation  
at the Proposed Site



Fence Around County Lined Open Ditch  
along Mohouli Street



Existing Utility Laterals  
fronting the Proposed Site

**M&E Pacific, Inc.**  
841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
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December 17, 2007

Mr. Don Klima, OFAP Director  
Advisory Council on Historic Preservation  
1100 Pennsylvania Avenue, NW, Suite 803  
Washington, DC 20004

Dear Mr. Klima,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex**  
**TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

The first phase of the proposed County of Hawaii Fire Department Administration Support Complex includes a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. Site lighting, potable water, sewer, electrical service, telecommunications, and other miscellaneous fencing, signage, grading and drainage will be included in the design as required. The facilities will be designed to be ADA accessible. A general location map and a schematic site map of the phase 1 facilities for the proposed project area are attached for your information and review.

We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have. No historical sites were found near the project site. Since the project site is undeveloped agricultural land, it is possible that historical or cultural materials may be discovered during construction activities. During the event that historical or cultural materials are discovered, work in the area will cease immediately and SHPD will be notified of the discovery and consulted as to the appropriate course of action. Burial finds will be treated in accordance with HAR 12-300 and HRS 6E-43.6. The SHPD will determine the appropriate treatment of the remains. A Finding of No Significant Impact (FONSI) is anticipated for the proposed project.

We are seeking your consultation on this project to identify potential impacts this project may have. We would appreciate any written comments within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

Enclosures: (1) Location Map  
(2) Phase 1 Schematic Site Map

cc: Project File  
David Yamamoto, County of Hawaii, Department of Public Works, Building Division  
Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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December 17, 2007

Mr. Patrick Leonard, Field Supervisor  
U.S. Fish & Wildlife Service, Pacific Region  
300 Ala Moana Boulevard, #3-122  
Honolulu, HI 96850

Dear Mr. Leonard,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex**  
**TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have. In addition to the US Fish and Wildlife Service, we will also consult with the Hawaii Natural Heritage Program (HNHP) at the University of Hawaii at Manoa for information on threatened, rare, or endangered species in or near the project area. Based on our investigation and research, it is anticipated that the proposed project will have no adverse impacts on threatened, rare, or endangered species in the project area. If any threatened, rare, or endangered species are found in the project area, mitigative measures (i.e. using shielded, downward-facing lights) will be used to minimize impacts of the project to threatened, rare, or endangered species. Therefore, a Finding of No Significant Impact (FONSI) is anticipated for the proposed project.

Pursuant to Section 7, Endangered Species Act, we request a list of any threatened, rare, or endangered species in or near the project area and any comments regarding concerns towards the proposed project. We would appreciate any written comments within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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December 17, 2007

Mr. Dean Higuchi  
Pacific Islands Contact Office  
U.S. EPA, Region 9  
P.O. Box 50003  
Honolulu, HI 96850

Dear Mr. Higuchi,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex**  
**TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking your consultation to identify any potential impacts or environmental concerns this project may have. We would appreciate any written comments regarding concerns towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

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Project Manager

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December 17, 2007

Mr. Clyde W. Namu'o, Administrator  
Office of Hawaiian Affairs  
711 Kapiolani Blvd., Suite 500  
Honolulu, HI 96813

Dear Mr. Namu'o,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking your consultation on this project to identify potential impacts, if any, on Native Hawaiian people or practices. We would appreciate any written comments regarding any cultural concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

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Project Manager

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December 17, 2007

Mr. Lawrence T. Yamamoto, Director  
USDA Natural Resources Conservation Service  
East Area Office  
Prince Kuhio Federal Building  
P.O. Box 50004  
Honolulu, HI 96850

Dear Mr. Yamamoto,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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Project Manager

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December 17, 2007

Mr. Theodore Liu, Director  
Dept. of Business, Economic Development and Tourism  
P.O. Box 2359  
Honolulu, HI 96804

Dear Mr. Liu,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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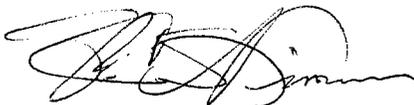
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Project Manager

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T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

December 17, 2007

Mr. Micah Kane, Chairman  
Dept. of Hawaiian Home Lands  
1099 Alakea Street, Suite 2000  
Honolulu, HI 96813

Dear Mr. Kane,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking your consultation on this project to identify potential impacts, if any, on Hawaiian Home Lands projects. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

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Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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December 17, 2007

Ms. Karleen Yoshioka, District Health Officer  
Department of Health  
Hawaii District Health Office  
P.O. Box 916  
Hilo, HI 96720

Dear Ms. Yoshioka,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking your consultation to identify potential concerns the Department of Health may have for this project. In addition to the Hawaii District Health Office, we will also be consulting with the Environmental Planning Office. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

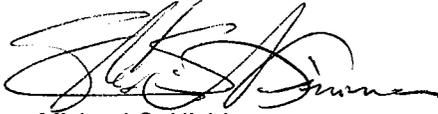
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December 17, 2007

Director  
Department of Health  
Environmental Planning Office  
919 Ala Moana Blvd., Room 312  
Honolulu, HI 96814

Dear Director,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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We are seeking your consultation to identify potential concerns the Department of Health may have for this project. In addition to the Environmental Planning Office, we will also be consulting with the Hawaii District Health Office. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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December 17, 2007

Administrator  
Dept. of Land and Natural Resources  
State Historic Preservation Division (SHPD)  
Kakuhihewa Building  
601 Kamokila Blvd., Suite 555  
Kapolei, HI 96707

Dear Administrator,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have. No historical sites were found near the project site. Since the project site is undeveloped agricultural land, it is possible that historical or cultural materials may be discovered during construction activities. During the event that historical or cultural materials are discovered, work in the area will cease immediately and SHPD will be notified of the discovery and consulted as to the appropriate course of action. Burial finds will be treated in accordance with HAR 12-300 and HRS 6E-43.6. The SHPD will determine the appropriate treatment of the remains. A Finding of No Significant Impact (FONSI) is anticipated for the proposed project.

We are seeking your consultation on this project to identify potential impacts this project may have on historic sites in the area. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

Enclosures: (1) Location Map  
(2) Phase 1 Schematic Site Map

cc: Project File  
David Yamamoto, County of Hawaii, Department of Public Works, Building Division  
Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

**M&E Pacific, Inc.**

841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

December 17, 2007

Mr. Barry Fukunaga, Director  
Dept. of Transportation  
869 Punchbowl Street, Room 509  
Honolulu, Hi 96813-5097

Dear Mr. Fukunaga,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

The first phase of the proposed County of Hawaii Fire Department Administration Support Complex includes a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. Site lighting, potable water, sewer, electrical service, telecommunications, and other miscellaneous fencing, signage, grading and drainage will be included in the design as required. The facilities will be designed to be ADA accessible. A general location map and a schematic site map of the phase 1 facilities for the proposed project area are attached for your information and review.

We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking consultation on this project to identify potential impacts or comments you may have on this project. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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Justin.Privett@m-e.aecom.com

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Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

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Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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Honolulu, Hawaii 96813  
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December 17, 2007

Ms. Genevieve Salmonson, Director  
Office of Environmental Quality Control  
235 South Beretania Street, Suite 702  
Honolulu, HI 96813-5097

Dear Ms. Salmonson,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

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Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

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Michael S. Nishimura  
Project Manager

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December 17, 2007

Ms. Bobby-Jean Leithead-Todd, Director  
County of Hawaii  
Dept. of Environmental Management  
25 Aupuni Street  
Hilo, HI 96720

Dear Ms. Leithead-Todd,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

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Sincerely,

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Michael S. Nishimura  
Project Manager

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December 17, 2007

Administrator  
County of Hawaii  
Civil Defense  
920 Ululani Street  
Hilo, Hi 96720

Dear Administrator,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are seeking consultation on this project to identify potential impacts or comments you may have on this project. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

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Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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December 17, 2007

Ms. Patricia Engelhard, Director  
County of Hawaii  
Dept. of Parks and Recreation  
101 Pauahi Street, Suite 6  
Hilo, HI 96720

Dear Ms. Engelhard,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

The first phase of the proposed County of Hawaii Fire Department Administration Support Complex includes a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. Site lighting, potable water, sewer, electrical service, telecommunications, and other miscellaneous fencing, signage, grading and drainage will be included in the design as required. The facilities will be designed to be ADA accessible. A general location map and a schematic site map of the phase 1 facilities for the proposed project area are attached for your information and review.

We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking consultation on this project to identify potential impacts to parks and recreation in the area or comments you may have on this project. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

Enclosures: (1) Location Map  
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David Yamamoto, County of Hawaii, Department of Public Works, Building Division  
Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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December 17, 2007

Mr. Milton Pavao, Department Head  
County of Hawaii  
Dept. of Water Supply  
345 Kekuanaoa Street, Suite 20  
Hilo, HI 96720

Dear Mr. Pavao,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

The first phase of the proposed County of Hawaii Fire Department Administration Support Complex includes a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. Site lighting, potable water, sewer, electrical service, telecommunications, and other miscellaneous fencing, signage, grading and drainage will be included in the design as required. The facilities will be designed to be ADA accessible. A general location map and a schematic site map of the phase 1 facilities for the proposed project area are attached for your information and review.

We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking consultation on this project to identify potential impacts to the water supply in the area or comments you may have on this project. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

Enclosures: (1) Location Map  
(2) Phase 1 Schematic Site Map

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Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

**M&E Pacific, Inc.**

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Honolulu, Hawaii 96813  
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December 17, 2007

Mr. Darryl J. Oliveria, Fire Chief  
County of Hawaii  
Fire Department  
25 Aupuni Street  
Hilo, HI 96720

Dear Mr. Oliveria,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking your consultation on this project to identify potential impacts, comments, or suggestions you may have on this project as your department will be using the facilities. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

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David Yamamoto, County of Hawaii, Department of Public Works, Building Division  
Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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841 Bishop Street, Suite 1900  
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December 17, 2007

Mr. Harry Kim, Mayor  
County of Hawaii  
Office of the Mayor  
25 Aupuni Street  
Hilo, HI 96720

Dear Mayor Kim,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have.

We are seeking consultation on this project to identify potential impacts to the public in the area or comments you may have on this project. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

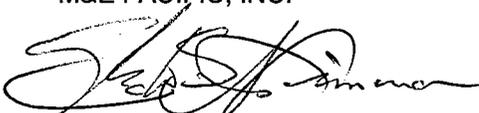
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December 17, 2007

Mr. Chris Yuen, Department Head  
County of Hawaii  
Planning Department  
101 Pauahi Street, Suite 3  
Hilo, HI 96720

Dear Mr. Yuen,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are seeking consultation on this project to identify potential impacts to development in the area or comments you may have on this project. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

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Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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December 17, 2007

Mr. Lawrence K. Mahuna, Police Chief  
Police Department  
349 Kapiolani Street  
Hilo, HI 96720

Dear Mr. Mahuna,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are seeking consultation on this project to identify potential impacts to the Police Department or comments you may have on this project. We would appreciate any written comments regarding any concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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Michael S. Nishimura  
Project Manager

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December 17, 2007

Mr. Pete Hoffmann, Council Chair  
Hawaii County Council  
25 Aupuni Street  
Hilo, HI 96720

Dear Mr. Hoffmann,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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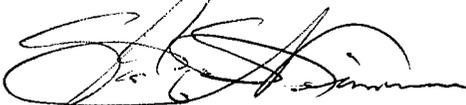
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Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

Enclosures: (1) Location Map  
(2) Phase 1 Schematic Site Map

cc: Project File  
David Yamamoto, County of Hawaii, Department of Public Works, Building Division  
Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

**M&E Pacific, Inc.**

841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

December 17, 2007

Director  
Hawaiian Telcom  
1177 Bishop Street  
Honolulu, HI 96813

Dear Director,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

The first phase of the proposed County of Hawaii Fire Department Administration Support Complex includes a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. Site lighting, potable water, sewer, electrical service, telecommunications, and other miscellaneous fencing, signage, grading and drainage will be included in the design as required. The facilities will be designed to be ADA accessible. A general location map and a schematic site map of the phase 1 facilities for the proposed project area are attached for your information and review.

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T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

December 17, 2007

Director  
Hawaii Electric Light Company  
1200 Kilauea Avenue  
Hilo, HI 96720

Dear Director,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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Michael S. Nishimura  
Project Manager

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Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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December 17, 2007

Mr. Roy Kam, Database Manager  
University of Hawaii at Manoa  
Center for Conservation Research and Training  
Hawaii Natural Heritage Program  
3050 Maile Way, Gilmore Hall #406  
Honolulu, Hawaii 96822

Dear Mr. Leonard,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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We are currently in the process of preparing an Environmental Assessment (EA). In preparing the EA we are consulting various State and Local Agencies, as well as various public organizations to determine if there are any potential impacts this project may have. In addition to the Hawaii Natural Heritage Program US Fish and Wildlife Service, we will also consult with the US Fish and Wildlife Service for information on threatened, rare, or endangered species in or near the project area. Based on our investigation and research, it is anticipated that the proposed project will have no adverse impacts on threatened, rare, or endangered species in the project area.

We are requesting a list of any threatened, rare, or endangered species in or near the project area and any comments regarding concerns towards the proposed project. We would appreciate any written comments within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

December 17, 2007

Ms. Donna Wong, Executive Director  
Hawaii's 1000 Friends  
25 Maluniu Avenue  
Suite 102#282  
Kailua, HI 96734

Dear Ms. Wong,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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Sincerely,

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Michael S. Nishimura  
Project Manager

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December 17, 2007

Ms. Kiersten Faulkner, Executive Director  
Hawaii Historic Foundation  
680 Iwilei Road, Suite 690  
Honolulu, HI 96817

Dear Ms. Faulkner,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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Michael S. Nishimura  
Project Manager

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841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

December 17, 2007

Mr. Jeff Mikulina, Director  
The Nature Conservancy  
923 Nuuanu Ave.  
Honolulu, HI 96817

Dear Mr. Mikulina,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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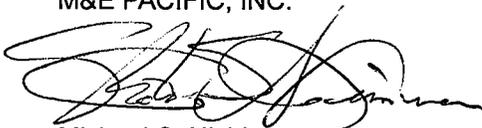
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T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

December 17, 2007

Director  
Oceanic Time Warner Cable  
1257 Kilauea Avenue  
Hilo, HI 96720

Dear Director,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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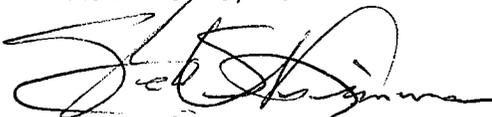
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December 17, 2007

Kathy Whitmire, President  
The Outdoor Circle  
1314 South King St., Suite 306  
Honolulu, Hi 96814

Dear Ms. Whitmire,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

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Honolulu, Hawaii 96813  
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December 17, 2007

Dr. John T. Harrison, PhD, Environmental Coordinator  
University of Hawaii at Manoa  
Environmental Center  
2500 Dole Street, Krauss Annex 19  
Honolulu, Hi 96822

Dear Dr. Harrison,

**Subject: Request for Review of Proposed County of Hawaii Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

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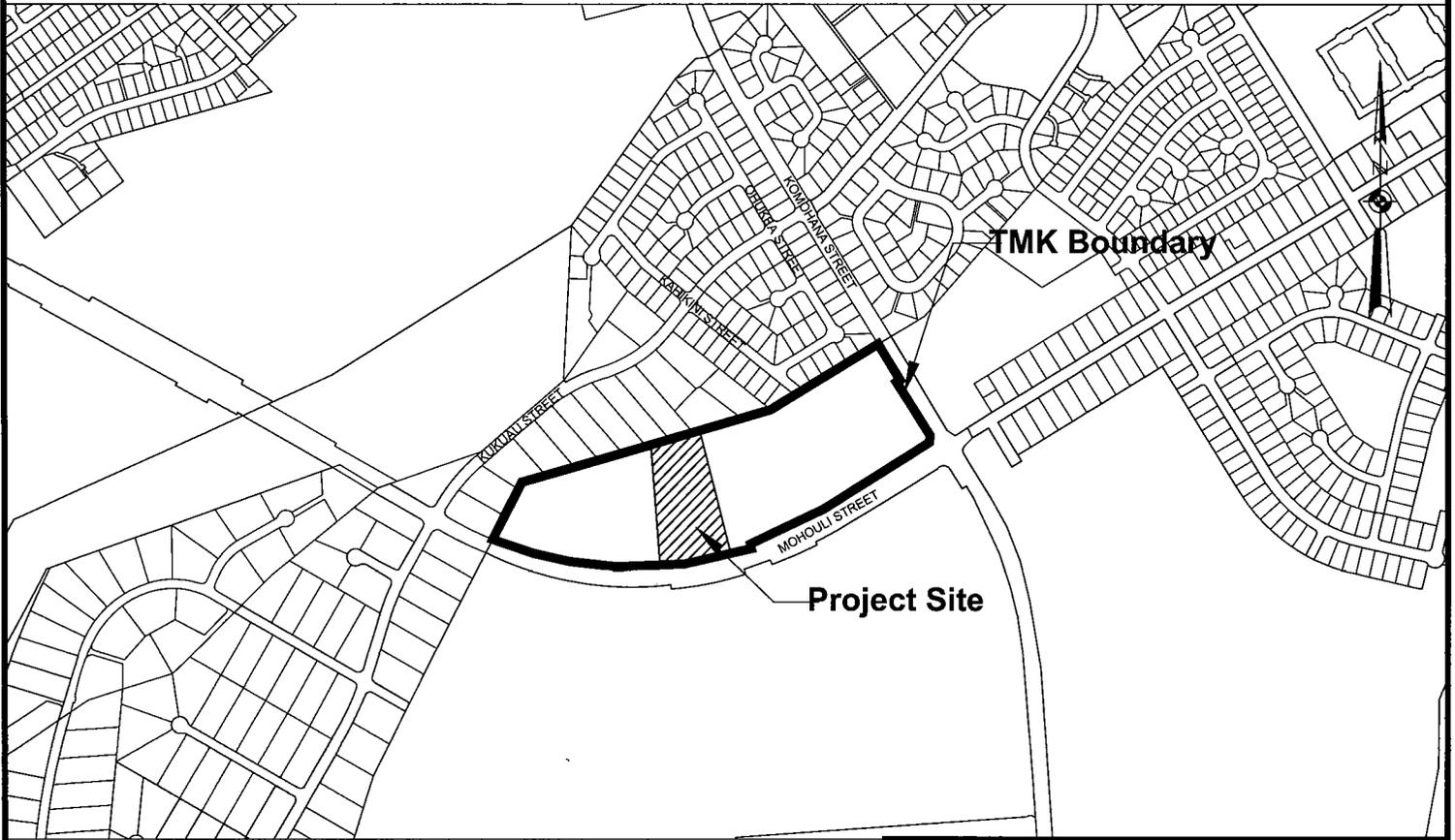
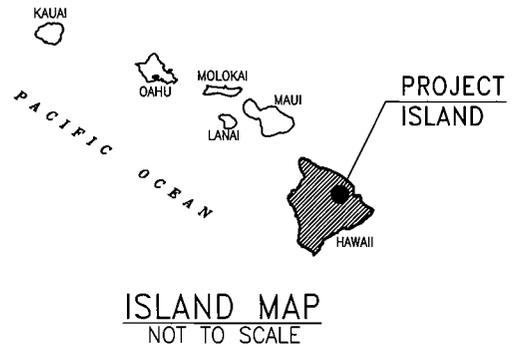
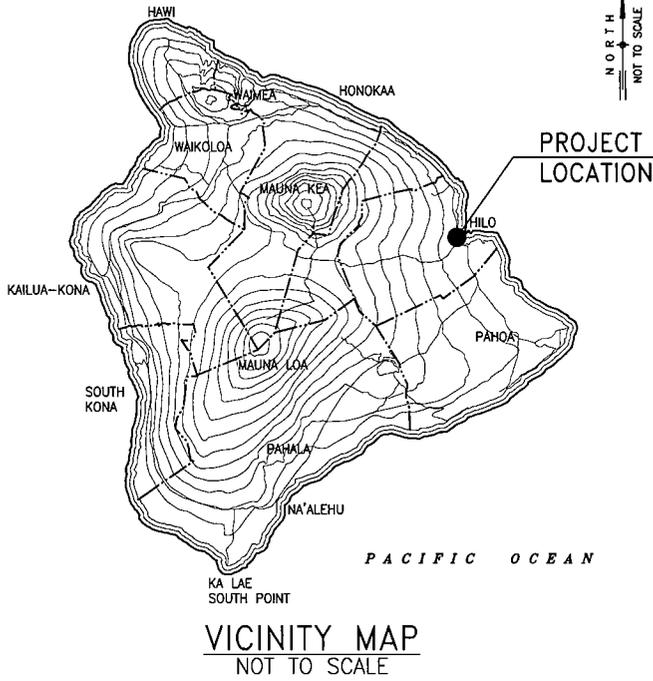
M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

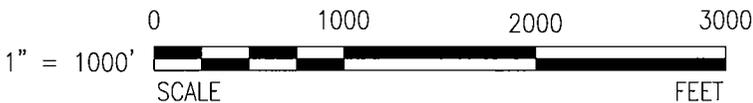
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David Yamamoto, County of Hawaii, Department of Public Works, Building Division  
Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.



**LOCATION MAP**

SCALE: 1" = 1000'



**M&E Pacific, Inc.**

METCALF & EDDY

DAVIES PACIFIC CTR, STE 1900 · 841 BISHOP ST, HONOLULU, HAWAII 96813

**Figure 1  
LOCATION MAP**

Environmental Assessment for the  
Fire Administration Support Complex  
December 2007

Museum, Covered Training Area, Warehouse, and Fire Station

Open Training Area      Parking

Training Building

Dispatch Building

Court Yard Area

General Public Parking

Project Site

Dispatch Parking

Administration Building

Employee Parking

Radio Tower



# SCHEMATIC SITE MAP

SCALE: 1" = 100'



## M&E Pacific, Inc.

METCALF & EDDY

DAVIES PACIFIC CTR, STE 1900 · 841 BISHOP ST, HONOLULU, HAWAII 96813

### Figure 2 SCHEMATIC SITE MAP

Environmental Assessment for the  
Fire Administration Support Complex  
December 2007

PATH/FILENAME: P:\Projects\Hawaii\60038559 AM COH Fire Dept Admin Supp Comp\500 Deliverable\EA report\Consult\0617\0618\0618\December 17, 2007 12:17:14 pm PLOT DATE: December 17, 2007 12:18:18 pm



# United States Department of the Interior



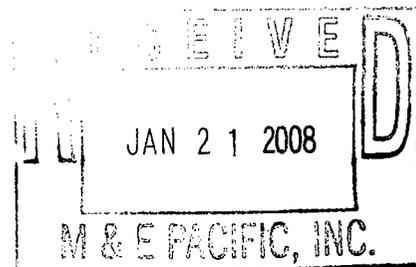
## FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office  
300 Ala Moana Boulevard, Room 3-122, Box 50088  
Honolulu, Hawaii 96850

In Reply Refer To:  
2008-TA-0095

JAN 18 2008

Mr. Michael L. Nishimura  
Project Manager  
M & E Pacific, Inc.  
841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813



Subject: Preparation of an Environmental Assessment for Proposed County of Hawaii Fire Administration Support Complex in Hilo, Hawaii [TMK: (3) 2-4-001 (Por.) 168]

Dear Mr. Nishimura:

Thank you for your letter received on December 18, 2007, requesting information regarding potential impacts to threatened and endangered species from the above referenced project. The first phase of the proposed project is to construct a County of Hawaii Fire Administration Support Complex in Hilo that will include a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area and a courtyard area. Land cover information indicates the proposed project site is vegetated and is adjacent to a developed residential area on the outskirts of Hilo.

Based on the project information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, and the Hawaii GAP Program, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) and Hawaiian hawk (*Buteo solitarius*) occur in the project vicinity. In addition, the threatened Newell's shearwater (*Puffinus auricularis newelli*) and endangered Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*) (collectively referred to as seabirds) are known to traverse the project site. We recommend you address potential project impacts to these listed species and include measures to minimize adverse impacts in your environmental review document. The following recommendations are provided to assist you in your plan development:

- Information about Hawaiian hoary bat use of the project area is incomplete. Bat surveys could be conducted in areas where cutting or removal of trees is proposed. If Hawaiian hoary bats are found in the project area, you should contact our office for additional information about how to address potential impacts to this species. Because bat pups are found in nursery trees during the April through August breeding season, it is particularly

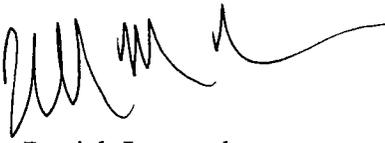
TAKE PRIDE<sup>®</sup>  
IN AMERICA 

important to avoid disturbance to trees during this period in areas where bats occur. Because bats can be harmed by barbed wire fences, their use should be minimized.

- Where Hawaiian hawks occur, brush and tree clearing during the March through September breeding season may result in impacts to hawk nests. If biological surveys indicate the presence of nesting hawks in an area where March through September vegetation clearing is proposed, please contact our office for additional information about how to address potential impacts to this species.
- Potential impacts to seabirds could be minimized by shielding outdoor lights in the project footprint throughout the construction period and within the completed project area so the bulb can only be seen from below, by avoiding use of lights at night during the peak fallout period of September 15 through December 15, and by providing staff with information about seabird fallout. Because communication towers may pose a flight hazard to seabirds, please contact our office for further assistance, if any towers will be constructed in association with this project.

To the best of our knowledge, no other federally listed or proposed threatened or endangered species or candidate species, or proposed or designated critical habitat occur within the proposed project footprint. We hope this information assists you in drafting the Environmental Assessment. If you have questions regarding this letter, please contact Dr. Jeff Zimpfer, Fish and Wildlife Biologist, Consultation and Technical Assistance Program (phone: 808-792-9431; fax: 808-792-9581).

Sincerely,



Patrick Leonard  
Field Supervisor

cc:

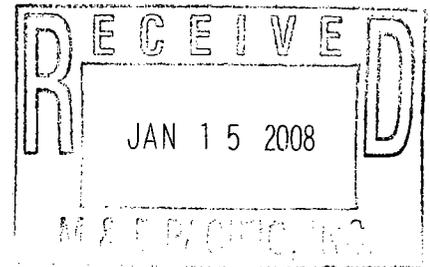
Scott Fretz, Hawaii Department of Land and Natural Resources

LINDA LINGLE  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF HEALTH  
P.O. BOX 916  
HILO, HAWAII 96721-0916

CHIYOME L. FUKINO, M.D.  
Director of Health



January 10, 2008

Mr. Michael S. Nishimura  
Project Manager  
M&E Pacific, Inc.  
841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813

Dear Mr. Nishimura:

SUBJECT: Additional Comments to Request for Review of Proposed County of Hawaii Fire  
Administration Support Complex  
TMK: (3) 2-4-001:por. 168

There is no record of a radiation incident on the proposed site.

The Hazard Evaluation and Emergency Response (HEER) office does not have records of any investigation or cleanup activities at the proposed site. This property was former agricultural land in sugar cane production, and lands formerly used for sugar cane production are now being developed into communities where residential homes, schools, and commercial businesses are being constructed. Chemicals associated with the sugar cane industry persist in soil today, and may be a threat to public health and the environment. Elevated arsenic levels were discovered in soil at former sugar cane production areas on the islands. The HEER office has identified former sugar cane production areas for assessment throughout the state, and plans to work with property owners to conduct environmental assessments to identify and address elevated soil arsenic levels prior to finalizing development plans for the properties.

Sincerely,

  
\_\_\_\_\_  
Newton Inouye  
Acting District Environmental Health  
Program Chief

LINDA LINGLE  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
869 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813-5097

BRENNON T. MORIOKA  
ACTING DIRECTOR

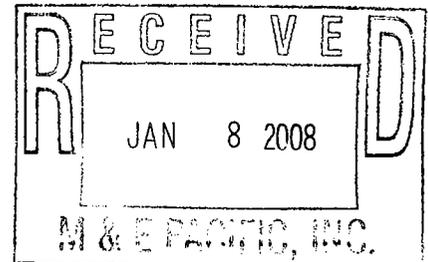
Deputy Directors  
MICHAEL D. FORMBY  
FRANCIS PAUL KEENO  
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.2737

January 7, 2008

Mr. Michael S. Nishimura  
Project Manager  
M & E Pacific, Inc.  
841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813



Dear Mr. Nishimura:

Subject: Hawaii Fire Administration Support Complex  
Early Consultation  
TMK: 2-4-001: por. 168

The proposal to develop the first phase of the Administration Support Complex (Fire Administration Building, Emergency Dispatch Building, Fire Preparation and Training Building, parking, open training area, and court yard area) is not anticipated to significantly impact any State transportation facilities.

However, the Draft Environmental Assessment (Draft EA) should include a traffic assessment to evaluate and recommend any traffic mitigation measures or roadway improvements that may be needed with the full buildout of the master planned development. Copies of the Draft EA should be provided to the Highways Division Planning Branch in Honolulu and to the Highways Division Hawaii District Office in Hilo for their review and comments.

We appreciate the opportunity to provide comments.

Very truly yours,

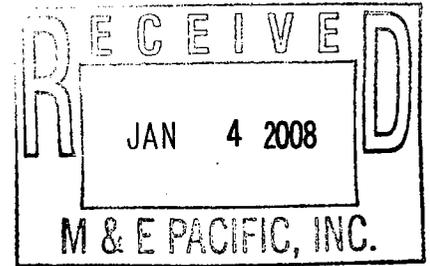
*Francis Paul Keeno*

*for* BRENNON T. MORIOKA, PH.D., P.E.  
Acting Director of Transportation

c: Bruce McClure, Hawaii Department of Public Works  
Christopher Yuen, Hawaii Department of Planning  
Darryl Oliveira, Hilo Fire Department



**STATE OF HAWAII**  
**OFFICE OF HAWAIIAN AFFAIRS**  
711 KAPI'OLANI BOULEVARD, SUITE 500  
HONOLULU, HAWAII 96813



HRD07/3441

December 31, 2007

Michael S. Nishimura, Project Manager  
M&E PACIFIC, INC.  
841 Bishop Street, Suite 1900  
Honolulu, Hawai'i 96813

**RE: Request for Review of Proposed County of Hawai'i Fire Administration Support Complex TMK: (3) 2-4-001:por. 168**

Aloha nō e Mr. Nishimura,

The Office of Hawaiian Affairs ("OHA") is in receipt of your December 17, 2007 transmittal request for review of the above-referenced project, and offers the following comments:

As you may already know, the Hawai'i State Constitution requires all local governmental entities to protect and preserve Native Hawaiian cultural assets and sites, burials and funerary objects, traditional practices and access rights, among other things. This mandate also constitutes one of OHA's primary kuleana.

The Environmental Assessment ("EA"), in accordance with Chapter 343 of the Hawaii Revised Statutes, should include a Cultural Impact Assessment ("CIA"). In accordance with the requirement of Act 50, Session Laws of Hawaii 2000, a CIA shall include information relating to the practices and beliefs of the Native Hawaiians who once inhabited the area(s), and it is recommended that community involvement be included in this assessment. We refer you to Lukela Ruddle, Cultural Resource Coordinator in OHA's Hilo office, who can be reached at (808) 920-6419, to further assist you in this project area.

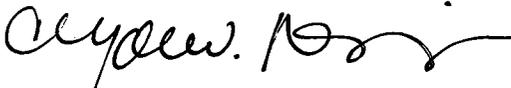
OHA asks that, in accordance with Section 6E-46.6, HRS and Chapter 13-300, Hawaii Administrative Rules, if the project moves forward, and if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the State Historic Preservation Division (SHPD) shall be contacted. OHA would also like to be notified.

Michael S. Nishimura, Project Manager  
M&E PACIFIC, INC.  
December 31, 2007  
Page 2

Upon completion of this vital segment to the project, OHA thanks you in advance and respectfully requests a hardcopy of any EA draft(s), if feasible, addressed to my attention. OHA hopes to be consulted on this matter in the future as more information becomes available and the project progresses.

Thank you for the opportunity to comment. If you have any further questions, please contact Jerome Yasuhara, Policy Advocate in the Native Rights, Land and Culture Hale, at 594-0239 or via email at [jeromey@oha.org](mailto:jeromey@oha.org).

‘O wau iho nō, me ka ha‘aha‘a,

A handwritten signature in black ink, appearing to read "Clyde W. Nāmu'o", with a stylized flourish at the end.

Clyde W. Nāmu‘o  
Administrator

C: Lukela Ruddle, OHA—Hilo Office

Harry Kim  
Mayor



Bobby Jean Leithead-Todd  
Director

Nelson Ho  
Deputy Director

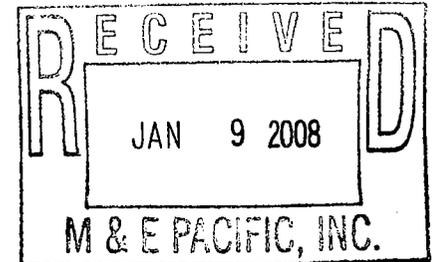
## County of Hawai'i

### DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

25 Aupuni Street • Hilo, Hawai'i 96720  
(808) 961-8083 • Fax (808) 961-8086  
[http://co.hawaii.hi.us/directory/dir\\_envmng.htm](http://co.hawaii.hi.us/directory/dir_envmng.htm)

January 4, 2008

Mr. Michael S. Nishimura, P.E.  
Project Manager  
Metcalf & Eddy, Inc.  
841 Bishop St., Suite 1900  
Honolulu, HI 96813



**SUBJECT: REQUEST FOR REVIEW OF PROPOSED COUNTY OF HAWAII FIRE  
ADMINISTRATION SUPPORT COMPLEX  
TMK: 2-4-001:PORTION 168**

We have reviewed the subject request and have the following comments to offer:

#### Wastewater Division

1. The County wastewater collection system is located on Kahikini Street.
2. Please use the Wastewater Division Design Checklist as a guide should you decide to connect to our system.
3. A meeting with our Wastewater Division staff is highly recommended prior to the start of planning and design phases.
4. Please submit a wastewater master plan study for the entire parcel prior to the start of planning and design.

Should you have Wastewater questions, please call Bert Saito, Wastewater Division Chief at 808-961-8513 or Ms. Toni Nakatani at 808-961-8512.

#### Solid Waste Division

1. Commercial operations, State and Federal agencies, religious entities and non-profit organizations may not use transfer stations for disposal.
2. Aggregates and any other construction/demolition waste should be responsibly reused to its fullest extent.
3. Ample and equal room should be provided for rubbish and recycling.
4. Greenwaste may be transported to the green waste sites located at the Hilo transfer station, or other suitable diversion programs.
5. Construction and demolition waste is prohibited at all County of Hawai'i Transfer Stations.
6. Submit a Solid Waste Management Plan in accordance with the attached guidelines.

10311A

If these comments are addressed in the EA, it may save time during the planning permit process. If you require additional Solid Waste Division information or assistance, please contact Mike Dworsky, Solid Waste Division Chief at 808-961-8515.

Thank you for allowing us the opportunity to provide comments on this project.

Sincerely,

A handwritten signature in black ink that reads "Bj Leithead Todd". The signature is written in a cursive, flowing style.

Bobby Jean Leithead Todd  
DIRECTOR

enclosures

cc: Bert Saito, P. E., WWD Chief  
Mike Dworsky, P.E., SWD Chief

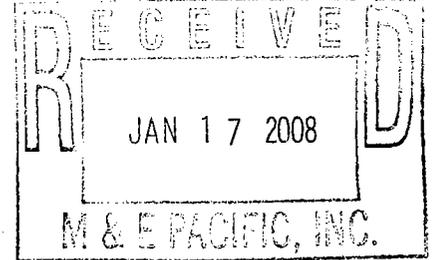
**Harry Kim**  
Mayor



**Darryl J. Oliveira**  
Fire Chief

**Glen P.I. Honda**  
Deputy Fire Chief

**County of Hawai'i**  
**HAWAII FIRE DEPARTMENT**  
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720  
(808) 981-8394 • Fax (808) 981-2037



January 10, 2008

Mr. Michael S. Nishimura  
Metcalf & Eddy Pacific, Inc.  
841 Bishop Street  
Suite 1900  
Honolulu, Hawaii 96813

SUBJECT: Environmental Assessment  
Hawaii Fire Dept Administration Support Complex  
TMK: (3) 2-4-001:por. 168.

---

We have no comments to offer at this time in reference to the above-mentioned environmental assessment.

  
DARRYL OLIVEIRA  
Fire Chief

DJO:lpc



Harry Kim  
Mayor



Lawrence K. Mahuna  
Police Chief

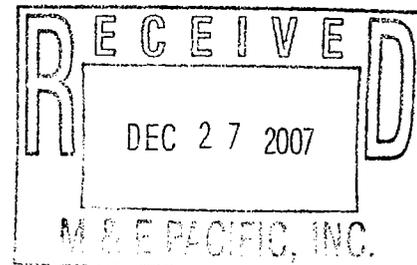
Harry S. Kubojiri  
Deputy Police Chief

## County of Hawaii

### POLICE DEPARTMENT

349 Kapiolani Street • Hilo, Hawaii 96720-3998  
(808) 935-3311 • Fax (808) 961-8865

December 20, 2007



Mr. Michael S. Nishimura  
Project Manager  
M&E Pacific, Inc.  
841 Bishop Street, Suite 1900  
Honolulu, Hawai'i 96813

Dear Mr. Nishimura:

This responds to your December 17, 2007, request for comments on the proposed construction of the County of Hawai'i Fire Administration Support Complex on a property located at the corner of Mohouli Street, in Hilo.

This proposed project does not appear to impact any of our existing or proposed projects, plans, policies, or programs. The only concern we would have is to ensure adequate parking for staff as the plan calls for our Communications-Dispatch staff to be relocated to the Dispatch Building.

Thank you for providing us the opportunity to provide comments on this project. Should you have any questions, feel free to contact Assistant Chief Paul Ferreira of our Administrative Bureau at (808)961-2261.

Sincerely,

LAWRENCE K. MAHUNA  
POLICE CHIEF

pkf

**Harry Kim**  
Mayor

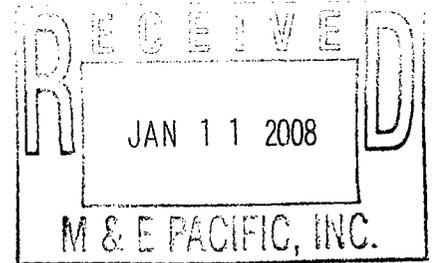


**Christopher J. Yuen**  
Director

**Brad Kurokawa, ASLA**  
**LEED® AP**  
Deputy Director

**County of Hawaii**  
**PLANNING DEPARTMENT**

101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-4224  
(808) 961-8288 • FAX (808) 961-8742



January 4, 2008

Mr. Michael S. Nishimura, Project Manager  
M&E Pacific, Inc.  
841 Bishop Street, Suite 1900  
Honolulu, HI 96813

Dear Mr. Nishimura:

**Subject: Environmental Assessment (EA) Pre-Consultation**  
**Project: County of Hawaii Fire Administration Support Complex**  
**Tax Map Key: (3) 2-4-001: por. 168**

---

This is in response to your letter dated December 17, 2007, in which you requested consultation on the proposed development.

The subject property is located in the State Land Use (SLU) Agriculture District. The County zoning designation for the property is A-1a (Agricultural District, minimum building site of 1 acre). However, the property is not prime or unique farmland and is not designated as Agricultural Lands of Importance to the State of Hawaii (ALISH). Moreover, Hawaii County Code Section 25-4-11 permits "public uses, structures and buildings" in any zoning district, provided that the Planning Director has issued plan approval for such use.

A portion of the property appears to be within the FEMA flood zone. Contact the County of Hawaii, Department of Public Works, Engineering Division at (808) 961-8327 to verify if the proposed structure(s) will be located within the flood zone.

Because of the property's proximity to residential development, please address in the Environmental Assessment proposed mitigation of light and noise pollution, particularly from the open training area.

Mr. Michael S. Nishimura, Project Manager  
M&E Pacific, Inc.  
Page 2  
January 4, 2008

Please provide this office with a copy of the draft EA upon its publication. Should you have questions, please contact Ron Whitmore of my staff at 961-8288, extension 250.

Sincerely,

A handwritten signature in black ink, appearing to read 'Chris Yuen', written in a cursive style.

CHRISTOPHER J. YUEN  
Planning Director

RW:cd

P:\wpwin60\RWhitmore\EA-EIS\COH Fire Admin 2-4-1-168 Pre-cmnts.doc

cc: David Yamamoto, Department of Public Works-Building Division

**M&E Pacific, Inc.**

841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

January 8, 2008

Pualani Kanaka`ole Kanahele  
Ke Po`ohala (Hawaiian Life Styles Department)  
Hawai`i Community College  
Building 380, Room 34  
200 West Kāwili Street  
Hilo, HI 96720

Dear Mrs. Pua Kanahele,

**Subject: Request for Review of Proposed County of Hawai`i Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

The first phase of the proposed County of Hawai`i Fire Department Administration Support Complex includes a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. A general location map and a schematic site map of the phase 1 facilities for the proposed project area are attached for your information and review.

We are currently in the process of preparing an Environmental Assessment (EA). Lukela Ruddle of the OHA Hilo office referred us to you for your help in completing a Cultural Impact Assessment which will be included in the EA. We are asking for your help on this project to identify potential impacts, if any, on past and present Native Hawaiian people or practices. A Cultural Assessment Interview Form and self addressed, stamped envelope is attached for your use. We would appreciate any written comments regarding any cultural concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

**M&E Pacific, Inc.**  
841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

January 9, 2008

Punahale Lerma  
Pua Lane  
71 Banyan Drive  
Hilo, HI 96720

Dear Mr. Puna Lerma,

**Subject: Request for Review of Proposed County of Hawai'i Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

The first phase of the proposed County of Hawai'i Fire Department Administration Support Complex includes a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. A general location map and a schematic site map of the phase 1 facilities for the proposed project area are attached for your information and review.

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Should you have any questions or comments, please contact either Justin Privett or me via postal mail, electronic mail or facsimile. Electronic mailings should be sent to either of the following two addresses:

Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

**M&E Pacific, Inc.**  
841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

January 11, 2008

Chiyomi Leina'ala Fukino, M.D.  
1250 Punchbowl St.  
Honolulu, Hawaii 96813

Dear Dr. Chiyomi Fukino,

**Subject: Request for Review of Proposed County of Hawai'i Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

The first phase of the proposed County of Hawai'i Fire Department Administration Support Complex includes a Fire Administration Building, an Emergency Dispatch Building, a Fire Preparation and Training Building, parking, open training area, and a court yard area. The master plan development also includes a museum, covered training area, warehouse, and fire station; however, the specifics of these facilities have not been finalized. A general location map and a schematic site map of the phase 1 facilities for the proposed project area are attached for your information and review.

We are currently in the process of preparing an Environmental Assessment (EA), and we ask for your assistance in completing a Cultural Impact Assessment which will be included in the EA. We are asking for your help on this project to identify potential impacts, if any, on past and present Native Hawaiian people or practices. A Cultural Assessment Interview Form and self addressed, stamped envelope is attached for your use. We would appreciate any written comments regarding any cultural concerns you may have towards the proposed project within 30 days from the date of this letter and will assume that your office has no comments on the proposed project if we receive no correspondence within 30 days from the date of this letter.

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Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

**M&E Pacific, Inc.**  
841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

January 11, 2008

Hilo Hawaiian Civic Club  
PO Box 543  
Hilo HI 96721

Dear Pelekikena of the Hilo Hawaiian Civic Club,

**Subject: Request for Review of Proposed County of Hawai'i Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,  
M&E PACIFIC, INC.



Michael S. Nishimura  
Project Manager

**M&E Pacific, Inc.**  
841 Bishop Street, Suite 1900  
Honolulu, Hawaii 96813  
T 808.521.3051 F 808.524.0246 www.m-e.aecom.com

January 11, 2008

Native Hawaiian Legal Corporation  
1164 Bishop Street, Suite 1205  
Honolulu, HI 96813

Dear Native Hawaiian Legal Corporation,

**Subject: Request for Review of Proposed County of Hawai'i Fire Administration Support Complex  
TMK: (3) 2-4-001: por. 168**

The County of Hawaii Fire Department is proposing to develop an Administration Support Complex on Mohouli Street near the intersection with Kukuau Street in Hilo on the Island of Hawaii. M&E Pacific has been contracted to prepare an Environmental Assessment (EA) for this development. The project is a 5 acre portion of TMK (3)2-4-001: 168.

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Mike.Nishimura@m-e.aecom.com  
Justin.Privett@m-e.aecom.com

Thank very much for your time and assistance.

Sincerely,

M&E PACIFIC, INC.



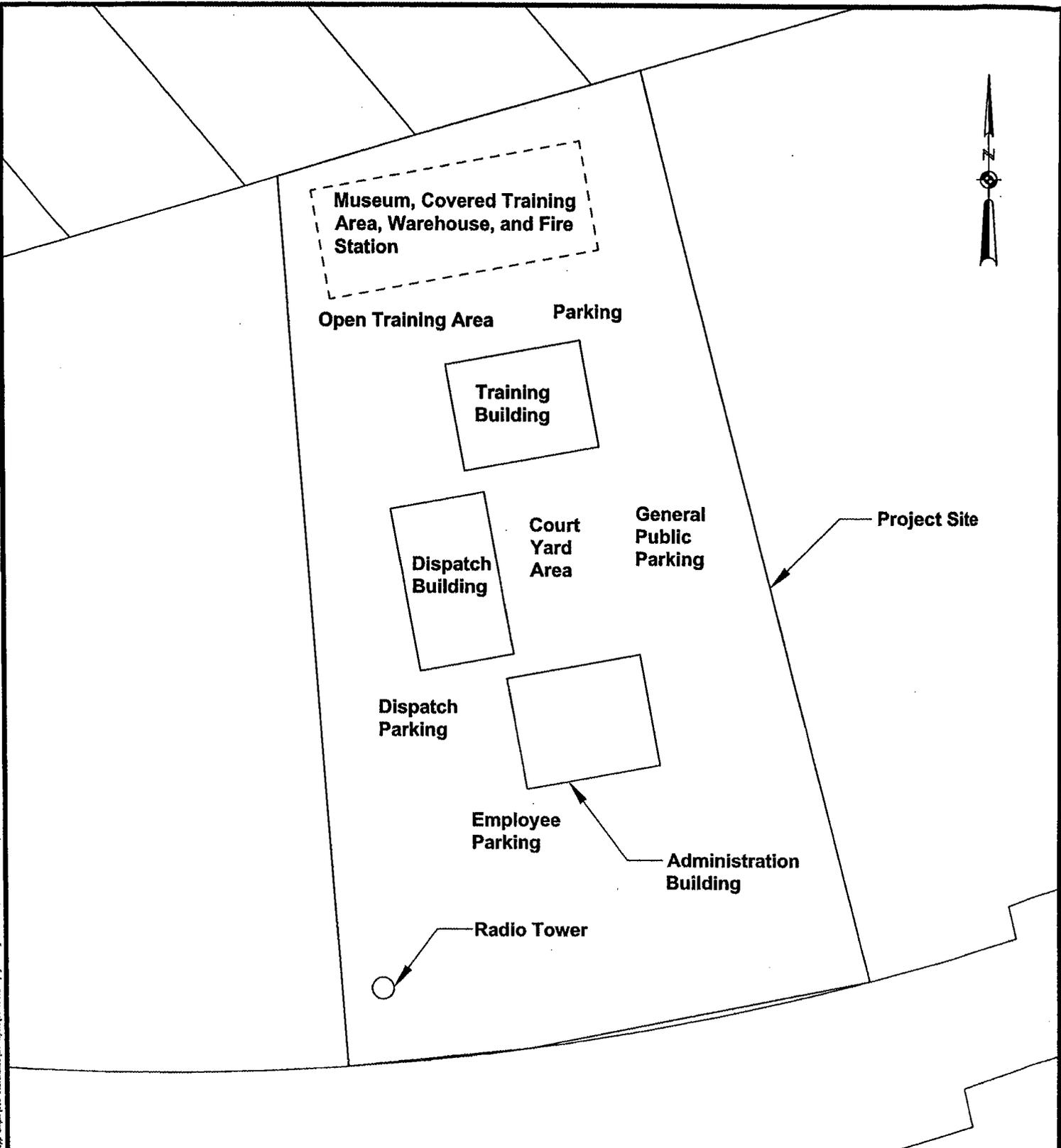
Michael S. Nishimura  
Project Manager

Enclosures: (1) Location Map  
(2) Phase 1 Schematic Site Map  
(3) Cultural Assessment Interview Form

cc: Project File  
David Yamamoto, County of Hawaii, Department of Public Works, Building Division  
Harold Inouye, Anabe, Aruga & Ishizu, Architects, Inc.

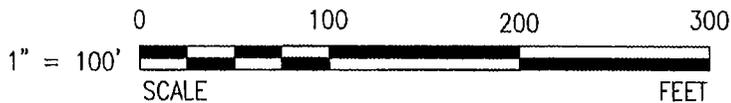


PLOT DATE: December 17, 2007 @ 12:18:18 pm  
PROJECT NAME: P:\Projects\hawaii\60036559 AM COH Fire Dept Admin Supp Cmpht\500 Deliverables\EA Report\Consultant\figs\fig2\December 17, 2007 @ 12:17:14 pm



# SCHEMATIC SITE MAP

SCALE: 1" = 100'



## M&E Pacific, Inc.

METCALF & EDDY

DAVIES PACIFIC CTR, STE 1900 • 841 BISHOP ST, HONOLULU, HAWAII 96813

### Figure 2 SCHEMATIC SITE MAP

Environmental Assessment for the  
Fire Administration Support Complex  
December 2007

# M&E Pacific, Inc.

METCALF & EDDY

DAVIES PACIFIC CTR, STE 1900 • 841 BISHOP ST, HONOLULU, HAWAII 96813

## Cultural Assessment Interview Form

<b>Name of Project:</b> County of Hawai'i, Department of Public Works <i>Fire Administration Support Complex</i> <i>Hilo, Island of Hawai'i, Hawai'i</i>		<b>TMK:</b> (3)2-4-001:168 [portion]
<b>Name of Interviewee(s):</b>		<b>Phone #(s):</b>
<b>Interviewer(s):</b> Justin K. Privett	<b>Date/Time:</b>	<b>Via Phone:</b> _____ <b>Via Mail:</b> _____ ✓ <b>In Person:</b> _____
<b>A. Personal Information and Geographic Identity</b>		
<input type="checkbox"/> Native Hawaiian <input type="checkbox"/> Resident <input type="checkbox"/> Agriculture <input type="checkbox"/> Community Organizations <input type="checkbox"/> Islandwide Organization <input type="checkbox"/> Other (explain)	<u>Geographic Identity</u>	
<p>A.1. Could you please provide some personal background information. (You do not have to answer if you are uncomfortable with the question.)</p> <p>a. Where were you born?</p> <p>b. How long have you lived on the Island of Hawai'i or in the vicinity of the subject property?</p> <p>c. Could you tell us about your family?</p>		

A.2. Could you please tell us your connection to the subject property area?

A.3. Could you provide any other information that may be pertinent to the subject property, such as:

- a. Membership in clubs or organizations.
- b. Interest in or expertise in.

A.4. Do you have any strong memories or feelings with the subject property?

**B. Activities on Project Site and Environs**

B.1. Do you use the proposed project site or surrounding area(s)? If so, for what and how often?

B.2. Do you know of any cultural practices that are or have been carried out on or near the proposed project site?

C.2. If the proposed project proceeds, what cultural concerns should be considered in the development plans?

D. Other comments:

## INTERVIEW SUMMARY AND CONSENT

**Job Name:** County of Hawai'i, Department of Public Works  
*Fire Administration Support Complex*  
Hilo, Island of Hawai'i, Hawai'i

**Person Interviewed:** \_\_\_\_\_

**Date of Interview:** \_\_\_\_\_

**Interviewer:** Justin K. Privett

**Purpose of Interview:** Assess the cultural history of the project area.

I hereby give permission to M & E Pacific, Inc. to use the information from this interview in preparing a cultural impact assessment report for the subject project. I understand that appropriate credit will be provided in the cultural impact assessment report.

By: \_\_\_\_\_  
Print Name

Signature: \_\_\_\_\_

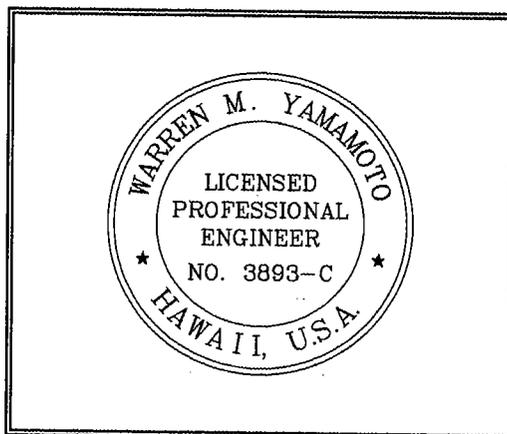
Date: \_\_\_\_\_

**County of Hawai'i**  
**Fire Administration Support Complex**  
Hilo, Island of Hawai'i, Hawai'i

**Traffic Impact Analysis Report**

**TMK: (3)2-4-001: Por. 168**

February 2008



Expiration Date:  
April 30, 2008

This work was prepared by me or under my direct supervision.

Signature  
M & E Pacific, Inc.  
METCALF & EDDY | AECOM

13 FEB 2008  
Date

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# Traffic Impact Analysis Report

for

**County of Hawai'i**  
**Fire Administration Support Complex**  
Hilo, Island of Hawai'i, Hawai'i

**Tax Map Key Number (3)2-4-001: Por. 168**

**FEBRUARY 2008**

*Prepared for:*

**County of Hawai'i**  
**Department of Public Works, Building Division**  
**Aupuni Center, 101 Pauahi Street, Suite 7**  
**Hilo, Hawai'i 96720-4224**

*Prepared by:*

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METCALF&EDDY | AECOM

**Davies Pacific Center, 841 Bishop Street**  
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**TRAFFIC IMPACT ANALYSIS REPORT**  
**for the**  
**COUNTY OF HAWAII**  
**FIRE ADMINISTRATION SUPPORT COMPLEX**

The County of Hawai'i Fire Department is proposing a Fire Administration Support Complex in Hilo, Hawai'i. This report documents a study that was conducted to identify the traffic impacts of the proposed project and to recommend any mitigating measures.

**PROJECT DESCRIPTION**

The County of Hawai'i Fire Department is proposing a Fire Administration Support Complex in Hilo, Hawai'i, to centralize its administrative units, safeguard the functions of emergency dispatch, and ensure the proper training of its personnel. The project site is on a 5.0 acre site on Mohouli Street mauka of Komohana Street, as shown on **Figure 1**. The proposed project site is identified as Tax Map Key (3)2-3-001: portion 168.

The primary complex would consist of three buildings:

- 1) Fire Support Building housing the personnel and staff of the Fire Chief, the Fiscal Division, Personnel Division, Fire Prevention Bureau, and the Emergency Medical Services Bureau.
- 2) Emergency Dispatch Building housing the personnel and equipment that provide for the receiving and dispatching of emergency calls to all fire units throughout the island and would be available 24/7.
- 3) Fire Preparation and Training Building with classrooms and offices for staffs of the Training Division, the Volunteer Training Division and the Water Safety Division.

In addition, the site is master planned for future development to include a museum, covered training area, warehouse, and fire station.

The proposed project is expected to be occupied in two years or sooner and would be expanded over a 20 year period. The proposed staffing and building area requirements are summarized on **Table 1**. Therefore, traffic forecasts were prepared for 2010, 2017 and 2027 study periods.

Access to the project site would be through a 50-foot roadway right of way on the eastern boundary of the site. Other roadways in the area include Komohana Street and Kukuau Street. The major intersections in the vicinity that would be affected by project generated traffic include the Komohana Street and Kukuau Street intersections with Mohouli Street, and the Komohana Street/Kukuau intersection. **Figure 1**, Location Map, shows the project site in relationship to the three study intersections.

## **EXISTING CONDITIONS**

A survey of the existing roadway and traffic conditions was made in December 2007.

### **Existing Roadways**

The roadways of interest in the project area are Mohouli Street, Komohana Street, and Kukuau Street. Mohouli Street and Komohana Street are two-lane County roadways classified as major collectors while Kukuau Street is a minor collector roadway.

Mohouli Street provides mauka to makai access between Kaumana Drive and Kilauea Street. The older portion of roadway makai of Komohana Street runs through a residential neighborhood and has a posted speed limit of 35 miles per hour (mph). The roadway was extended mauka from Komohana Street to the Kaumana Drive/Ainako Avenue intersection in about 2002. The newer section of roadway has wide shoulders that could be used to widen Mohouli Street to four lanes and has a posted speed limit of 45 mph. The lands adjoining this section of roadway are currently mostly vacant. The new section of roadway provides residents of Kaumana and Ainako with an alternate access route to the south and west sections of Hilo.

Komohana Street runs in a general north to south direction between Waianuenu Avenue and Ainaola Drive. The portion of roadway south of Puainako Street generally passes through residential areas while the northern section adjoins vacant lands. The posted speed limit is 45 mph. Komohana Street serves as a commuter route for residents in the south and west sections of Hilo to reach downtown Hilo.

Kukuau Street is a two-lane County collector road. The older section of the roadway makai of Komohana Street dead-ends in a residential neighborhood area. The newer roadway section mauka of Komohana Street provides access to a mauka residential subdivision. The extension of Mohouli Street created a new intersection on this roadway. The posted speed limit on this roadway is 35 mph.

The Komohana Street/Mohouli Street intersection is signalized with protected left turn movements on the Mohouli Street approaches and protected/permitted left turns on the Komohana Street approaches. The northbound Komohana Street and eastbound Mohouli Street approaches have separate left turn, through, and right turn lanes. The southbound Komohana Street and westbound Mohouli Street approaches have separate left turn and shared through/right turn lanes.

The Komohana Street/Kukuau Street intersection has stop sign controls on the Kukuau Street approaches. Both Komohana Street approaches and the Kukuau Street westbound approach have separate left turn and shared through/right turn lanes. The Kukuau Street eastbound approach has a single shared lane.

The Mohouli Street/Kukuau Street intersection has stop sign controls on the Kukuau Street approaches. Both Mohouli Street approaches have separate left turn and shared through/right turn lanes while the Kukuau Street approaches are single shared lanes.

### Traffic Volumes

Traffic turning movement counts were taken at the three study intersections from December 11-13, 2007, to determine existing traffic conditions. Traffic counts were taken during the morning (6:30 to 8:30 AM) and afternoon (3:30 to 5:30 PM) peak periods. Traffic turning movement counts require a traffic surveyor to observe traffic flow and record the movements of each vehicle crossing the intersection as through or turning movements by 15-minute intervals. The worksheets for these traffic counts are included in **Appendix A**.

The morning counts from 7:00 to 8:00 AM and afternoon counts from 4:15 to 5:15 (and 4:30 to 5:30) PM are shown on **Figure 2**, with volumes rounded to the nearest five vehicles per hour (vph) except for volumes less than five. The main direction of travel in the morning peak is northbound on Komohana Street and makai bound on Mohouli Street. The main directions of travel reverse in the afternoon peak hour. The morning northbound traffic flow on Komohana Street is currently constrained by the backup of traffic from the Ponahawai Street intersection, the next signalized intersection to the north.

The traffic volumes on the Kukuau Street approaches can be described as light. The main direction of travel in the morning is makai bound out of the subdivision. The afternoon direction of travel shifts to mauka bound into the subdivision. The current traffic operations at the three study intersections are discussed in the **Level of Service Analysis** section.

The State of Hawai'i Department of Transportation (State DOT) used to take traffic counts every two years at selected roadway sections on the island of Hawai'i under their previous counting program. One of these count stations is at the Puainako Street/Komohana Street intersection (Station 18-Z), about one-half mile south of the Mohouli Street intersection. Five daily traffic volumes were available for the ten year period from 1994 to 2004, with data for the year 2000 not reported. The data shown on **Figure 3** gives the historical trend of daily traffic at this location on the north leg of Komohana Street and the makai leg of Puainako Street. The graph shows a gradual

increase in traffic from 1994 to 2004. Daily two-way traffic volumes on Komohana Street increased 14.8% in 10 years for an annual compound growth rate of 1.39%, while daily traffic on Puainako Street increased 7.0% for an annual rate of 0.7%.

The pattern of hourly traffic volumes on Komohana Street on June 16, 2004, is shown in tabular and graph form on **Figure 4**. The morning northbound traffic flow has a steep one hour peak at 7:00 AM, and remains at a lower but relatively stable level until 6:00 PM. The southbound traffic shows a small morning peak, a moderate midday peak, and a high afternoon peak at 4:00 PM.

The State DOT also took a one time traffic count at the Komohana Street/Mohouli Street intersection on July 23, 2002. The pattern of hourly traffic volumes on Mohouli Street is shown in tabular and graph form on **Figure 5**. Like Komohana Street, there is a sharp makai bound peak in the morning and a sharp mauka bound peak in the afternoon.

### **PROPOSED ROADWAY IMPROVEMENTS**

The County of Hawai'i has two roadway improvements planned in the study area. The County determined that traffic signals were warranted at the Mohouli Street/Kumukoa Street intersection (one block east of Komohana Street) and is in the process of installing them.

The County has included the improvement (widening) of Mohouli Street from Komohana Street to Kino'ole Street in the FY 2008-2013 Financially Constrained Statewide Transportation Improvement Program (STIP). The design is programmed for Fiscal Year (FY) 2009 and construction in FY 2013. Projects listed in FYs 2012 and 2013 are considered for information only.

The State DOT is also pursuing the realignment and widening of Puainako Street from Komohana Street to Kanoelehua Avenue. Their efforts are being expended in a generally mauka to makai direction. The first phase involves the realignment of Puainako Street between Komohana Street and Kawili Street to the north so that the new roadway would be north of residences lining the existing roadway, which would

then become a local street. The STIP shows right-of-way acquisition programmed in FY 2013. Future phases would involve widening Puainako Street makai of Kawili Street.

## TRAFFIC FORECASTS

The proposed project is scheduled for occupancy in two years from 2007 and would be expanded over a 20-year planning horizon. During the 20-year period from the 2007 traffic count date to full development, ambient traffic on the area roadways can be expected to increase due to regional growth and new projects in the area. The traffic that would be generated from the proposed project was added to the ambient traffic forecast to obtain the total with project traffic forecasts for the three study forecast years.

### Ambient Traffic Forecast

Ambient traffic on the study area roadways will increase due to regional growth in the adjoining areas and new projects in the study area. A two-step process was used to develop the ambient traffic forecasts. The first step developed a background traffic forecast based on regional traffic growth and committed projects. The second step added traffic which would be generated by proposed development on the University of Hawai'i at Hilo (UHH) mauka property.

For the first forecast year 2010, traffic growth was assumed to come from regional growth and three UHH projects. The existing traffic volumes shown on **Figure 2** were increased by 4.2% to represent regional growth. This number represents the 1.39% annual growth rate observed in traffic on Komohana Street as shown on **Figure 3** over a three year period. Traffic which would be generated onto Komohana Street by three proposed UHH projects as forecast by their traffic studies were included as listed below:

- China-U.S. Center
- U.S. Department of Agriculture Pacific Basin Agricultural Research Center
- UH-Hilo Ka Haka 'Ula O Ke'elikolani Hawaiian Language Building

The results of the forecasts are shown on **Figure 6** with volumes rounded to the nearest five vehicles per hour (vph) except for volumes less than five. It was assumed that development on the UHH mauka property will not begin by 2010; therefore this background forecast is also the ambient traffic forecast for 2010.

The background traffic for the second and third forecast years of 2017 and 2027, respectively, included the regional increase in traffic, the traffic from the three UHH projects listed above, and traffic generated by the fully developed UHH Research Park as forecast by its traffic study. The 2017 forecasts were obtained by increasing the existing traffic by 14.8% (1.39% over 10 years), adding the traffic generated by the three UHH projects, and including the traffic generated by a fully developed UHH Research Park. The results of the 2017 background forecasts are shown on **Figure 7** with volumes rounded to the nearest five vehicles per hour (vph) except for volumes less than five.

For the third forecast year 2027, the rate of general traffic growth was assumed to decrease to 1.0% annually, more in line with the population growth rate projected for South Hilo in the County of Hawaii General Plan. The 2017 traffic volumes were increased by 10.5% representing a 1% growth rate over ten years and traffic from the UHH projects added. The results of the 2027 background forecasts are shown on **Figure 8** with volumes rounded to the nearest five vehicles per hour (vph) except for volumes less than five.

The State of Hawai'i owns a 267 acre parcel across Mohouli Street from proposed project site known as the UH Hilo Mauka Lands. This parcel consists of 118 acres for the University Park Expansion, 122 acres for the Hawai'i Community College (HCC) Komohana Campus, and 28 acres for other University-related functions. A master plan has been developed for the University Park Expansion but no development timetable has been established. A traffic study was prepared for the HCC campus which assumed full development in 2025. The primary access points to the mauka lands would be from Komohana Street via Nowelo Street and from the Puainako Street Extension. A secondary access point would be from the Mohouli Street Extension. The

location of this access roadway has not been determined and its relative location to the proposed project access roadway is not known. Based on this information, preliminary traffic estimates were forecast based on the following assumptions for the development of this parcel:

- 1) The HCC campus would be fully developed by 2025. It would generate 60% of the fully developed traffic in 2017.
- 2) The University Park Expansion would continue the research park uses of the current University Park. It would begin development in 2010 and be fully developed by 2027. The property would be 42% developed (49 acres) by 2017.

The 2025 traffic assignment forecasts from the Traffic Impact Analysis Report University of Hawaii at Hilo Komohana-Mauka Hawaii Community College Komohana Campus, (August 2004) by Julian Ng, Inc., were used for the proposed HCC campus. For the 2017 forecast year, 60% of the 2025 forecasts were used.

The traffic that would be generated by the University Park Expansion was added to the above traffic assignments. The three-step process of trip generation, trip distribution, and trip assignment was used to forecast future traffic that would be generated by the University Park Expansion. The trip generation step forecasts the volume of vehicle trips that would be generated by the proposed project during the morning and afternoon peak periods. The Institute of Transportation Engineers Trip Generation (Seventh Edition, 2003) has trip generation equations or rates to calculate the number of AM and PM peak hour trips that would be generated by various land uses. The handbook also provides the percentage of inbound and outbound trips in each peak hour. The trip generation rate per acre for a research and development center (Land Use code 760) and inbound/outbound percentages are as follows:

	AM PEAK	PM PEAK
Trips/acre	16.77	15.44
Inbound %	84%	12%
Outbound %	16%	88%

The University Park Expansion is forecast to generate 822 AM trips and 757 PM trips in 2017, and 1,979 AM trips and 1,822 PM trips in 2017. The trip distribution step divides the generated trips by directions of travel to/from the project site(s). The trip distribution splits shown in the Ng report were assumed for the University Park Expansion and the proposed Fire Administration Support Complex, and are summarized on **Table 2**, Trip Generation and Trip Distribution Analysis for the proposed project. The project generated traffic volumes were assigned to the study area network based on the directions of travel. The traffic assignments for the University Park Expansion were added to the traffic assignments for the HCC campus to obtain the UHH Mauka Property Generated Traffic for 2017 (**Figure 9**) and for 2027 (**Figure 10**) with volumes rounded to the nearest five vph.

The 2017 UHH Mauka Lands generated traffic forecasts (**Figure 9**) were added to the 2017 background traffic forecasts (**Figure 7**) to obtain the 2017 ambient traffic forecast shown on **Figure 11**. Likewise, the 2027 UHH Mauka Lands generated traffic forecasts (**Figure 10**) were added to the 2027 background traffic forecasts (**Figure 8**) to obtain the 2027 ambient traffic forecast shown on **Figure 12**. The traffic operations for the ambient forecast conditions at the three study intersections are discussed in the **Level of Service Analysis** section.

### Project Generated Traffic

The traditional three-step process of trip generation, trip distribution, and trip assignment was used to forecast future traffic that would be generated by the proposed project. The trip generation step forecasts the number of new trips that would be produced in each of the two study periods. The trip distribution step allocates these new trips by direction of travel. Finally, the trip assignment step assigns the trips to the specific turning movements at the study intersections.

The trip generation step forecasts the volume of vehicle trips that would be generated by the proposed project during the morning and afternoon peak periods. The trip generation rates for a government office complex (land use code 733) as found in the Institute of Transportation Engineers (ITE) Trip Generation report were used for the

proposed project. The number of trips generated in 2010, 2017, and 2027 based on projected floor area are shown on **Table 2**.

The proposed fire Administration Support Complex is forecast to generate 48 trips in the 2010 morning peak and 62 trips in the afternoon peak. The number of trips generated would increase to 57 in the morning peak and 73 in the afternoon peak when project is fully developed in 2027. The Trip Generation report also provides trip generation rates based on number of employees which resulted in a lower number of trips. The higher estimate based on building area was used in the traffic analysis.

The trip generation analysis did not include proposed future land uses: museum, covered training area, warehouse, and fire station. These land uses were master planned on the site but were not shown on the proposed plan. These types of land uses generally do not generate trips during the peak hours however result in trips that are more oriented to the business hours between the morning and afternoon peaks.

The trip distribution step divides the generated trips by directions of travel to/from the project site(s). The trip distribution percentages used in the aforementioned Ng traffic study for HCC were utilized for this study and adopted to its study network, and are summarized on **Table 2**. Half of the trips are forecast to travel to/from the south approach of Komohana Street. The combined total volumes may not add up to the sum of the individual components of generated trips due to rounding.

The project generated traffic volumes were assigned to the study area network based on the directions of travel and the access routes. The results of the traffic assignment analysis are shown on **Figures 13 to 15** for 2010, 2017 and 2027, respectively, with the volumes not rounded.

#### Total Forecast Volumes

The project generated traffic assignment volumes were added to the ambient traffic forecasts to obtain the total with project traffic forecasts. The 2010 project generated traffic assignment volumes from **Figure 13** were added to the ambient traffic forecasts from **Figure 7** to obtain the 2010 total with project traffic forecasts shown on **Figure 16**.

The 2017 project generated traffic assignment volumes from **Figure 14** were added to the ambient traffic forecasts from **Figure 11** to obtain the 2017 total with project traffic forecasts shown on **Figure 17**. The 2027 project generated traffic assignment volumes from **Figure 15** were added to the ambient traffic forecasts from **Figure 12** to obtain the 2027 total with project traffic forecasts shown on **Figure 18**. The traffic volumes are rounded to the nearest five vph except for volumes less than five.

### **LEVEL OF SERVICE ANALYSIS**

The concept of level of service is used to quantify the quality of traffic flow on roadway facilities. The Transportation Research Board (TRB) has developed procedures to calculate level of service value(s) by measuring traffic volumes against the capacities of different types of roadway facilities. Their Highway Capacity Manual 2000 (HCM2000) describes the various procedures developed for freeways, highways, signalized and unsignalized intersections, etc.

Two of the study intersections on Kukuau Street are currently unsignalized. The procedure used for analyzing unsignalized intersections calculates vehicle delays and levels of service based on the distribution of gaps in traffic on the major street and driver judgment in selecting gaps through which to execute turns. For two-way stop intersections where only the minor street traffic is controlled by a stop sign, levels of service are calculated for the critical turning movements including outbound movements from the stop-controlled approach, and left turns from the major street to the minor street. The procedure does not calculate an overall intersection level of service.

The Highway Capacity Manual defines the relationship between level of service and delay (in seconds/vehicle) for unsignalized intersections as shown below:

LEVEL OF SERVICE	DELAY (Seconds/Vehicle)
A	< 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	> 50.1

The County of Hawai'i considers levels of service A to D as acceptable for unsignalized intersections. Level of service F (with average delays longer than 50 seconds) is considered undesirable for unsignalized intersections and would indicate the possible need for mitigation. Level of service F conditions could be tolerated if the delays are not much higher than 60 seconds, traffic queues are short, and there are no reasonable mitigating measures available.

**Table 3** summarizes the unsignalized intersection level of service analysis for the two study intersections on Kukuau Street for current conditions. The Mohouli Street/Kukuau Street intersection approaches are currently operating at acceptable levels of service in both peak hours due to the lower traffic volumes on Mohouli Street. The intersection is forecast to continue operating at acceptable levels of service in both 2010 peak hours. The proposed project would generate small volumes of traffic such that it would not affect traffic operations in 2010.

The traffic generated by the UHH Mauka Lands would affect traffic operations at this intersection in 2017 and 2027. The increase in traffic volumes on Mohouli Street would cause the Kukuau Street eastbound approach to operate at level of service F in the 2017 AM peak and the westbound approach at level of service E during the PM peak. The small number of trips generated by the proposed project would not cause any changes in delay, indicating it would have not an adverse traffic impact.

The ambient traffic volumes forecast for Mohouli Street in 2027 would require four through lanes. The level of service for the eastbound Kukuau Street approach would be at level F in the AM and PM peak periods with two through lanes on Mohouli Street, but would improve to level E in the PM peak if Mohouli Street were widened to four lanes. The westbound approach of Kukuau Street would also be at level of service F in the PM peak period. Again, the small number of trips generated by the proposed project in both peak periods would not cause any changes in delay, indicating it would have not an adverse traffic impact.

The above analysis indicates that Mohouli Street and the Kukuau Street intersection would require mitigating measures to accommodate increases in ambient traffic. Mohouli Street would eventually have to be widened to four lanes before 2027. Traffic signals probably would not be warranted at this intersection; therefore, the possibility of imposing left turn/through movement bans on the westbound approaches during peak hours should be considered. An alternate route is available via the Komohana Street/Mohouli Street signalized intersection.

The traffic exiting the Kukuau Street approaches at Komohana Street are currently operating at level of service E in the morning peak, indicating the possible existing need for mitigation. The same traffic movements in the afternoon peak are operating at an acceptable level of service D. Since the high traffic volumes on Komohana Street occur for only a short period of the day and there are no reasonable mitigating actions, the existing traffic operations could be tolerated.

The outbound movements from Kukuau Street are forecast to operate at levels of service F in the 2010 AM peak and level E in the afternoon peak. The small number of trips generated by the proposed project and driving through this intersection would not have any noticeable effect. The unacceptable levels of service and delay would continue to worsen with the 2017 forecasts due to the traffic increases on Komohana Street. Widening Komohana Street to four lanes would improve traffic operations on that street but would not improve traffic operations on Kukuau Street. Traffic mitigation

measures would be required at this intersection. Traffic signals could be warranted at this intersection in the future.

The proposed project access roadway intersection with Mohouli Street is expected to be stop sign controlled. The intersection movements are forecast to have acceptable level of service in 2010 and 2017, although the outbound left turn movement is forecast to be at level of service E in the 2017 PM peak. The intersection movements are forecast to be at acceptable levels in the 2027 AM peak since most of the traffic movements would be inbound. However, the outbound left turn movement is forecast to be at level of service F in the 2027 PM peak hour if Mohouli Street remains at two lanes. Widening Mohouli Street to four lanes would improve the outbound left turn movement to level of service E, which could be tolerated. Hence, mitigating measures are not foreseen at this intersection other than the widening of Mohouli Street to accommodate the through traffic volumes.

The Komohana Street/Mohouli Street intersection is currently signalized. The methodology for analyzing signalized intersections calculates the levels of service for individual movements, approaches and the intersection as a whole based on the average stopped delay per vehicle. The results range from level of service A (best with average delays less than ten seconds) to F (worst with average delays longer than 80 seconds), described as follows:

<b>LEVEL OF SERVICE</b>	<b>CONTROL DELAY PER VEHICLE (Seconds/Vehicle)</b>
A	< 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	> 80.1

The County of Hawai'i considers levels of service A to D as acceptable for signalized intersections, with levels of service E and F indicating the need for mitigating measures. For signalized intersections, the major streets can be designed to have a higher level of service than the minor streets or turning lanes. Level of service E conditions are sometimes tolerated for minor traffic movements such as left turn movements if they maintain acceptable levels of service on the major street.

The Komohana Street/Mohouli Street traffic signal presently runs on a 127 second cycle during the morning peak, and the signal is fully actuated in the afternoon peak. The northbound through traffic flow on Komohana Street is delayed in the morning peak by the traffic queue that forms from the Ponahawai Street signal to the north. The capacity for the northbound through movement was reduced from 1,500 to 1,200 vph to replicate the effects of this queuing.

The level of service analysis for this intersection is shown on **Table 4**. It is operating at a minimally acceptable level of service D in the morning peak. The two approaches with the highest volumes, Komohana Street northbound, and Mohouli Street eastbound, are operating at level of service E, indicating the possible need for mitigating measures. The northbound through movement is operating at level of service F due to the backup of traffic from the next traffic signal. The primary reasons for these poor levels of service are the high volumes of vehicles on a single lane of traffic.

The intersection is operating at level of service E in the afternoon peak due to two problem movements. The high volumes of vehicles making left turns from the westbound approach of Mohouli Street are operating at level of service F and require more green time or an additional traffic lane. The high volumes of southbound through vehicles on Komohana Street are operating at level of service E.

The intersection level of service is forecast to decrease to E in the 2010 AM peak hour with the current roadway system and increase in ambient traffic, indicating that the current problem movements would worsen. Although there are no roadway improvements planned for this intersection by 2010, the impacts of two separate

mitigating measures were analyzed. If Komohana Street were widened to four lanes, the intersection level of service would improve from E to D, northbound through movement would improve from F to D, Mohouli Street eastbound through movement would worsen from E to F, and Mohouli Street westbound left turn movement would improve from F to D. If the Mohouli Street approaches were widened to provide two eastbound through lanes and two westbound left turn lanes, the intersection level of service would improve from E to D, northbound through movement would improve from F to E, Mohouli Street eastbound through movement would remain at E, and the westbound left turn movement would improve from F to E.

The intersection is forecast to continue operating at level of service E in the 2010 PM peak without any roadway improvements. If Komohana Street were widened to four lanes the intersection level of service would improve from E to D, the southbound through movement would improve from F to D, and the Mohouli Street westbound left turn movement would remain at F. If Mohouli Street were widened to provide two eastbound through lanes and two westbound left turn lanes, the intersection level of service would improve from E to D, southbound through movement would improve from F to E, and Mohouli Street westbound left turn movement would improve from F to E.

The widening of Komohana Street has the greater benefits in terms of reducing overall delay in the morning peak hour but widening the Mohouli Street approaches has the bigger beneficial impact in the afternoon peak. The construction for the widening of Mohouli Street is programmed in FY 2013, which does not indicate any priority. The widening of Komohana Street is planned but not programmed, meaning it would take at least 10 years to be implemented unless special funding were provided. For both peak periods, the small amount of traffic generated by the proposed project has little impact on traffic operations as evidenced by the small increases in delay.

The large increases in ambient traffic forecast for 2017 would cause the intersection operations to fail (as evidenced by the intersection level of service F with the ambient forecasts) without any roadway improvements. Therefore, the total with project forecasts were not analyzed. Mitigating measures analyzed for 2017 included widening

Komohana Street to four lanes and combining the widening of Komohana Street and the Mohouli Street approaches.

With the widening of Komohana Street alone, the intersection would operate at level of service E in the AM peak and F in the PM peak, indicating unacceptable conditions. With the widening of both streets, the intersection would improve to an acceptable level of service D in the AM peak but several movements would remain at unacceptable levels. The Komohana Street southbound left turn movement and the Mohouli Street westbound left turn movement would operate at level of service E. The traffic generated by the proposed project would increase delay slightly on all but one of the affected traffic movements. Delay would increase by ten seconds on the northbound left turn movement and cause level of service to change from D to E.

The intersection would operate at level of service E in the 2017 PM peak hour with both roadway widening improvements. Three movements would be operating at level of service F including the Komohana Street southbound through, the Komohana Street northbound left turn and the Mohouli Street westbound left turn movements. Additional mitigating measures would be required to have acceptable operating conditions in the 2017 PM peak hour. The additional trips generated by the proposed project would not cause changes in levels of service on any movements at the intersection. This analysis indicates that additional mitigating measures would be required to meet the projected 2017 traffic volumes. However, only preliminary estimates of future land uses were available at the time of this study. Further traffic analyses would be required when more definite land uses become available.

The two previously described roadway widening improvements would not be able to accommodate the much higher ambient traffic volumes forecast for 2027. The intersection is forecast to operate at level of service E in the AM peak hour with level of service F on the Komohana Street northbound and southbound left turns, and the Mohouli Street westbound left turn. The intersection is forecast to operate at level of service F in the PM peak hour with level of service F on the Komohana Street northbound left and right turns, all the Mohouli Street westbound movements, and the

eastbound left turn movement. The additional trips generated by the proposed project would not cause changes in levels of service on any movements at the intersection. This analysis indicates that additional mitigating measures would be required to meet the projected 2027 traffic volumes. However, only preliminary estimates of future land uses were available at the time of this study. Further traffic analyses would be required when more definite land uses become available.

## **CONCLUSIONS**

The proposed County of Hawai'i Fire Administration Support Complex is forecast to generate a relatively small number of trips during the morning and afternoon commuter peak hours over its 20-year development period. This additional traffic in itself would not require mitigating measures. However, traffic on Komohana Street is already congested during the morning peak hour and the Mohouli Street intersection is in need of mitigation.

Major roadway improvements would be needed to accommodate the future traffic which would be generated from the UHH Mauka Lands. Both Komohana Street and its Mohouli Street approaches would have to be widened to four lanes by 2017 to accommodate this future land use. The mauka portion of Mohouli Street would need to be widened to four lanes between 2017 and 2027.

The currently unsignalized intersections at Mohouli Street/Kukuau Street and Komohana Street/Kukuau Street would require mitigation in the future due to the increases in ambient traffic. The first intersection would probably not warrant traffic signals in the future and a peak period ban on left turns/through movements should be considered. Traffic signals may be warranted at the latter intersection in the future.

The large ambient traffic increases forecast for this study and its subsequent major impacts were based on preliminary estimates of development of the UHH Mauka Lands. The traffic impacts should be reevaluated when the UHH Mauka Lands development proposals are better defined.

## *References*

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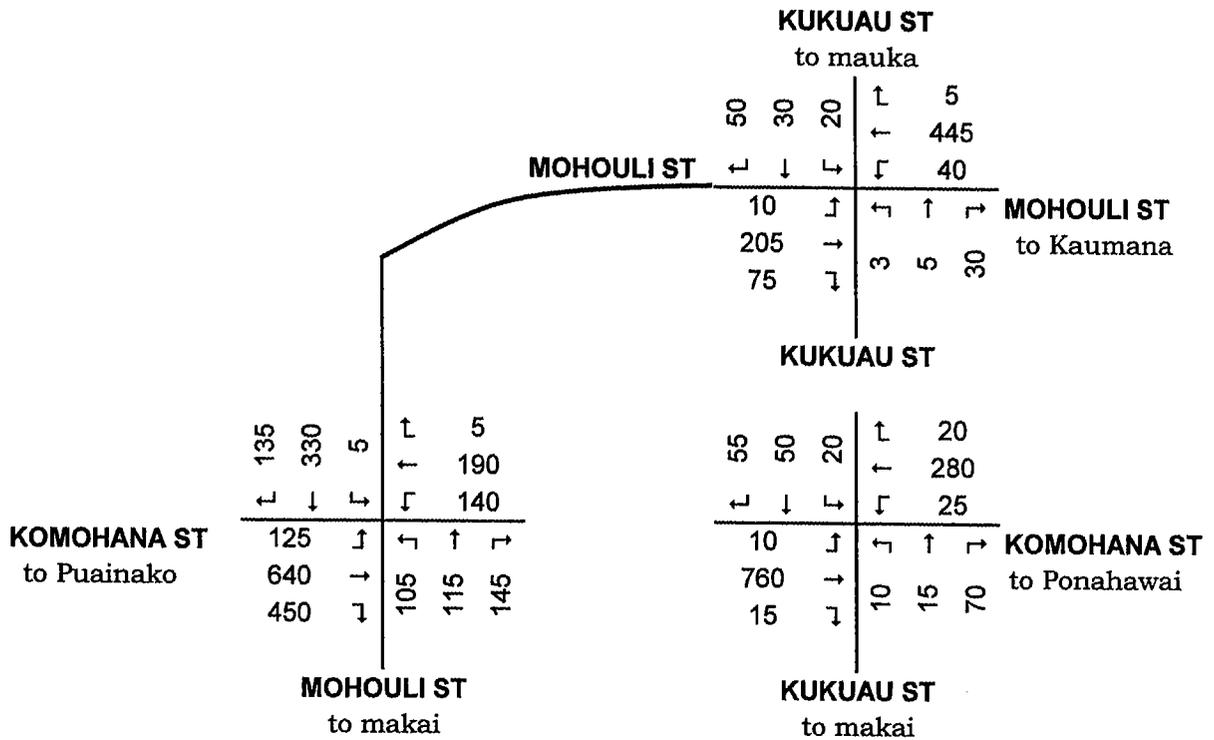
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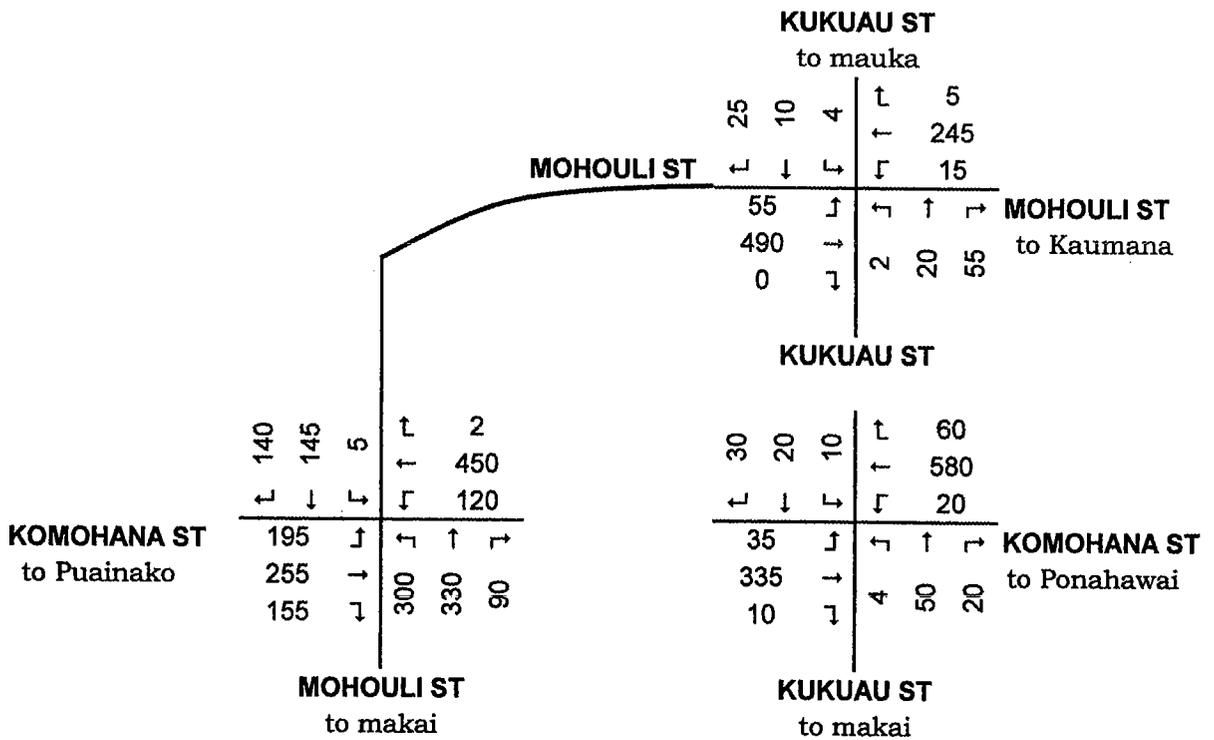
## *Figures*

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**AM PEAK HOUR**

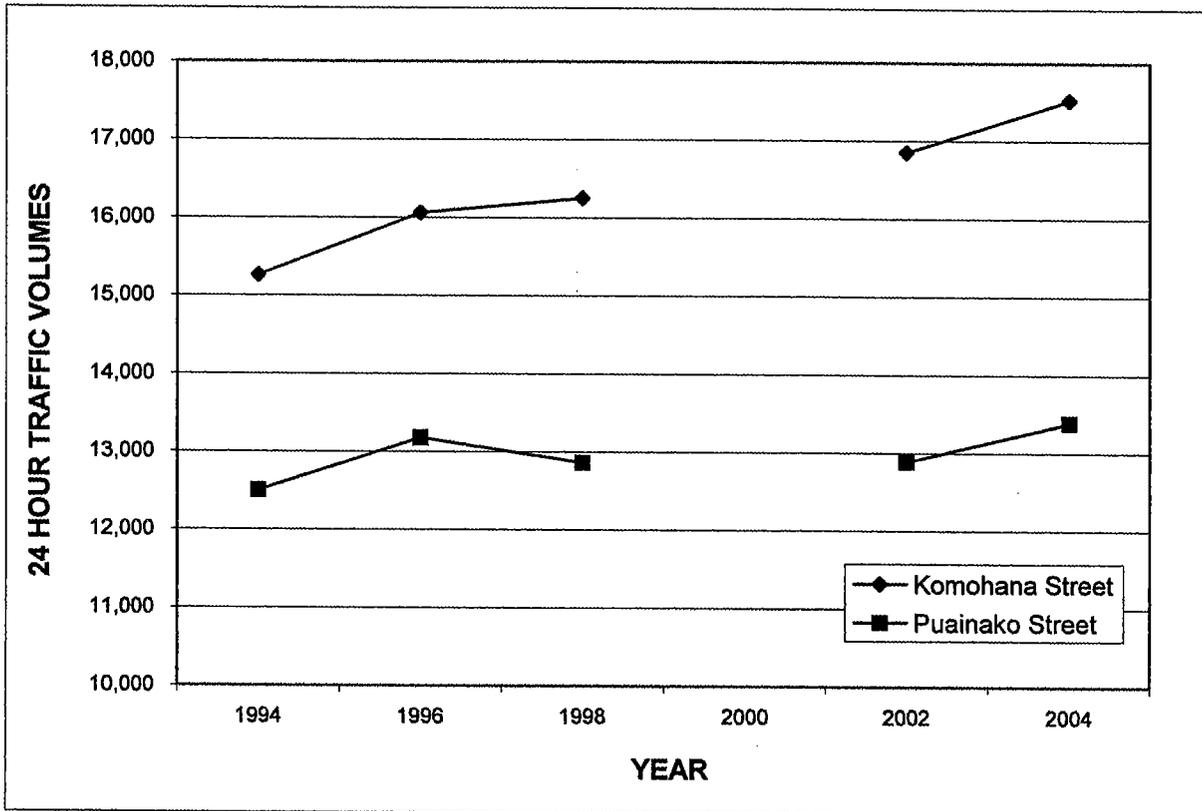


**PM PEAK HOUR**

**EXISTING 2007 TRAFFIC VOLUMES  
FIGURE 2**

TWO-WAY DAILY TRAFFIC VOLUMES		
YEAR	Komohana North of Puainako	Puainako Makai of Komohana
1994	15,259	12,502
1996	16,060	13,179
1998	16,251	12,863
2000		
2002	16,850	12,885
2004	17,522	13,386

Source:  
 State of Hawaii Department of Transportation  
 Station 18-Z Puainako St at Komohana St



**HISTORICAL TREND IN DAILY TRAFFIC VOLUMES  
 ON KOMOHANA STREET AT PUAINAKO STREET**

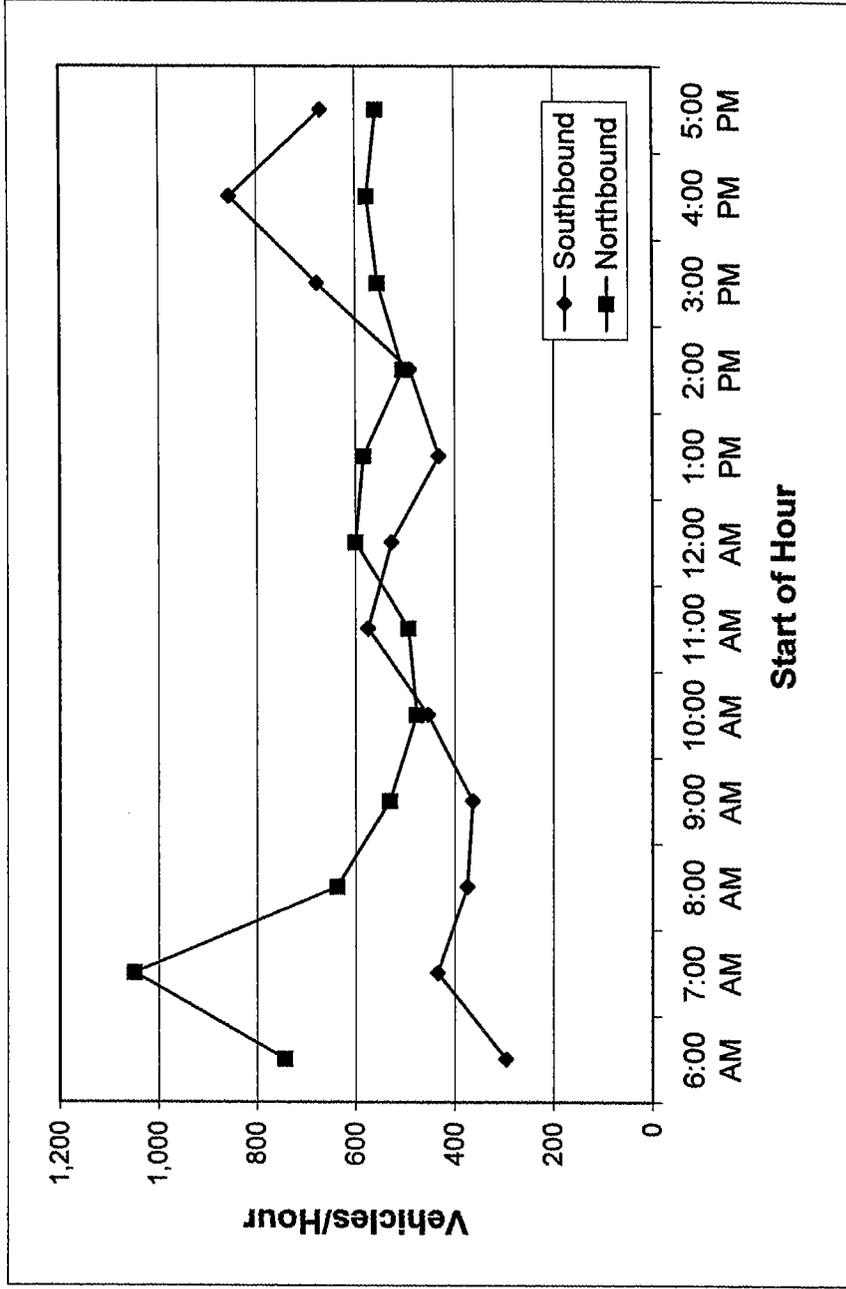
**FIGURE 3**

# HOURLY TRAFFIC VOLUMES ON KOMOHANA STREET

North of Puainako Street (station 18-Z) June 16, 2004

Source: State of Hawaii Department of Transportation

Start of Hour	VEHICLES/HOUR	
	South Bound	North Bound
6:00 AM	296	743
7:00 AM	434	1,048
8:00 AM	375	637
9:00 AM	364	531
10:00 AM	454	476
11:00 AM	574	493
12:00 AM	527	599
1:00 PM	431	583
2:00 PM	490	504
3:00 PM	677	555
4:00 PM	855	576
5:00 PM	669	557



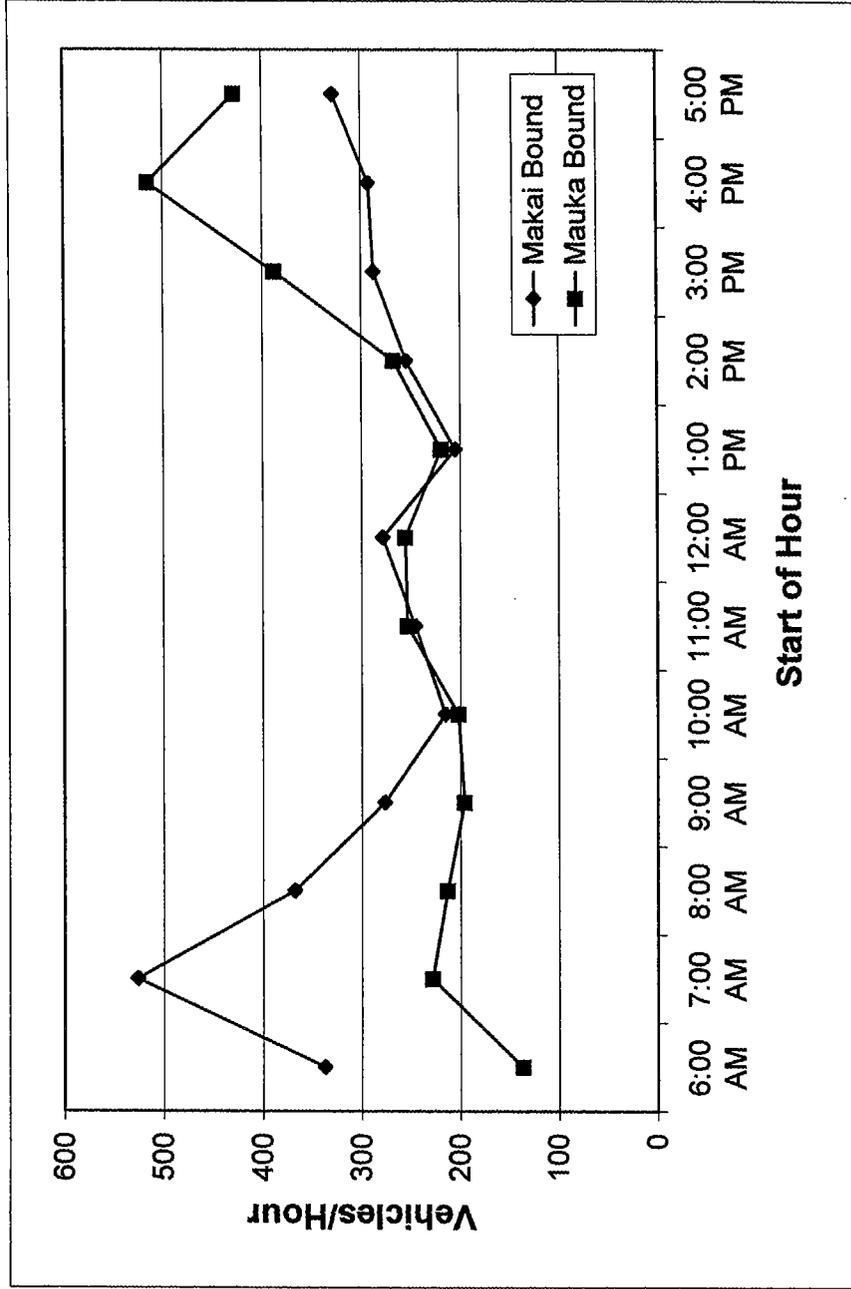
HOURLY TRAFFIC VOLUMES ON KOMOHANA STREET NORTH OF PUAINAKO STREET  
FIGURE 4

# HOURLY TRAFFIC VOLUMES ON MOHOULI STREET

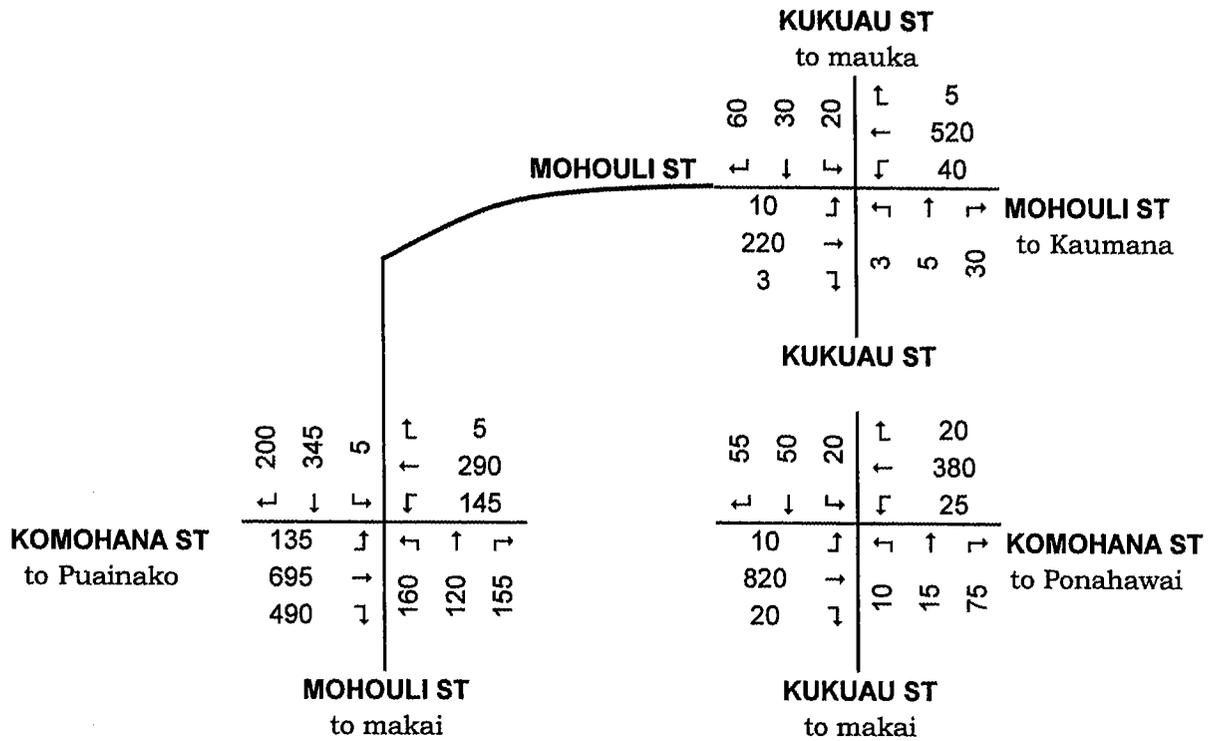
Mauka of Komohana Street (Station 19-D) July 23, 2002

Source: State of Hawaii Department of Transportation

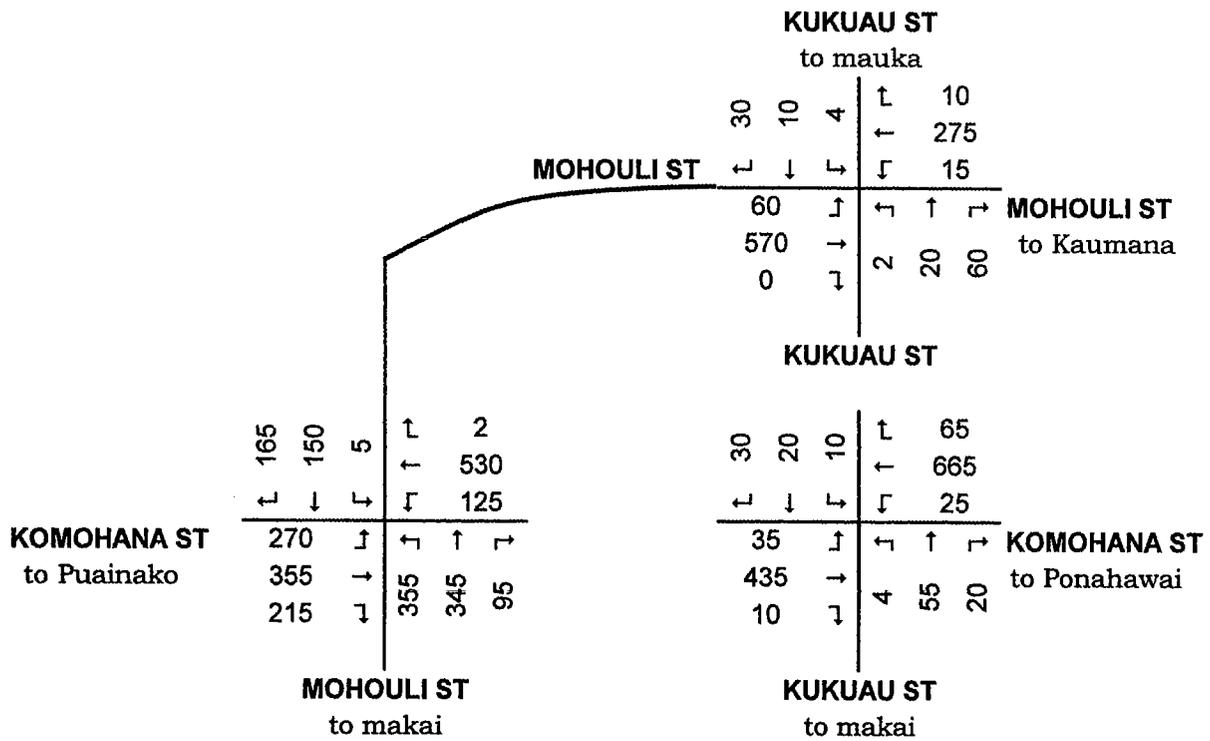
VEHICLES/HOUR		
Start of Hour	Makai Bound	Mauka Bound
6:00 AM	337	137
7:00 AM	526	228
8:00 AM	368	213
9:00 AM	276	196
10:00 AM	215	202
11:00 AM	245	253
12:00 AM	278	255
1:00 PM	205	219
2:00 PM	254	267
3:00 PM	287	388
4:00 PM	292	515
5:00 PM	328	428



HOURLY TRAFFIC VOLUMES ON MOHOULI STREET MAUKA OF KOMOHANA STREET  
FIGURE 5

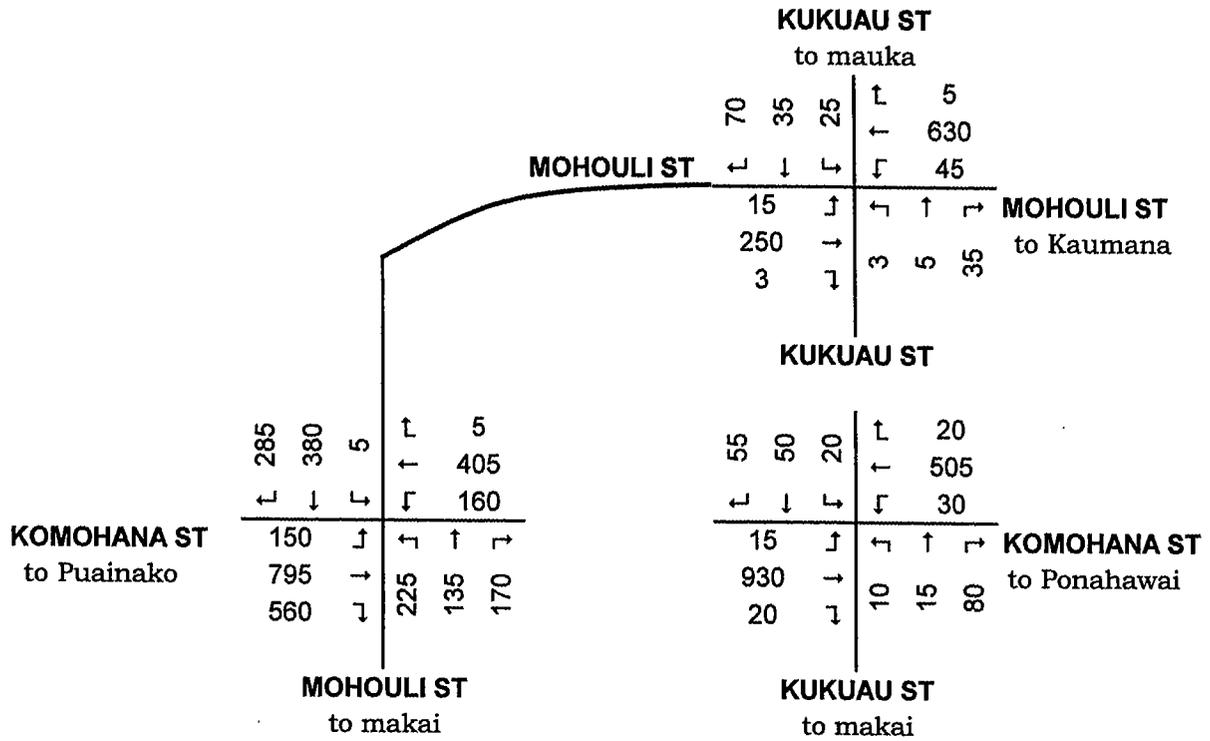


**AM PEAK HOUR**

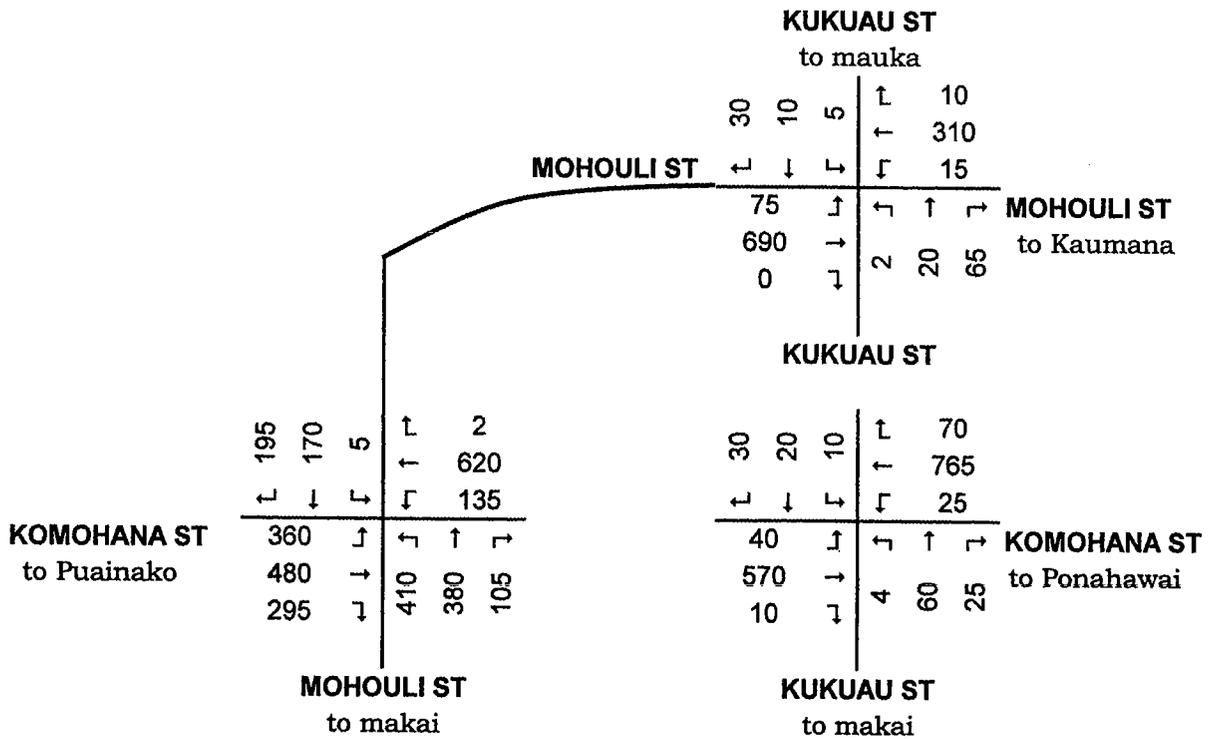


**PM PEAK HOUR**

**2010 AMBIENT TRAFFIC FORECAST  
FIGURE 6**

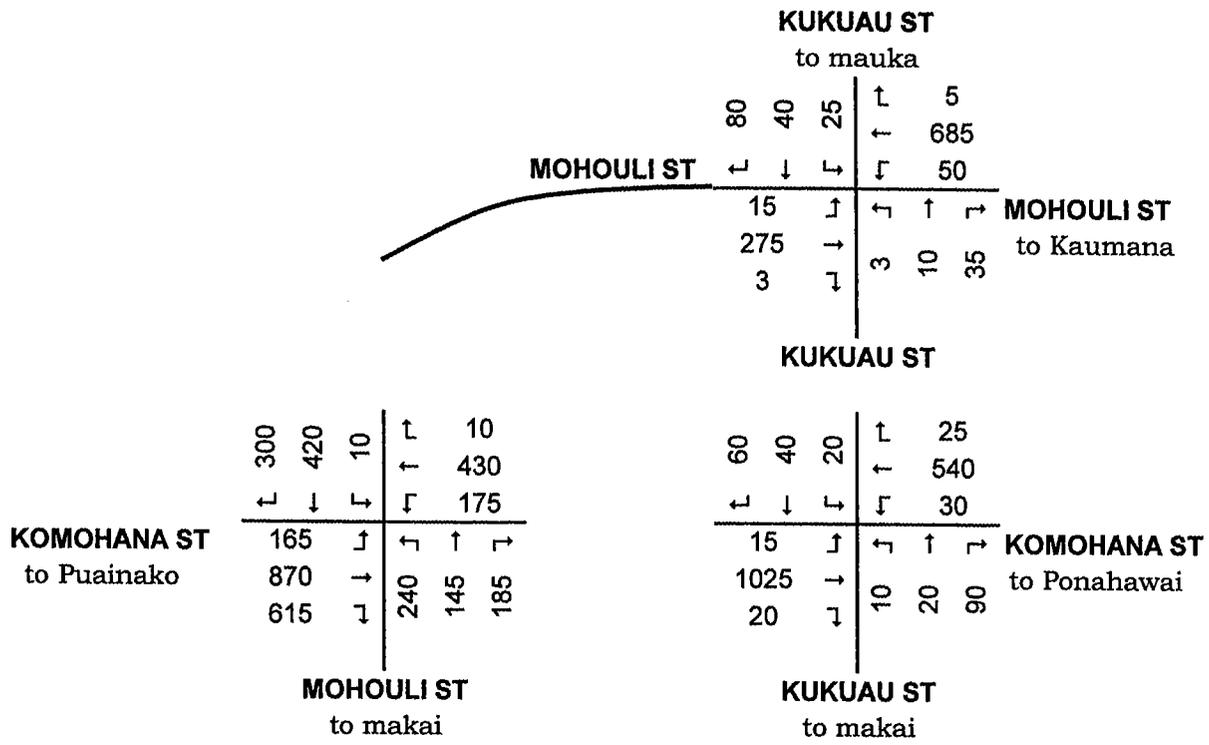


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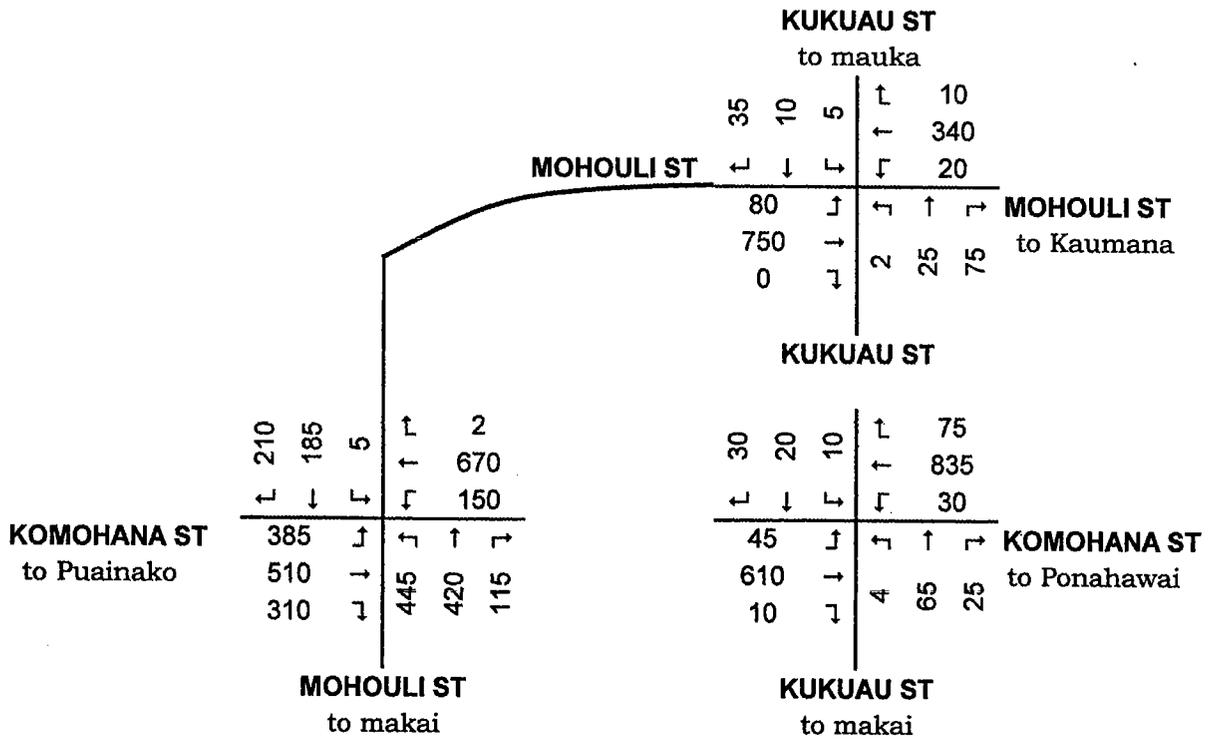


**PM PEAK HOUR**

**2017 BACKGROUND TRAFFIC FORECAST  
FIGURE 7**

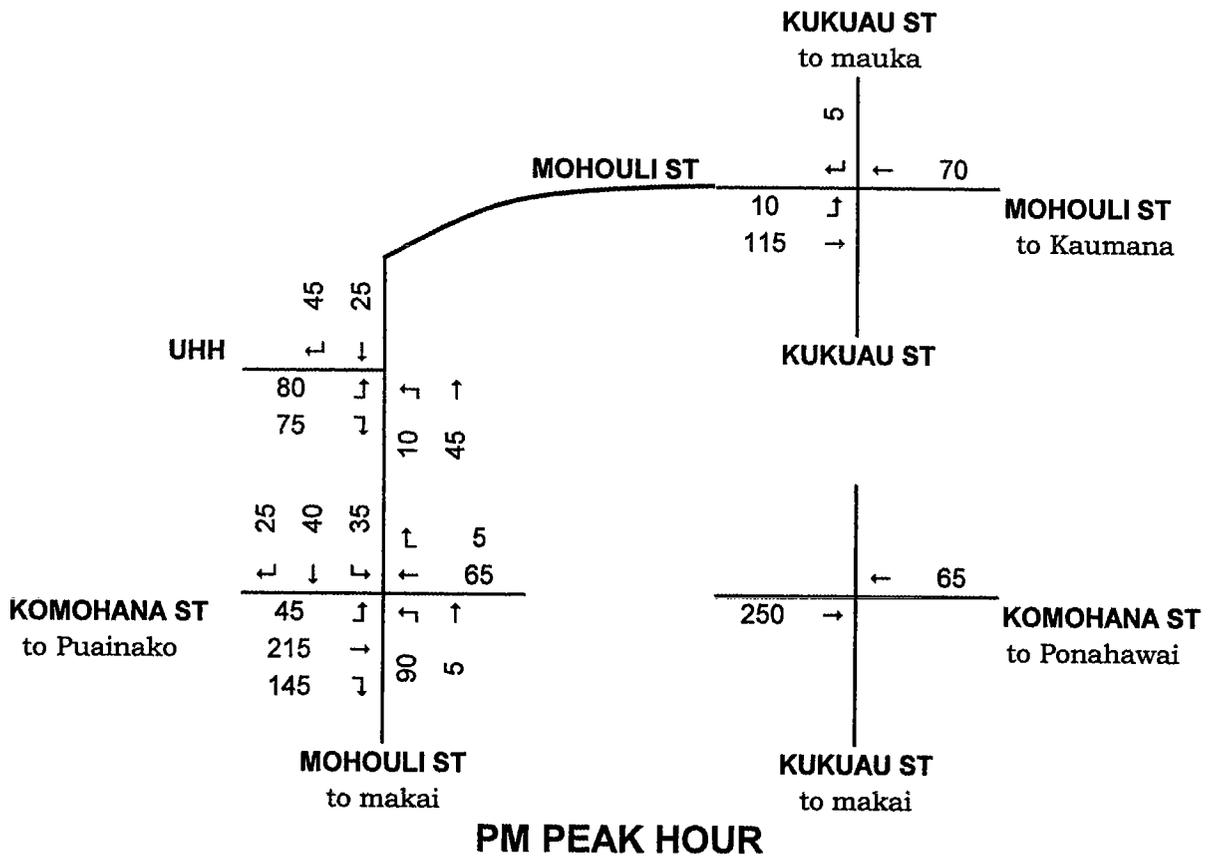
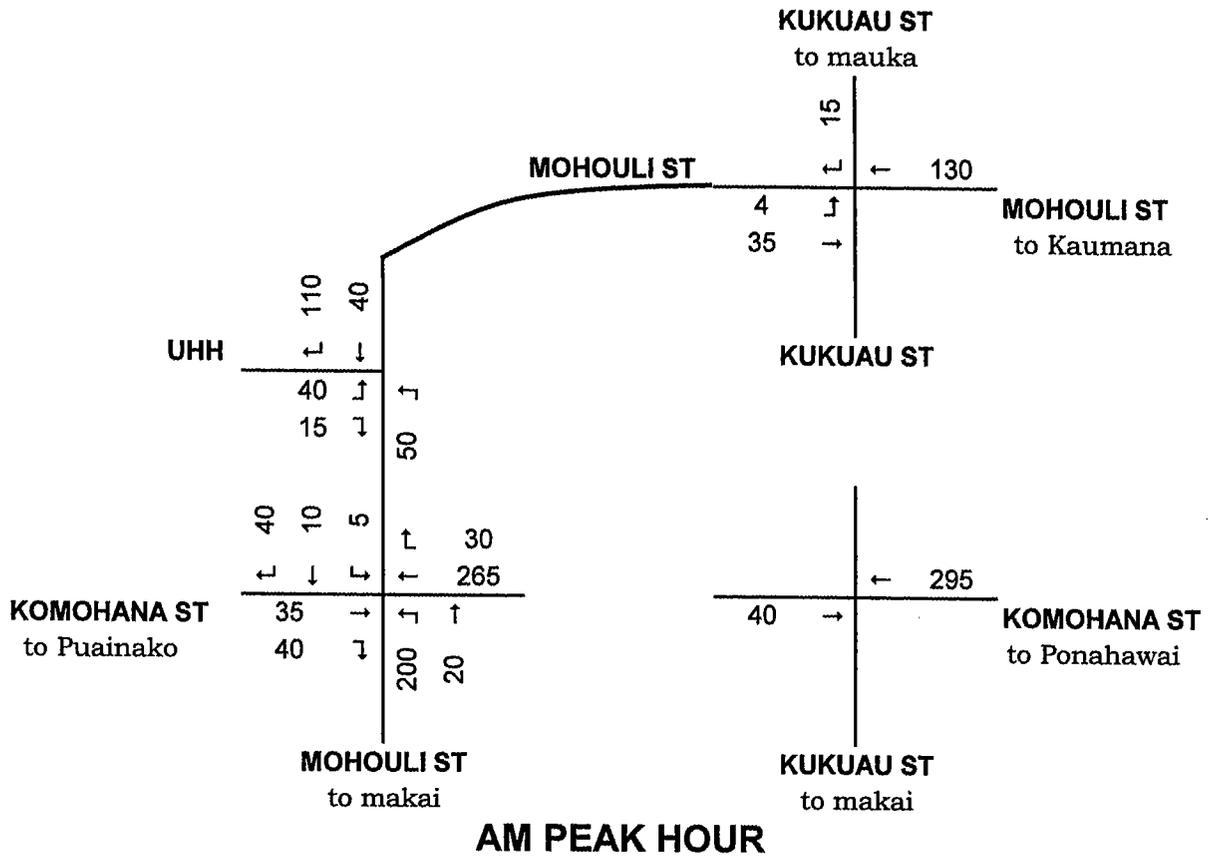


**AM PEAK HOUR**

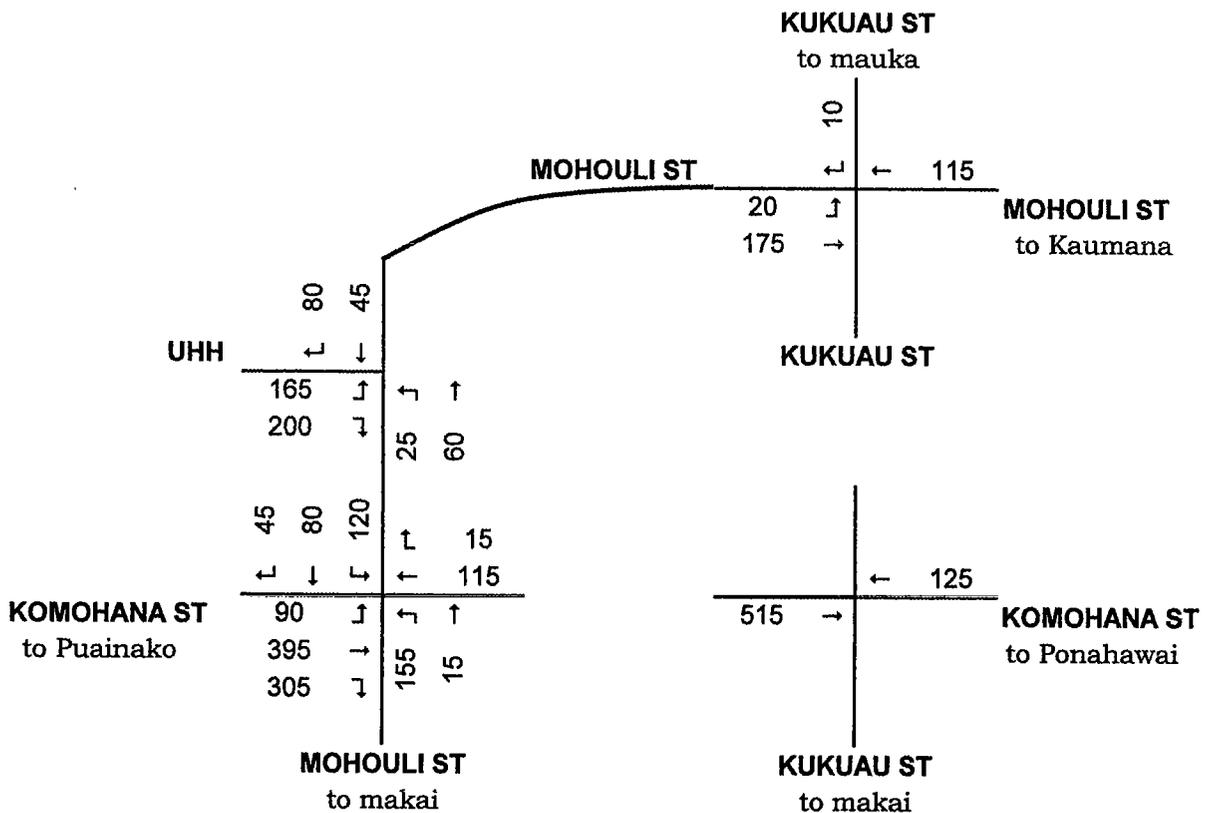
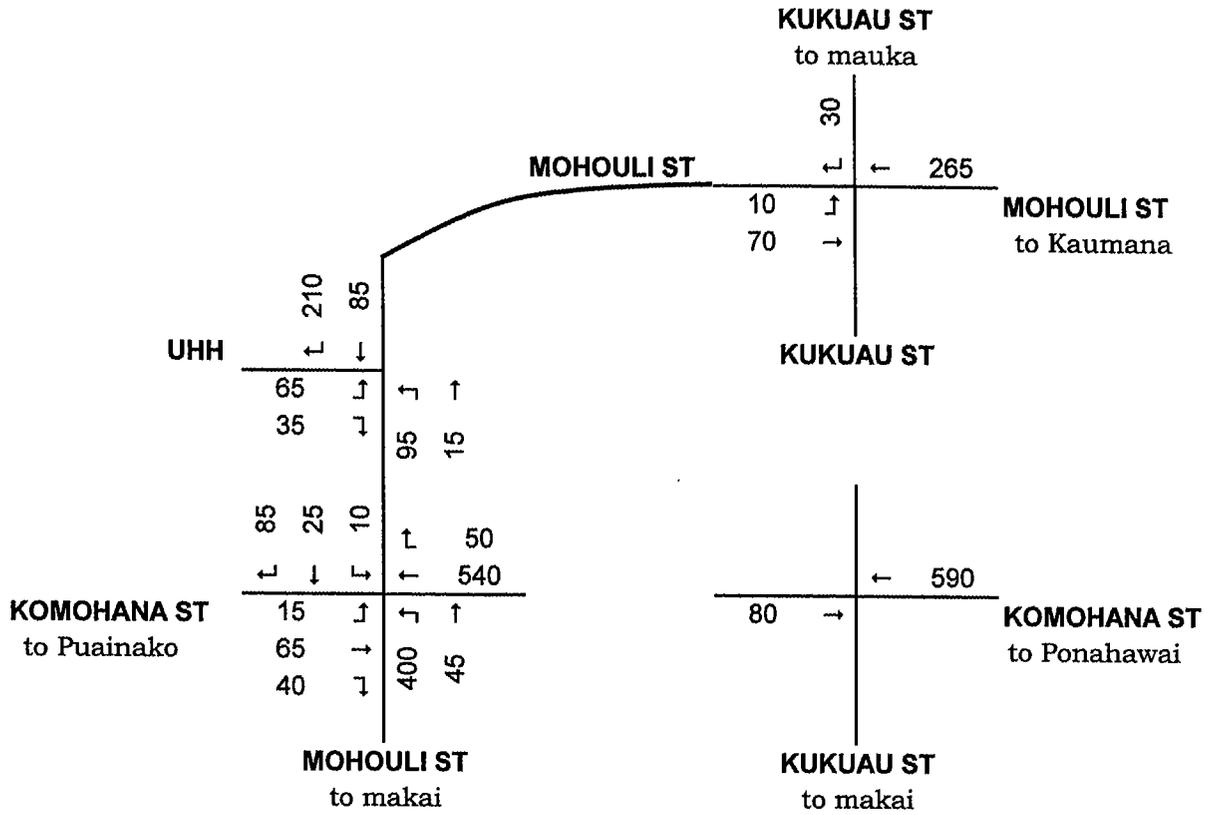


**PM PEAK HOUR**

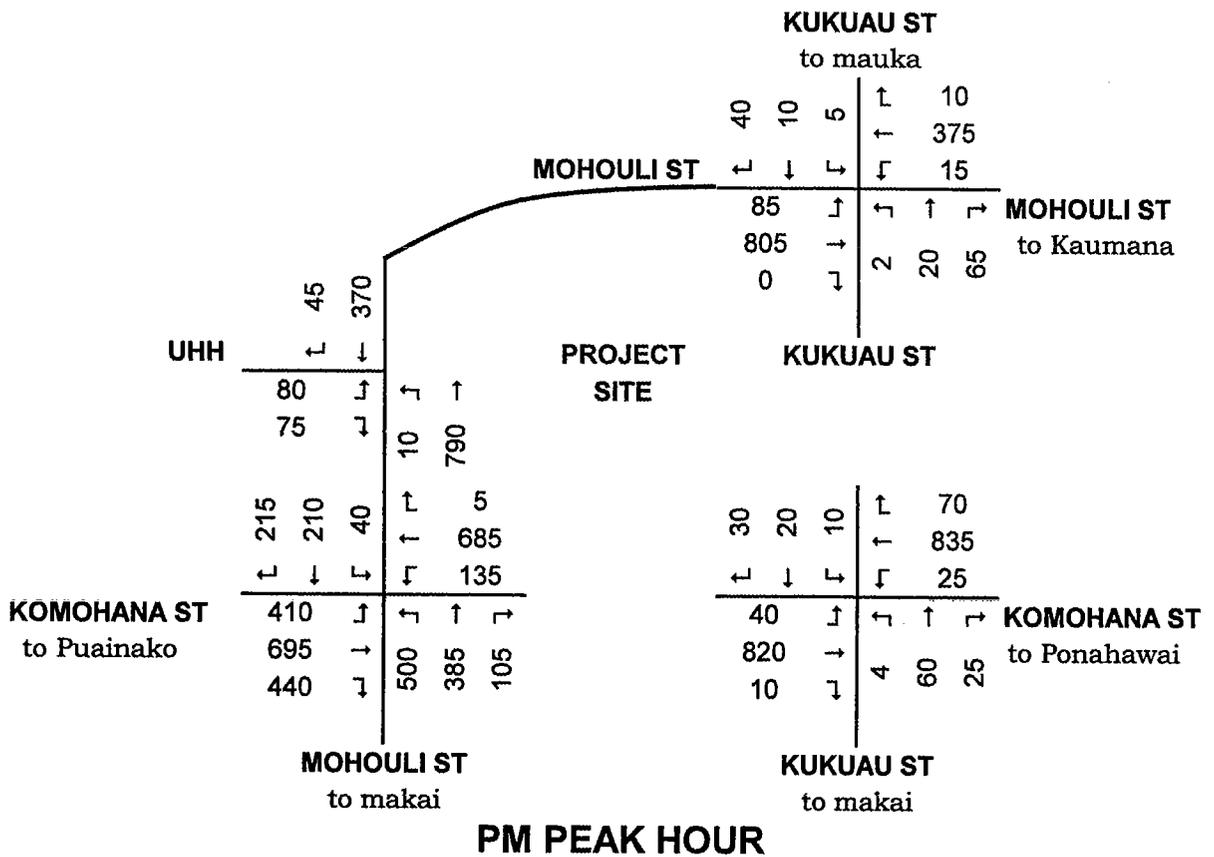
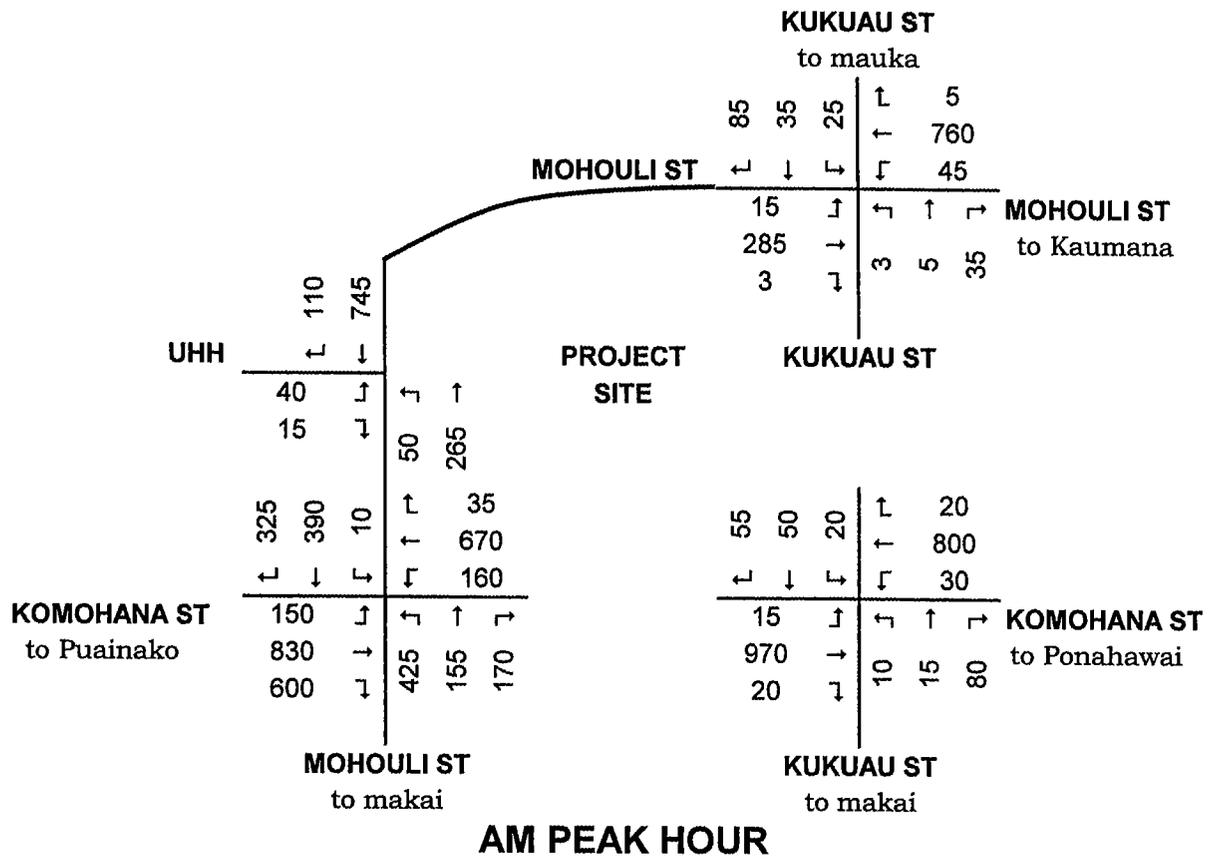
**2027 BACKGROUND TRAFFIC FORECAST  
FIGURE 8**



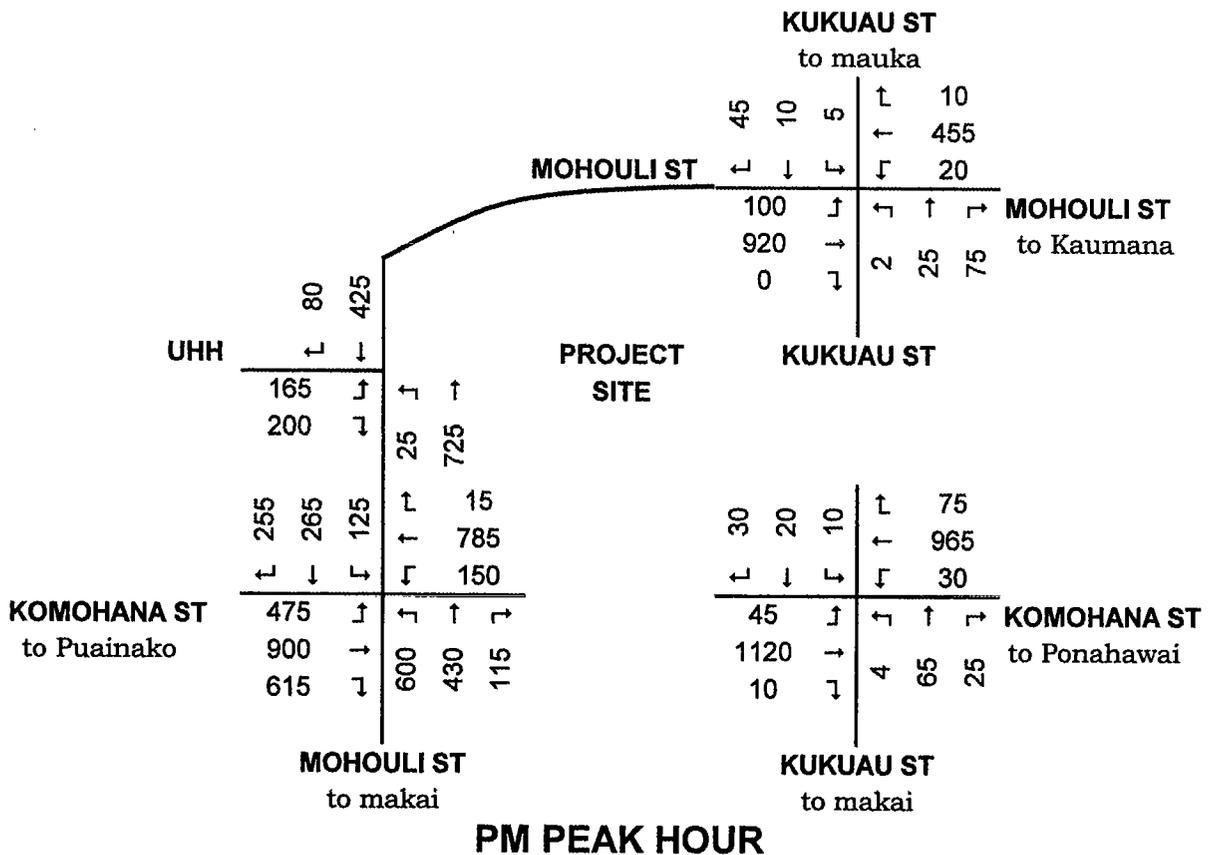
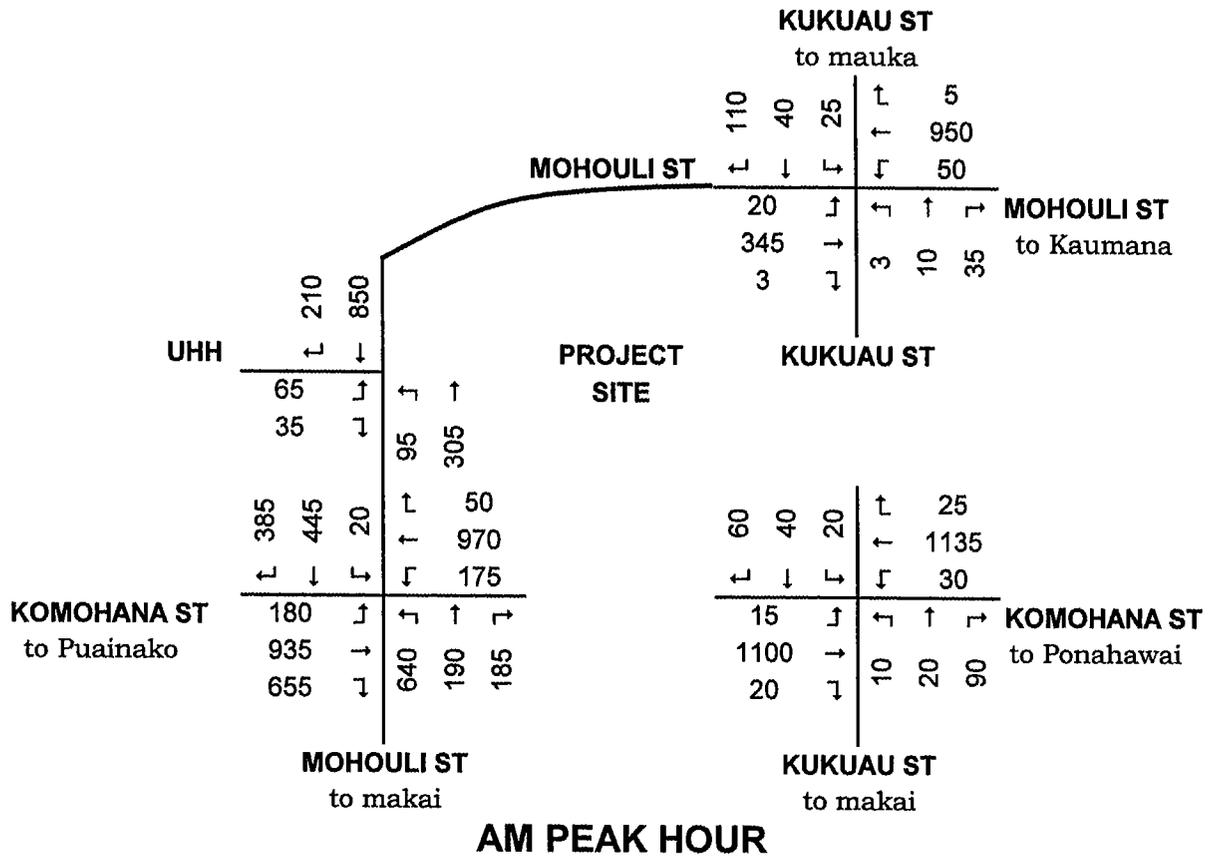
**2017 UHH MAUKA PROPERTY GENERATED TRAFFIC  
FIGURE 9**



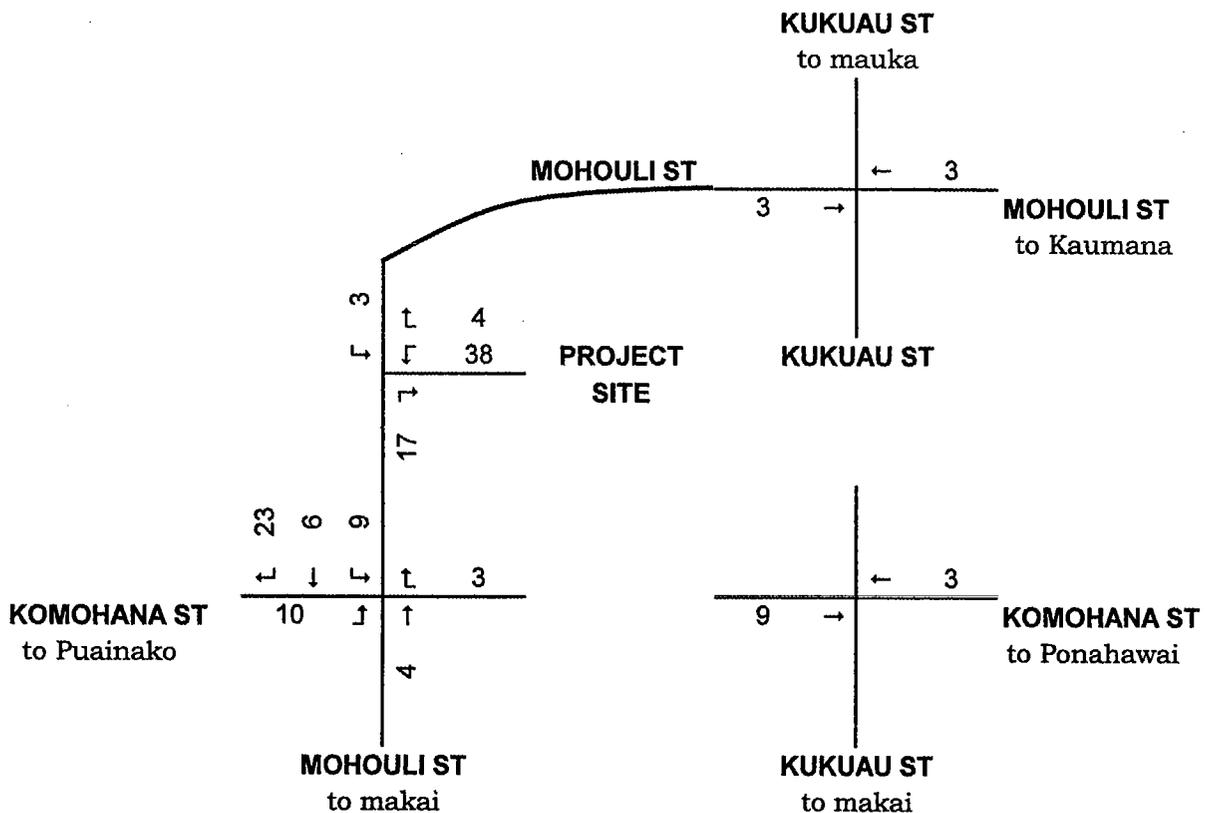
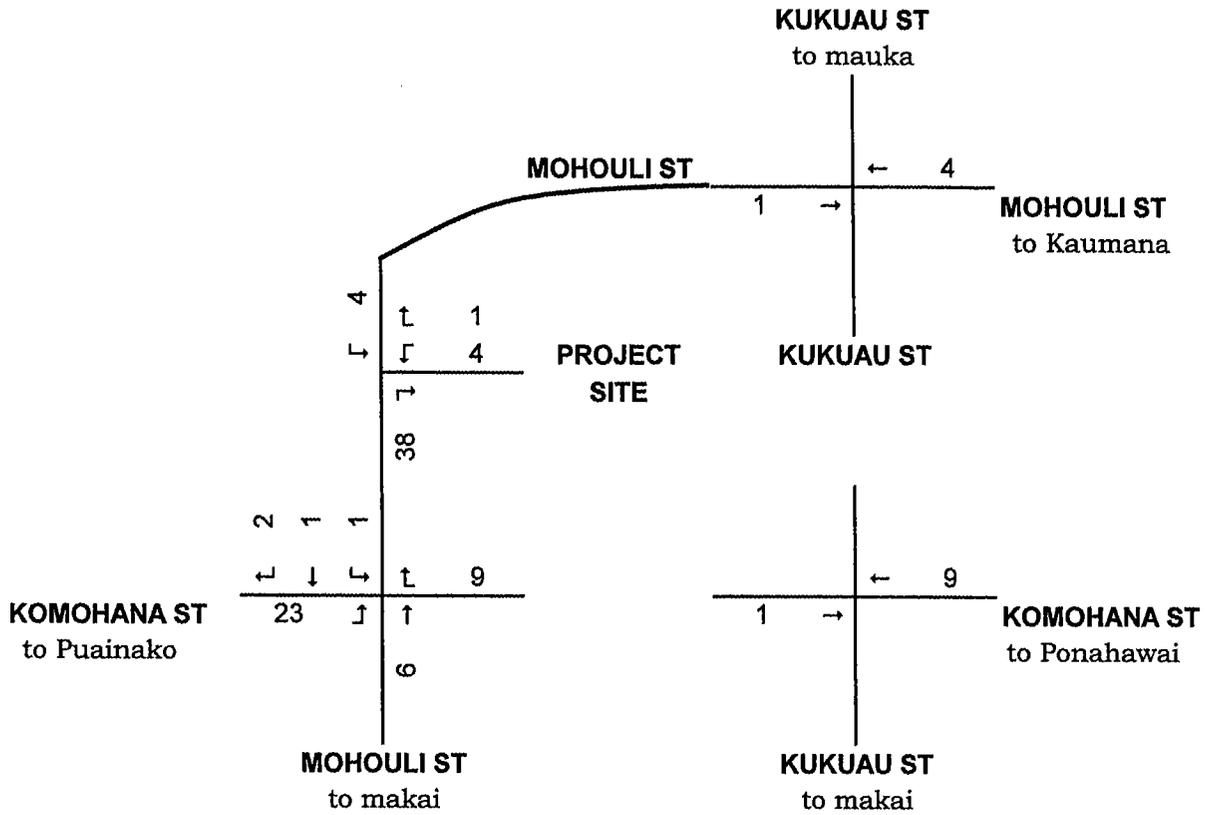
**2027 UHH MAUKA PROPERTY GENERATED TRAFFIC  
FIGURE 10**



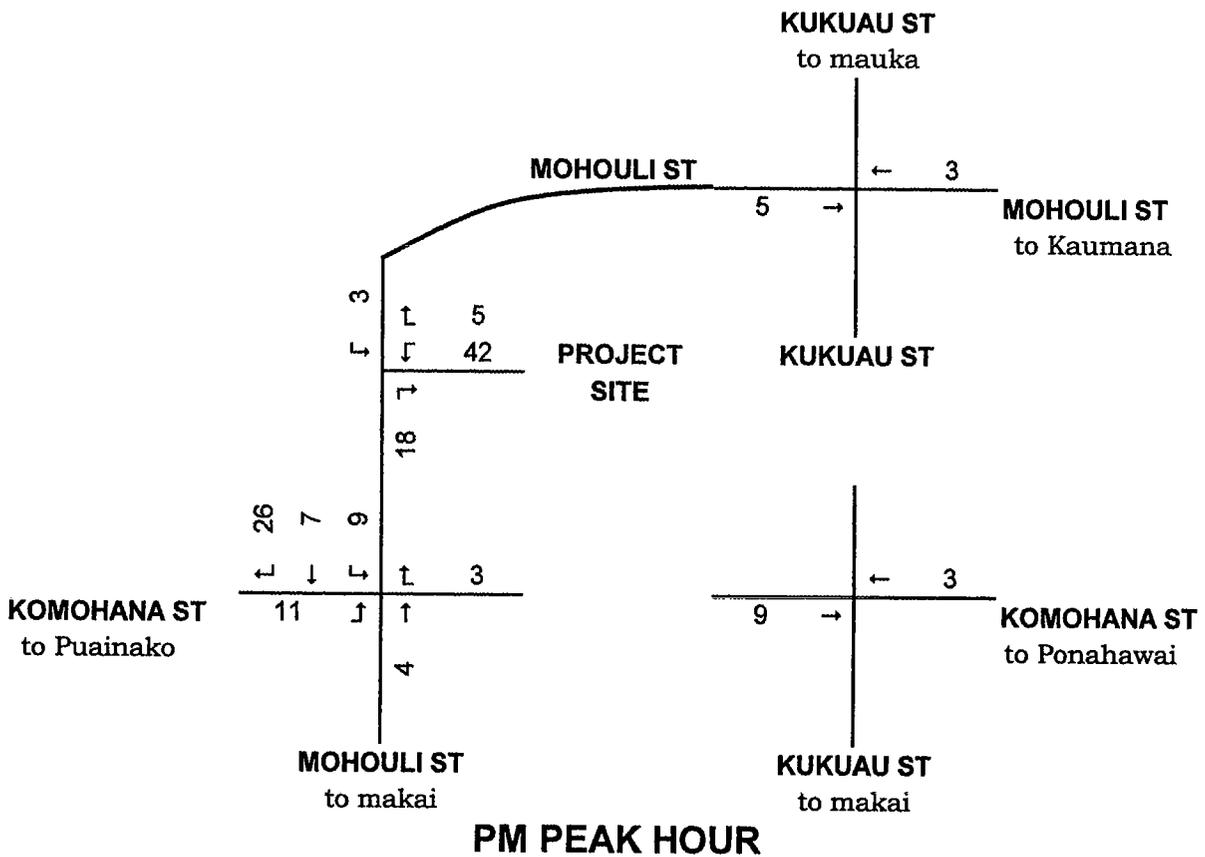
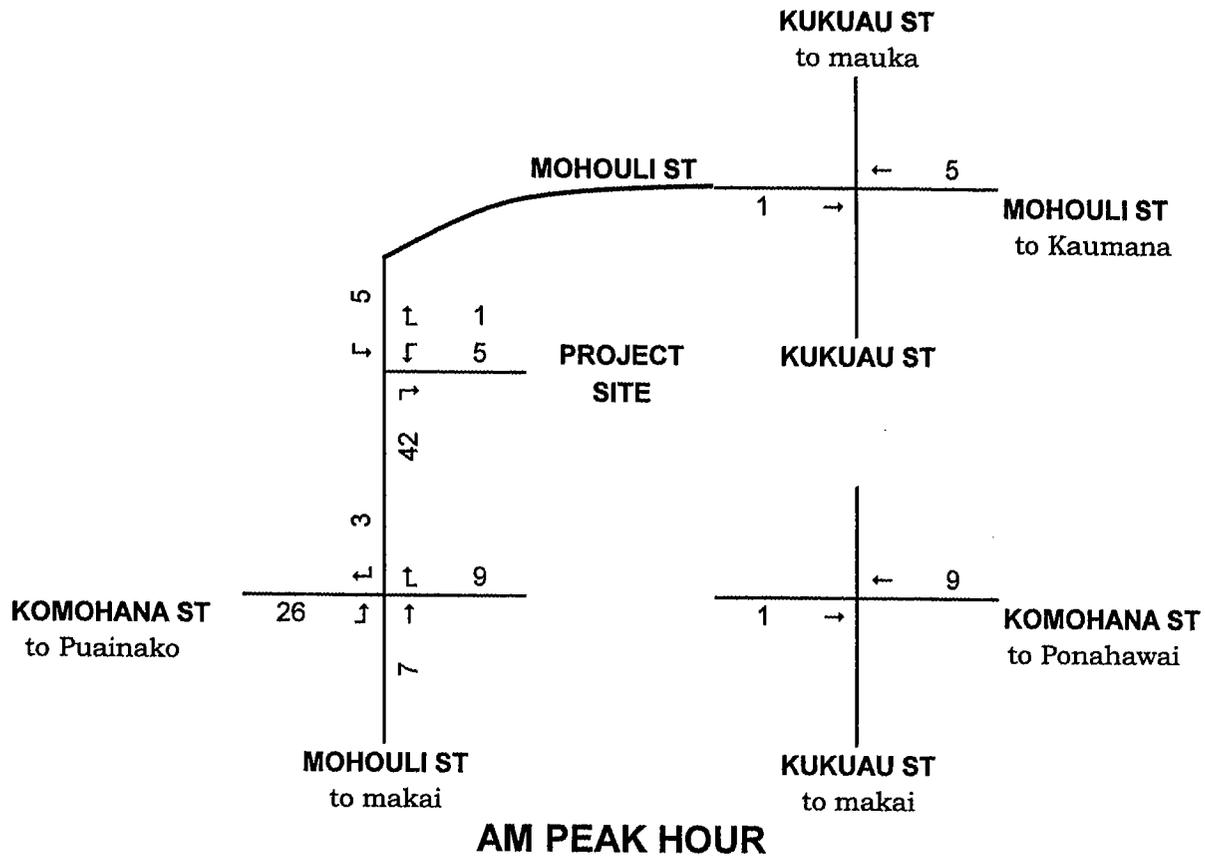
**2017 AMBIENT TRAFFIC FORECAST  
FIGURE 11**



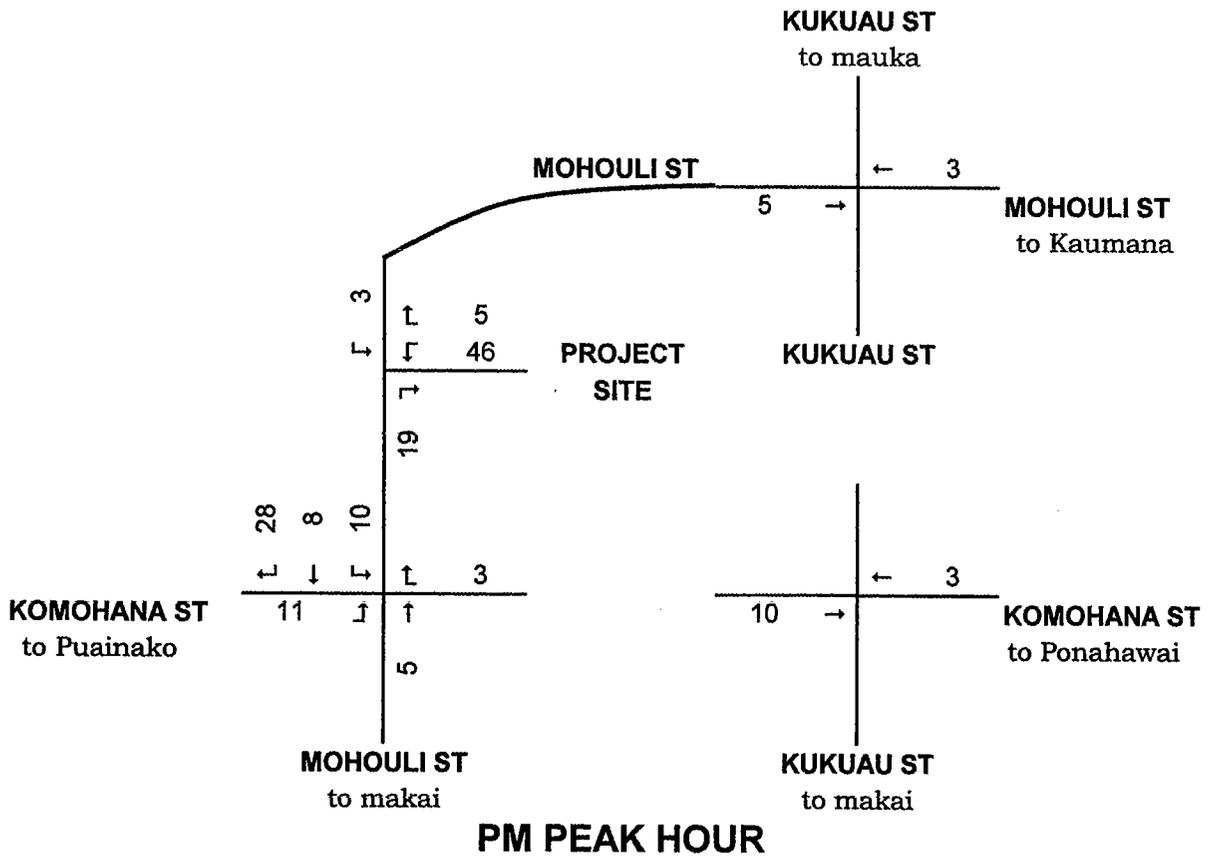
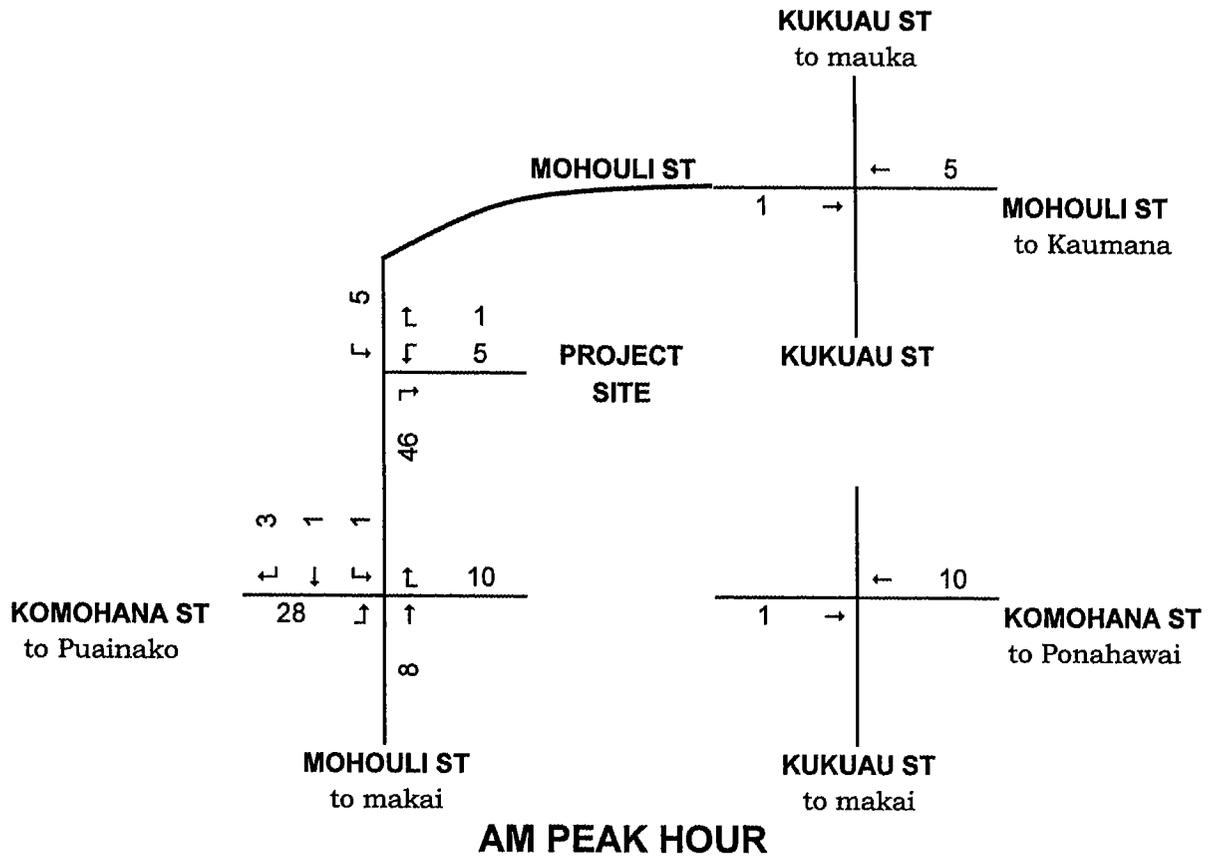
**2027 AMBIENT TRAFFIC FORECAST  
FIGURE 12**



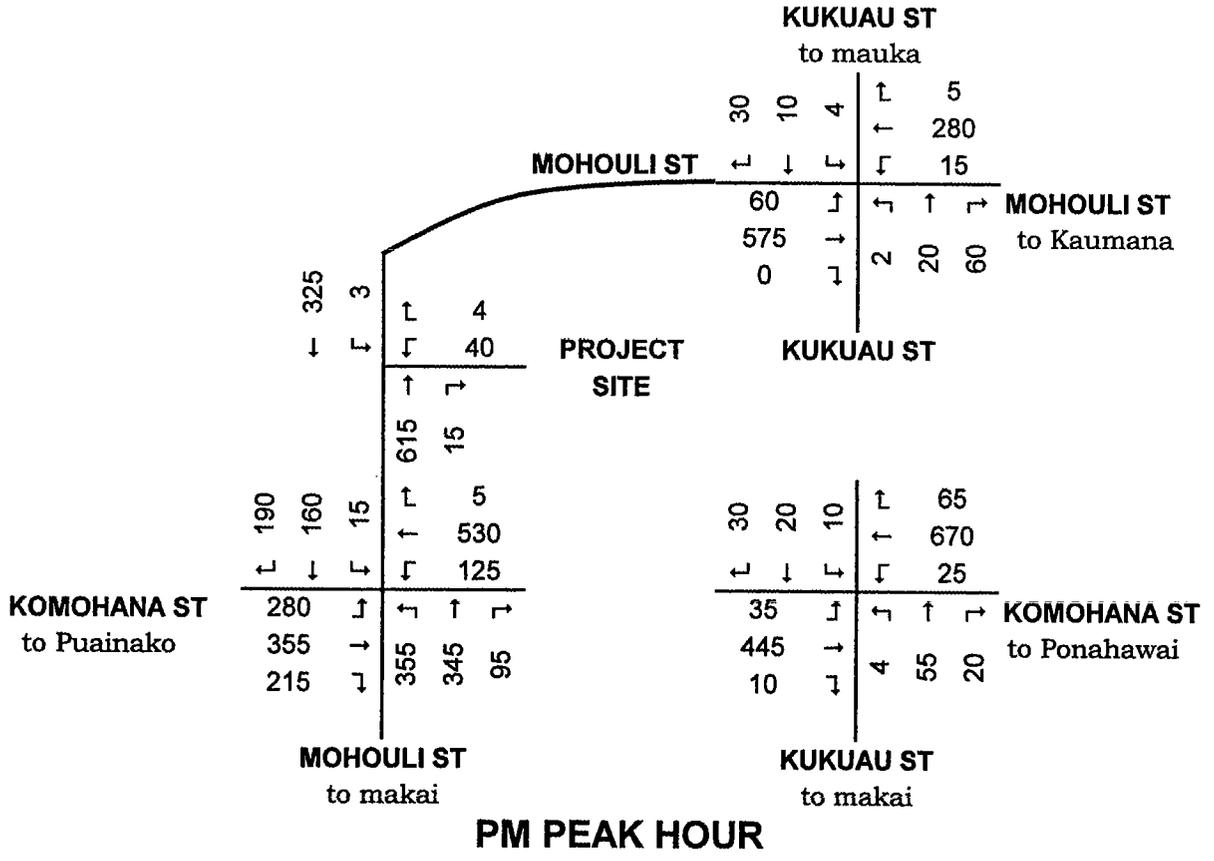
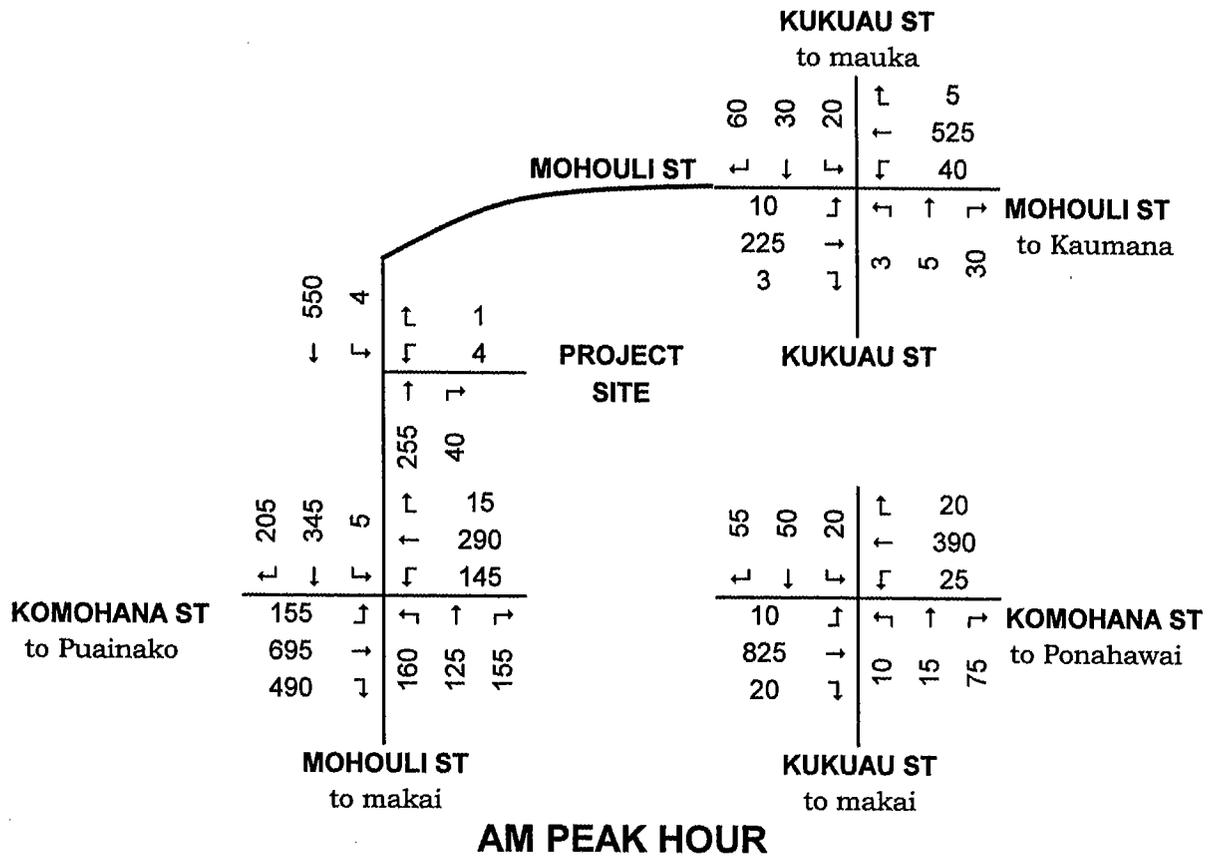
**2010 (PHASE 1) PROJECT GENERATED TRAFFIC FORECAST  
FIGURE 13**



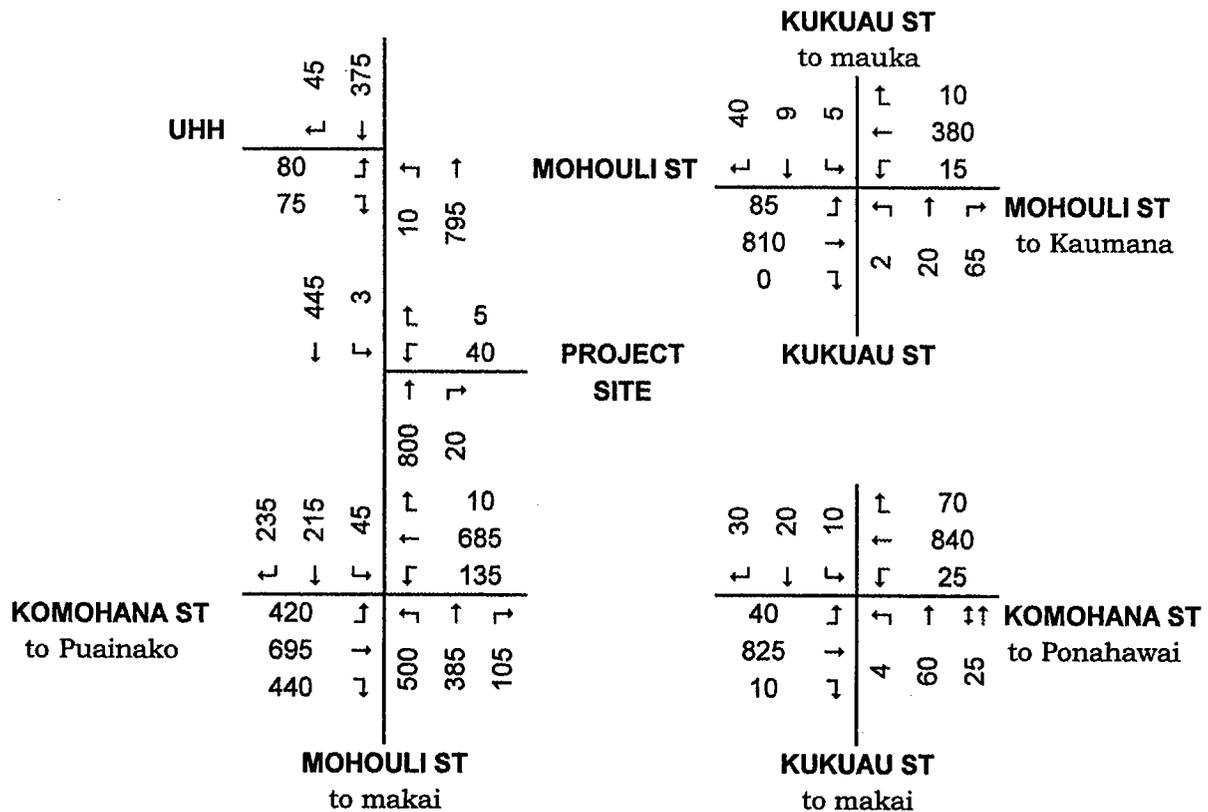
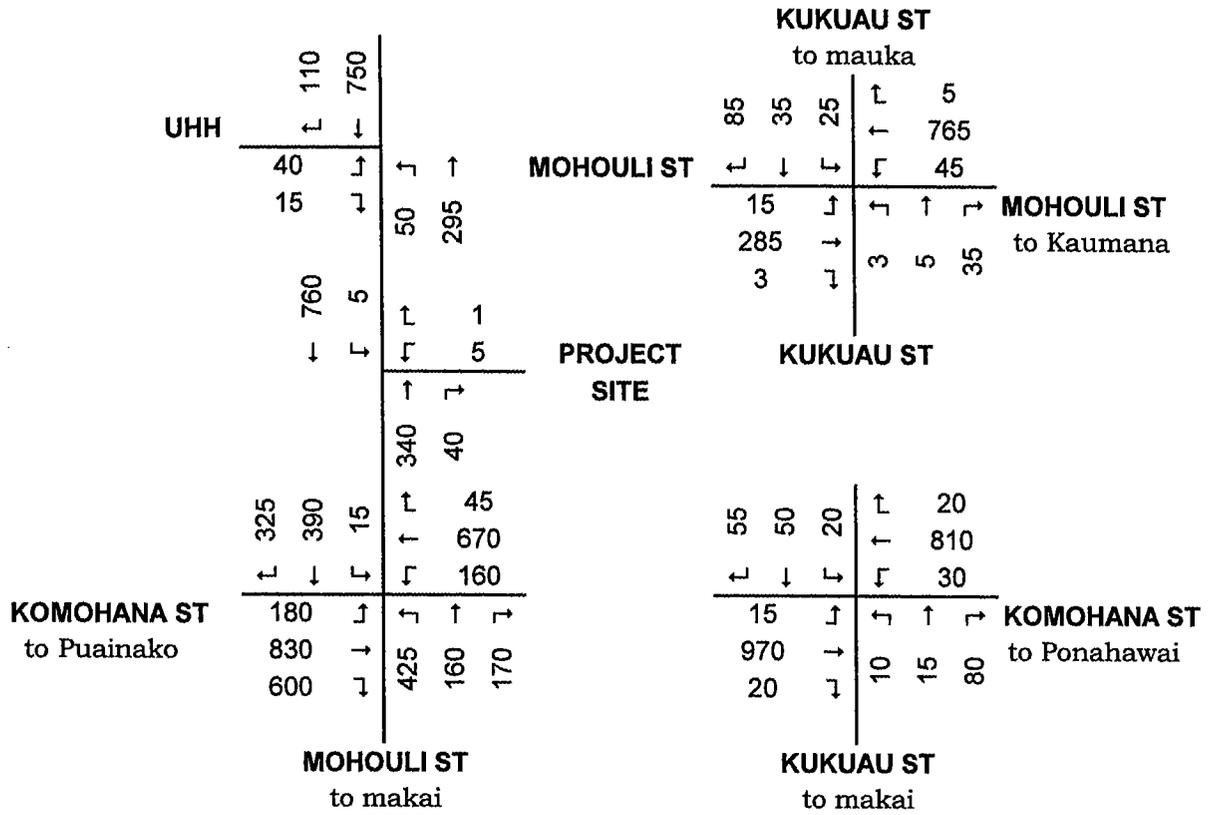
**2017 (PHASE 2) PROJECT GENERATED TRAFFIC FORECAST  
FIGURE 14**



**2027 (PHASE 3) PROJECT GENERATED TRAFFIC FORECAST  
FIGURE 15**



**2010 (PHASE 1) TOTAL WITH PROJECT TRAFFIC FORECAST  
FIGURE 16**



**2017 (PHASE 2) TOTAL WITH PROJECT TRAFFIC FORECAST  
FIGURE 17**



## *Tables*

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**TABLE 1**  
**COUNTY OF HAWAII**  
**FIRE DEPT FIRE ADMINISTRATION SUPPORT COMPLEX**  
**SUMMARY OF EMPLOYEE AND SPACE REQUIREMENTS**

<b>COMPONENT</b>	<b>STAFF REQUIREMENTS</b>			<b>AREA REQUIRED (sf)</b>		
	<b>2007</b>	<b>2017</b>	<b>2027</b>	<b>2007</b>	<b>2017</b>	<b>2027</b>
1a - Chief Officer	11	11	11	5,458	5,458	5,458
1b - Fiscal Division	8	10	12	1,487	1,719	1,913
1c - Personnel Division	3	5	7	1,033	1,249	1,465
1d - Prevention Bureau	3	10	12	1,061	1,590	1,812
1e - EMS Bureau	2	6	6	565	949	949
<b>SUBTOTAL</b>	<b>27</b>	<b>42</b>	<b>48</b>	<b>9,604</b>	<b>10,965</b>	<b>11,597</b>
2 - Emergency Disp	25	31	36	12,094	13,107	14,120
<b>TOTAL</b>	<b>52</b>	<b>73</b>	<b>84</b>	<b>21,698</b>	<b>24,072</b>	<b>25,717</b>

**TABLE 2  
TRIP GENERATION AND TRIP DISTRIBUTION ANALYSIS**

TRIP GENERATION ANALYSIS				TRIP DISTRIBUTION			
				Direction of Travel			
				Mohouli Mauka	Mohouli Makai	Komohana North	Komohana South
<b>Phase 1- 21,698 sf Fire Support Complex [LU 733]</b>							
AM PEAK HOUR	T = 2.21X						
	T =	48	10%	15%	20%	55%	
	89% in	43	4	6	9	23	
	11% out	5	15%	20%	15%	50%	
			1	1	1	3	
PM PEAK HOUR	T = 2.85X						
	T =	62	15%	20%	15%	50%	
	31% in	19	3	4	3	10	
	69% out	43	10%	15%	20%	55%	
			4	6	9	23	
<b>Phase 2 - 24,072 sf Fire Support Complex [LU 733]</b>							
AM PEAK HOUR	T = 2.21X						
	T =	53	10%	15%	20%	55%	
	89% in	47	5	7	9	26	
	11% out	6	15%	20%	15%	50%	
			1	1	1	3	
PM PEAK HOUR	T = 2.85X						
	T =	69	15%	20%	15%	50%	
	31% in	21	3	4	3	11	
	69% out	47	10%	15%	20%	55%	
			5	7	9	26	
<b>Phase 3- 25,717 sf Fire Support Complex [LU 733]</b>							
AM PEAK HOUR	T = 2.21X						
	T =	57	10%	15%	20%	55%	
	89% in	51	5	8	10	28	
	11% out	6	15%	20%	15%	50%	
			1	1	1	3	
PM PEAK HOUR	T = 2.85X						
	T =	73	15%	20%	15%	50%	
	31% in	23	3	5	3	11	
	69% out	51	10%	15%	20%	55%	
			5	8	10	28	

**TABLE 2  
TRIP GENERATION AND TRIP DISTRIBUTION ANALYSIS**

TRIP GENERATION ANALYSIS				TRIP DISTRIBUTION			
				Direction of Travel			
				Mohouli Mauka	Mohouli Makai	Komohana North	Komohana South
<b>Phase 1 - 52 Employee Fire Support Complex [LU 733]</b>							
AM PEAK HOUR	T = 0.61X						
	T =	32	10%	15%	20%	55%	
	89% in	28	3	4	6	16	
			15%	20%	15%	50%	
	11% out	3	0	1	0	2	
PM PEAK HOUR	T = 0.79X						
	T =	41	15%	20%	15%	50%	
	31% in	13	2	3	2	6	
			10%	15%	20%	55%	
	69% out	28	3	4	6	16	
<b>Phase 2 - 73 Employee Fire Support Complex [LU 733]</b>							
AM PEAK HOUR	T = 0.61X						
	T =	45	10%	15%	20%	55%	
	89% in	40	4	6	8	22	
			15%	20%	15%	50%	
	11% out	5	1	1	1	2	
PM PEAK HOUR	T = 0.79X						
	T =	58	15%	20%	15%	50%	
	31% in	18	3	4	3	9	
			10%	15%	20%	55%	
	69% out	40	4	6	8	22	
<b>Phase 3 - 84 Employee Fire Support Complex [LU 733]</b>							
AM PEAK HOUR	T = 0.61X						
	T =	51	10%	15%	20%	55%	
	89% in	46	5	7	9	25	
			15%	20%	15%	50%	
	11% out	6	1	1	1	3	
PM PEAK HOUR	T = 0.79X						
	T =	66	15%	20%	15%	50%	
	31% in	21	3	4	3	10	
			10%	15%	20%	55%	
	69% out	46	5	7	9	25	

**TABLE 3  
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE ANALYSIS**

INTERSECTION/PEAK HOUR Approach/Movement	EXISTING			2010			2017			2027			2027 w/ Mohouli 4 Lanes					
	LOS	Delay	Total	Ambient		Total	Ambient		Total	Ambient		Total	Ambient		Total			
				LOS	Delay		LOS	Delay		LOS	Delay		LOS	Delay		LOS	Delay	
<b>MOHOULI ST/ KUKUAU ST</b>																		
<b>AM PEAK HOUR</b>																		
Kukuau St Westbound	B	12.4	B	13.3	B	13.3	C	18.0	C	18.5	D	31.4	D	31.9	C	21.0	C	21.1
Kukuau St Eastbound	C	18.9	C	22.4	C	22.6	F	61.1	F	62.5	F	>100	F	>100	F	>100	F	>100
Mohouli St Northbound LT	A	8.4	A	8.7	A	8.7	A	9.7	A	9.7	A	10.6	B	10.7	B	10.7	B	10.7
Mohouli St Southbound LT	A	7.8	A	7.9	A	7.9	A	8.1	A	8.1	A	8.3	A	8.3	A	8.3	A	8.3
<b>PM PEAK HOUR</b>																		
Kukuau St Westbound	C	17.4	C	20.8	C	21.0	E	44.1	E	44.1	E	98.0	F	>100	F	62.1	F	63.7
Kukuau St Eastbound	C	15.1	C	16.9	C	17.0	D	33.4	D	33.4	D	79.3	F	82.3	E	36.8	E	37.5
Mohouli St Northbound LT	A	8.0	A	8.1	A	8.1	A	8.5	A	8.5	A	8.9	A	8.9	A	8.9	A	8.9
Mohouli St Southbound LT	A	8.7	A	9.0	A	9.1	B	10.2	B	10.2	B	10.9	B	10.9	B	10.9	B	11.0

INTERSECTION/PEAK HOUR Approach/Movement	EXISTING			2010			2017			2017 w/ 4 lanes		
	LOS	Delay	Total	Ambient		Total	Ambient		Total	Ambient		Total
				LOS	Delay		LOS	Delay		LOS	Delay	
<b>KOMOHAHA ST/ KUKUAU ST</b>												
<b>AM PEAK HOUR</b>												
Kukuau St Westbound Thru	C	21.6	D	26.4	D	26.7	F	67.5	NA	E	45.0	NA
Kukuau St Westbound LT	E	44.0	F	72.9	F	75.1						
Kukuau St Eastbound	E	44.0	F	90.9	F	94.9	F	>100		F	>100	
Komohana St Northbound LT	A	7.9	A	8.3	A	8.3	A	9.9		A	10.0	
Komohana St Southbound LT	A	9.6	A	10.0	A	10.0	B	10.8		B	10.8	
<b>PM PEAK HOUR</b>												
Kukuau St Westbound Thru	D	27.4	E	40.7	E	41.3	F	>100	NA	F	>100	NA
Kukuau St Westbound LT	D	32.3	E	45.9	E	46.4	F	>100		F	84.0	
Kukuau St Eastbound	D	27.3	E	41.0	E	41.6	F	78.3		F	68.5	
Komohana St Northbound LT	A	9.0	A	9.4	A	9.4	B	10.2		B	10.3	
Komohana St Southbound LT	A	8.1	A	8.4	A	8.4	A	9.8		A	9.9	

**TABLE 3 (continued)  
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE ANALYSIS**

INTERSECTION/PEAK HOUR Approach/Movement	EXISTING		2010			2017			2027			2027 w/ Mohouli 4 Lanes		
	LOS	Delay	Ambient		Total	Ambient		Total	Ambient		Total	Ambient		Total
			LOS	Delay		LOS	Delay		LOS	Delay		LOS	Delay	
<b>MOHOULI ST/ PROJECT ACCESS</b>														
<b>AM PEAK HOUR</b>														
Project Access RT					A 9.9			B 10.6						A 9.8
Project Access LT					C 17.3			C 24.8						C 19.9
Mohouli St Eastbound LT					A 7.9			A 8.2						A 8.4
<b>AM PEAK HOUR</b>														
Project Access RT														
Project Access LT					B 13.2			C 15.9						B 12.4
Mohouli St Eastbound LT					C 22.8			E 37.8						E 48.6
					A 9.1			A 9.9						B 10.5

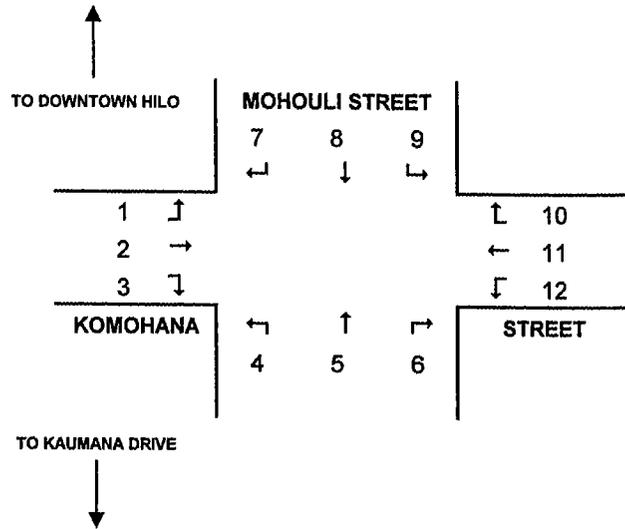
*Appendix A*

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*Traffic Turning Movement Counts*

**TRAFFIC TURNING MOVEMENT COUNT  
COUNTY OF HAWAII FIRE ADMINISTRATION BUILDING**

**LOCATION:** Komohana Street/Mohouli Street  
**DATE:** December 11, 2007, Tuesday  
**TIME:** 6:30a-8:30a / 3:30p-5:30p  
**WEATHER:** Clear  
**RECORDER:** Robert Miguel (1-6)/Carole Darby (7-12)

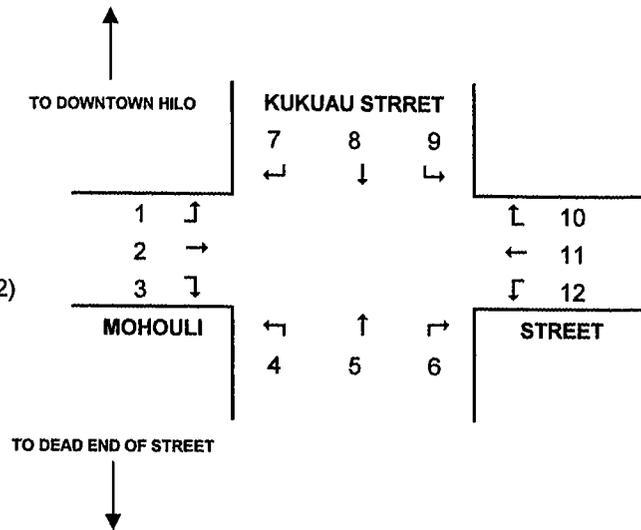


TIME PERIOD	MOVEMENT NUMBER												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
6:30-6:45a	15	38	0	0	72	37	18	18	10	44	118	24	394
6:45-7:00a	20	39	0	0	89	70	19	12	16	52	127	25	469
7:00-7:15a	25	52	1	1	81	36	20	24	23	103	141	31	538
7:15-7:30a	31	47	0	1	67	31	37	31	23	115	171	22	576
7:30-7:45a	46	40	2	1	89	31	47	40	29	136	162	36	659
7:45-8:00a	37	51	3	3	93	35	43	21	29	97	167	34	613
8:00-8:15a	39	60	1	3	82	37	25	36	33	66	124	20	526
8:15-8:30a	20	38	0	0	50	23	24	24	19	45	98	17	358
6:30-8:30a	233	365	7	9	623	300	233	206	182	658	1108	209	4133
7:00-8:00a	139	190	6	6	330	133	147	116	104	451	641	123	2386
PHF	0.92			0.895			0.791			0.909			

TIME PERIOD	MOVEMENT NUMBER												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
3:30-3:45p	31	121	1	1	46	31	32	65	37	41	94	36	536
3:45-4:00p	26	93	1	3	39	21	26	56	42	33	99	42	481
4:00-4:15p	30	111	1	1	41	28	26	80	50	36	85	43	532
4:15-4:30p	25	101	0	1	36	40	23	55	56	39	60	38	474
4:30-4:45p	27	122	1	4	29	31	18	100	92	40	72	67	603
4:45-5:00p	35	117	1	0	42	35	26	87	76	35	57	48	559
5:00-5:15p	31	111	0	0	39	35	24	87	76	42	67	40	552
5:15-5:30p	17	98	1	0	23	31	20	75	59	35	51	37	447
3:30-5:30p	222	874	6	10	295	252	195	605	488	301	585	351	4184
4:15-5:15p	118	451	2	5	146	141	91	329	300	156	256	193	2188
PHF	0.933			0.948			0.857			0.845			

**TRAFFIC TURNING MOVEMENT COUNT  
COUNTY OF HAWAII FIRE ADMINISTRATION BUILDING**

**LOCATION:** Kukuau Street/Mohouli Street  
**DATE:** December 12, 2007, Wednesday  
**TIME:** 6:30a-8:30a / 3:30p-5:30p  
**WEATHER:** Clear  
**RECORDER:** Robert Miguel (1-6)/Carole Darby (7-12)

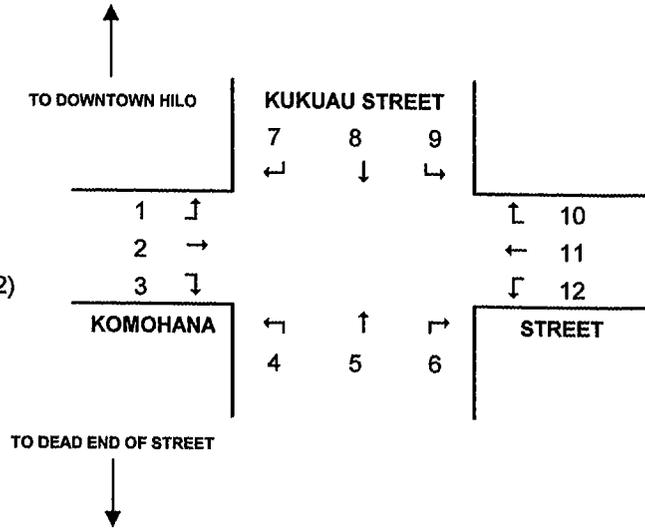


TIME PERIOD	MOVEMENT NUMBER												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
6:30-6:45a	7	108	0	1	2	7	0	0	2	0	33	0	160
6:45-7:00a	2	155	1	2	1	9	4	1	1	1	35	3	215
7:00-7:15a	3	126	0	3	6	9	6	4	2	0	39	4	202
7:15-7:30a	14	130	2	8	9	15	5	1	0	0	56	1	241
7:30-7:45a	14	99	0	5	8	14	8	1	1	2	54	4	210
7:45-8:00a	9	89	3	4	7	13	10	0	0	1	58	2	196
8:00-8:15a	5	88	1	2	5	10	4	4	0	1	66	6	192
8:15-8:30a	3	73	3	4	5	6	5	3	0	0	42	5	149
6:30-8:30a	57	868	10	29	43	83	42	14	6	5	383	25	1565
7:00-8:00a	40	444	5	20	30	51	29	6	3	3	207	11	849
PHF	0.837						0.921						

TIME PERIOD	MOVEMENT NUMBER												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
3:30-3:45p	4	67	1	2	6	8	5	6	1	1	79	6	186
3:45-4:00p	1	55	0	0	4	4	11	4	0	1	86	13	179
4:00-4:15p	2	55	4	0	2	5	5	4	0	1	93	6	177
4:15-4:30p	1	46	3	1	3	5	8	4	0	1	108	12	192
4:30-4:45p	2	56	1	0	1	6	14	7	0	0	143	18	248
4:45-5:00p	3	65	2	2	2	6	14	4	2	0	119	13	232
5:00-5:15p	5	65	3	2	2	6	15	2	0	0	124	9	233
5:15-5:30p	5	61	1	0	3	7	14	6	0	0	104	13	214
3:30-5:30p	23	470	15	7	23	47	86	37	3	4	856	90	1661
4:30-5:30p	15	247	7	4	8	25	57	19	2	0	490	53	927
PHF	0.921						0.843						

**TRAFFIC TURNING MOVEMENT COUNT  
COUNTY OF HAWAII FIRE ADMINISTRATION BUILDING**

**LOCATION:** Kukuau Street/Komohana Street  
**DATE:** December 13, 2007, Thursday  
**TIME:** 6:30a-8:30a / 3:30p-5:30p  
**WEATHER:** Clear  
**RECORDER:** Robert Miguel (1-6)/Carole Darby (7-12)



TIME PERIOD	MOVEMENT NUMBER												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
6:30-6:45a	1	42	2	3	8	5	2	1	1	1	127	0	193
6:45-7:00a	1	57	2	6	3	5	10	1	1	1	149	0	236
7:00-7:15a	2	70	4	3	11	9	8	4	3	3	173	2	292
7:15-7:30a	11	74	1	7	10	13	18	3	1	6	188	4	336
7:30-7:45a	9	63	8	6	13	18	22	5	2	4	190	1	341
7:45-8:00a	3	71	5	5	15	14	22	3	2	4	210	4	358
8:00-8:15a	10	75	6	7	5	6	6	5	1	2	170	2	295
8:15-8:30a	2	72	6	6	5	2	3	1	0	7	111	5	220
6:30-8:30a	39	524	34	43	70	72	91	23	11	28	1318	18	2271
7:00-8:00a	25	278	18	21	49	54	70	15	8	17	761	11	1327
PHF	0.933									0.905			

TIME PERIOD	MOVEMENT NUMBER												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
3:30-3:45p	6	161	10	2	7	6	5	12	1	4	104	5	323
3:45-4:00p	5	129	10	6	7	4	7	10	2	5	105	9	299
4:00-4:15p	4	153	13	1	3	4	6	4	2	1	89	4	284
4:15-4:30p	2	125	15	3	7	8	4	9	1	5	68	7	254
4:30-4:45p	6	165	17	2	5	5	7	16	0	2	90	10	325
4:45-5:00p	7	146	15	2	7	7	4	10	2	1	102	7	310
5:00-5:15p	7	145	14	3	1	8	6	17	1	2	75	10	289
5:15-5:30p	7	102	14	2	7	4	5	11	3	6	80	10	251
3:30-5:30p	44	1126	108	21	44	46	44	89	12	26	713	62	2335
4:15-5:15p	22	581	61	10	20	28	21	52	4	10	335	34	1178
PHF	0.883									0.861			

## *Appendix B*

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### *Unsignalized Intersection Level of Service (LOS) Calculations*

### CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

**Analysis Summary**

**General Information**      **Site Information**

Analyst: WY \_\_\_\_\_      Jurisdiction/Date: MOHOU LI ST      12/25/2007

Agency or Company: M&E \_\_\_\_\_      Major Street: KUKUAU ST

Analysis Period/Year: EX AM      2007      Minor Street: KUKUAU ST

Comment: 2007 EXISTING AM

**Input Data**

Movement	NB			SB			WB			EB		
	1 (LT)	2 (TH)	3 (RD)	4 (LT)	5 (TH)	6 (RD)	7 (LT)	8 (TH)	9 (RD)		10 (LT)	11 (TH)
Volume (veh/h)	11	207	3	40	444	5	3	6	29	20	30	51
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	13	246	4	43	483	5	3	7	32	22	33	57
Flare storage (ft of vels)												
Median storage (ft of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ ft      Movement 5 \_\_\_\_\_ ft

Length of study period (h) \_\_\_\_\_ .25 \_\_\_\_\_

**Output Data**

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	42	527	.08	<1	12.4	B	12.4
WB 2							
3							B
1 LTR	112	369	.303	1	18.9	C	18.9
EB 2							
3							C
①	13	1070	.012	<1	8.4	A	
④	43	1310	.033	<1	7.8	A	

### CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

**Analysis Summary**

**General Information**      **Site Information**

Analyst: WY \_\_\_\_\_      Jurisdiction/Date: MOHOU LI ST      1/27/2008

Agency or Company: M&E \_\_\_\_\_      Major Street: MOHOU LI ST

Analysis Period/Year: AMB AM      2010      Minor Street: KUKUAU ST

Comment: 2010 AMBIENT AM

**Input Data**

Movement	NB			SB			WB			EB		
	1 (LT)	2 (TH)	3 (RD)	4 (LT)	5 (TH)	6 (RD)	7 (LT)	8 (TH)	9 (RD)		10 (LT)	11 (TH)
Volume (veh/h)	11	222	3	42	520	5	3	6	29	21	31	59
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	13	264	4	46	565	5	3	7	32	23	34	66
Flare storage (ft of vels)												
Median storage (ft of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ ft      Movement 5 \_\_\_\_\_ ft

Length of study period (h) \_\_\_\_\_ .25 \_\_\_\_\_

**Output Data**

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	42	476	.088	<1	13.3	B	13.3
WB 2							
3							B
1 LTR	123	328	.375	2	22.4	C	22.4
EB 2							
3							C
①	13	997	.013	<1	8.7	A	
④	46	1290	.035	<1	7.9	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: Site Information  
 Analyst: WY \_\_\_\_\_ 12/7/2008  
 Agency or Company: M&E MOHOULI ST  
 Analysis Period/Year: TOT AM 2010 KUKUAU ST  
 Comment: 2010 TOTAL AM

Input Data

Lane Configuration	NB	TR	SB	WB	EB							
Lane 1 (cutb)	TR	TR	LTR	LTR	LTR							
Lane 2	L	L	L	L	L							
Lane 3	L	L	L	L	L							
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	11	223	3	42	524	5	3	6	29	21	31	59
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	13	265	4	46	570	5	3	7	32	23	34	66
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R Movement 5 \_\_\_\_\_ R  
 Length of study period (h) \_\_\_\_\_ .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	42	474	.089	<1	13.3	B	13.3
WB 2							
3							
1 LTR	123	325	.378	2	22.6	C	22.6
EB 2							
3							
①	13	993	.013	<1	8.7	A	
④	46	1289	.035	<1	7.9	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: Site Information  
 Analyst: WY \_\_\_\_\_ 1/27/2008  
 Agency or Company: M&E MOHOULI ST  
 Analysis Period/Year: AMB AM 2017 KUKUAU ST  
 Comment: 2017 AMBIENT AM

Input Data

Lane Configuration	NB	TR	SB	WB	EB							
Lane 1 (cutb)	TR	TR	LTR	LTR	LTR							
Lane 2	L	L	L	L	L							
Lane 3	L	L	L	L	L							
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	17	284	3	46	762	6	3	7	33	23	35	87
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	20	338	4	50	828	7	3	8	37	26	39	97
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R Movement 5 \_\_\_\_\_ R  
 Length of study period (h) \_\_\_\_\_ .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	47	324	.145	1	18	C	18
WB 2							
3							
1 LTR	162	213	.76	5	61.1	F	61.1
EB 2							
3							
①	20	794	.025	<1	9.7	A	
④	50	1212	.041	<1	8.1	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: **Site Information:** WY 1/27/2008  
 Analyst M&E Jurisdiction/Date MOHOULI ST  
 Agency or Company TOT AM Major Street KUKUJAU ST  
 Analysis Period/Year 2017 Minor Street  
 Comment 2017 TOTAL AM

Input Data

Lane Configuration	NB			SB			WB			EB		
	Lane 1 (carb)	TR	L	TR	L	L	LTR	L	L	LTR	L	
Lane 2												
Lane 3												
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	17	285	3	46	767	6	3	7	33	23	35	87
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	20	339	4	50	834	7	3	8	37	26	39	97
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R Movement 5 \_\_\_\_\_ R  
 Length of study period (h) .25

Output Data

Lane/Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	48	314	.153	1	18.5	C	18.5
WB 2							
3							C
1 LTR	162	211	.767	5	62.5	F	62.5
EB 2							
3							F
①	20	791	.026	<1	9.7	A	
④	50	1211	.041	<1	8.1	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: **Site Information:** WY 1/27/2008  
 Analyst M&E Jurisdiction/Date MOHOULI ST  
 Agency or Company AMB AM Major Street KUKUJAU ST  
 Analysis Period/Year 2027 Minor Street  
 Comment 2027 AMBIENT AM

Input Data

Lane Configuration	NB			SB			WB			EB		
	Lane 1 (carb)	TR	L	TR	L	L	LTR	L	L	LTR	L	
Lane 2												
Lane 3												
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	22	344	3	51	950	7	3	8	36	25	39	108
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	26	410	4	55	1033	8	3	9	40	28	43	120
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R Movement 5 \_\_\_\_\_ R  
 Length of study period (h) .25

Output Data

Lane/Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	52	188	.277	1	31.4	D	31.4
WB 2							
3							D
1 LTR	191	146	1.312	12	239.7	F	239.7
EB 2							
3							F
①	26	665	.039	<1	10.6	B	
④	55	1140	.049	<1	8.3	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 1/27/2008  
 Agency or Company M&E MOHOLI ST  
 Analysis Period/Year TOT AM 2027 KUKUAU ST  
 Comment 2027 TOTAL AM W/2LANE

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (carb)	TR	TR	LTR	LTR
Lane 2	L	L		
Lane 3				
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)
Volume (veh/h)	22	345	3	51 955 7 3 8 36 25 39 108
PHF	.84	.84	.84	.92 .92 .92 .9 9 .9 .9 .9
Proportion of heavy vehicles, HV	3	3	3	3 3 3 3 3 3 3 3 3 3
Flow rate	26	411	4	55 1038 8 3 9 40 28 43 120
Flare storage (# of vels)				0 0 0 0 0 0
Median storage (# of vels)				0 0 0 0 0 0

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft  
 Length of study period (h) .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	52	185	.281	1	31.9	D	31.9
WB 2							
3							D
1 LTR	191	144	1.325	12	245.2	F	245.2
EB 2							
3							F
①	26	661	.04	<1	10.7	B	
④	55	1139	.049	<1	8.3	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 1/27/2008  
 Agency or Company M&E MOHOLI ST  
 Analysis Period/Year AMB AM 2027 KUKUAU ST  
 Comment 2027 AMBIENT AM W/4LANES

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (carb)	TR	TR	LTR	LTR
Lane 2	T	T		
Lane 3	L	L		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)
Volume (veh/h)	22	344	3	51 950 7 3 8 36 25 39 108
PHF	.84	.84	.84	.92 .92 .92 .9 9 .9 .9 .9
Proportion of heavy vehicles, HV	3	3	3	3 3 3 3 3 3 3 3 3 3
Flow rate	26	410	4	55 1033 8 3 9 40 28 43 120
Flare storage (# of vels)				0 0 0 0 0 0
Median storage (# of vels)				0 0 0 0 0 0

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft  
 Length of study period (h) .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	52	277	.188	1	21	C	21
WB 2							
3							C
1 LTR	191	182	1.05	9	133.5	F	133.5
EB 2							
3							F
①	26	658	.04	<1	10.7	B	
④	55	1135	.049	<1	8.3	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: \_\_\_\_\_  
 Analyst: \_\_\_\_\_  
 Agency or Company: M&E  
 Analysis Period/Year: TOT AM 2027  
 Comment: 2027 TOTAL AM W/LANES

Site Information:  
 Jurisdiction/Date: 12/12/2008  
 Major Street: MOHOLI ST  
 Minor Street: KUKUAU ST

Approach	NB			SB			WB			EB		
	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Lane 1 (feet)	TR	TR	TR	TR	TR	TR	LTR	LTR	LTR	LTR	LTR	LTR
Lane 2	T	T	T	T	T	T	L	L	L	L	L	L
Lane 3	L	L	L	L	L	L	L	L	L	L	L	L
Movement	22	345	3	51	955	7	3	8	36	25	39	108
Volume (veh/h)	.84	.84	.92	.92	.92	.92	.9	.9	.9	.9	.9	.9
PHF	3	3	3	3	3	3	3	3	3	3	3	3
Proportion of heavy vehicles, HV	26	411	4	55	1038	8	3	9	40	28	43	120
Flow rate												
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2: \_\_\_\_\_ ft Movement 5: \_\_\_\_\_ ft  
 Length of study period (h): .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LDS	Approach Delay and LDS
1 LTR	52	275	.189	1	21.1	C	21.1
2							
3							C
1 LTR	191	180	1.06	9	136.9	F	136.9
2							
3							F
①	26	655	.04	<1	10.7	B	
④	55	1134	.049	<1	8.3	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 12/25/2006  
 Analyst M&E MOHOLI ST  
 Agency or Company EX PM 2007 KUKUAU ST  
 Analysis Period/Year 2007 EXISTING PM  
 Comment 2007 EXISTING PM

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (out)	TR	TR	LTR	LTR
Lane 2	L	L		
Lane 3				

Movement	1 (LT)	2 (TR)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)	10 (LT)	11 (TR)	12 (RT)
Volume (veh/h)	53	490	0	15	247	7	2	19	57	4	8	25
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	63	583	0	16	268	8	2	21	63	4	9	28
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2: R Movement 5: R  
 Length of study period (h): .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	86	375	.229	1	17.4	C	17.4
WB 2							
3							C
1 LTR	41	399	.103	<1	15.1	C	15.1
EB 2							
3							C
①	63	1281	.049	<1	8	A	
④	16	986	.017	<1	8.7	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 1/27/2008  
 Analyst M&E MOHOLI ST  
 Agency or Company AMB PM 2010 KUKUAU ST  
 Analysis Period/Year 2010 AMBIENT PM  
 Comment 2010 AMBIENT PM

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (out)	TR	TR	LTR	LTR
Lane 2	L	L		
Lane 3				

Movement	1 (LT)	2 (TR)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)	10 (LT)	11 (TR)	12 (RT)
Volume (veh/h)	61	571	0	16	275	7	2	20	59	4	8	28
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	73	680	0	17	299	8	2	22	66	4	9	31
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2: R Movement 5: R  
 Length of study period (h): .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	90	317	.284	1	20.8	C	20.8
WB 2							
3							C
1 LTR	44	347	.127	<1	16.9	C	16.9
EB 2							
3							C
①	73	1248	.058	<1	8.1	A	
④	17	908	.019	<1	9	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

WY 1/27/2008  
 M&E MOHOUULIST  
 TOT PM 2010 Major Street KUKUAU ST  
 Comment 2010 TOTAL PM Minor Street

Site Information

Jurisdiction/Date  
 Major Street  
 Minor Street

Input Data

Lane Configuration	NB	SB	WB	EB								
Lane 1 (curb)	TR	TR	LTR	LTR								
Lane 2	L	L										
Lane 3												
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	61	574	0	16	278	7	2	20	59	4	8	28
PHF	.84	.84	.84	.92	.92	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	73	683	0	17	302	8	2	22	66	4	9	31
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft

Length of study period (h) .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	90	314	.286	1	21	C	21
WB 2							
3							C
1 LTR	44	344	.128	<1	17	C	17
EB 2							
3							C
①	73	1245	.058	<1	8.1	A	
④	17	905	.019	<1	9.1	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

WY 1/27/2008  
 M&E MOHOUULIST  
 AMB PM 2017 Major Street KUKUAU ST  
 Comment 2017 AMBIENT PM Minor Street

Site Information

Jurisdiction/Date  
 Major Street  
 Minor Street

Input Data

Lane Configuration	NB	SB	WB	EB								
Lane 1 (curb)	TR	TR	LTR	LTR								
Lane 2	L	L										
Lane 3												
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	87	803	0	17	376	8	2	22	66	5	9	38
PHF	.84	.84	.84	.92	.92	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	104	956	0	18	409	9	2	24	73	6	10	42
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft

Length of study period (h) .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	99	187	.53	3	44.1	E	44.1
WB 2							
3							E
1 LTR	58	184	.316	1	33.4	D	33.4
EB 2							
3							D
①	104	1136	.091	<1	8.5	A	
④	18	715	.026	<1	10.2	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 1/27/2008  
 Agency or Company M&E MOHOULI ST  
 Analysis Period/Year TOT PM 2017 KUKUAU ST  
 Comment 2017 TOTAL PM

Input Data

Lane Configuration	NB			SB			WB			EB		
	TR	L	L	TR	L	L	TR	L	L			
Lane 1 (car)												
Lane 2												
Lane 3												
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	87	808	0	17	379	8	2	22	66	5	9	38
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	104	962	0	18	412	9	2	24	73	6	10	42
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft  
 Length of study period (h) .25

Output Data

Lane/Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	99	185	.536	3	45	E	45
WB 2							
3							
1 LTR	58	181	.32	1	34	D	34
EB 2							
3							
①	104	1133	.091	<1	8.5	A	
④	18	711	.026	<1	10.2	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 1/27/2008  
 Agency or Company M&E MOHOULI ST  
 Analysis Period/Year AMB PM 2027 KUKUAU ST  
 Comment 2027 AMBIENT PM

Input Data

Lane Configuration	NB			SB			WB			EB		
	TR	L	L	TR	L	L	TR	L	L			
Lane 1 (car)												
Lane 2												
Lane 3												
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	100	922	0	19	457	9	2	24	73	6	10	47
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	119	1098	0	21	497	10	2	27	81	7	11	52
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft  
 Length of study period (h) .25

Output Data

Lane/Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	110	135	.817	5	98	F	98
WB 2							
3							
1 LTR	70	112	.623	3	79.3	F	79.3
EB 2							
3							
①	119	1053	.113	<1	8.9	A	
④	21	632	.033	<1	10.9	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information  
 WY 1/27/2008  
 Agency or Company M&E MOHOLI ST  
 Analysis Period/Year TOT PM 2027 KUKUAU ST  
 Comment 2027 TOTAL PM W/2 LANE

Input/Output

Lane Configuration	NB	SB	WB	EB
Lane 1 (cont)	TR	TR	LTR	LTR
Lane 2	L	L		
Lane 3				
	NB	SB	WB	EB
Movement	1 (LD) 2 (TH) 3 (RT) 4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LD) 11 (TH) 12 (RT)			
Volume (veh/h)	100 927 0 19 460 9 2 24 73 6 10 47			
PIF	.84 .84 .84 .92 .92 .92 .9 9 9 9 9 9			
Proportion of heavy vehicles, HV	3 3 3 3 3 3 3 3 3 3 3 3			
Flow rate	119 1104 0 21 500 10 2 27 81 7 11 52			
Flare storage (# of vels)			0	0
Median storage (# of vels)			0	0

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft  
 Length of study period (h) \_\_\_\_\_ .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	110	133	.827	5	100.8	F	100.8
WB 2							
3							F
1 LTR	70	110	.635	3	82.3	F	82.3
EB 2							
3							F
①	119	1050	.113	<1	8.9	A	
④	21	629	.083	<1	10.9	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information  
 WY 1/27/2008  
 Agency or Company M&E MOHOLI ST  
 Analysis Period/Year AMB PM 2027 KUKUAU ST  
 Comment 2027 AMBIENT PM W/4 LANES

Input/Output

Lane Configuration	NB	SB	WB	EB
Lane 1 (cont)	TR	TR	LTR	LTR
Lane 2	T	T		
Lane 3	L	L		
	NB	SB	WB	EB
Movement	1 (LD) 2 (TH) 3 (RT) 4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LD) 11 (TH) 12 (RT)			
Volume (veh/h)	100 922 0 19 457 9 2 24 73 6 10 47			
PIF	.84 .84 .84 .92 .92 .92 .9 9 9 9 9 9			
Proportion of heavy vehicles, HV	3 3 3 3 3 3 3 3 3 3 3 3			
Flow rate	119 1098 0 21 497 10 2 27 81 7 11 52			
Flare storage (# of vels)			0	0
Median storage (# of vels)			0	0

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft  
 Length of study period (h) \_\_\_\_\_ .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	110	165	.667	4	62.1	F	62.1
WB 2							
3							F
1 LTR	70	181	.386	2	36.8	E	36.8
EB 2							
3							E
①	119	1047	.114	<1	8.9	A	
④	21	626	.083	<1	10.9	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: Site Information  
 Analyst: WY Jurisdiction/Date: MOHOULIST 1/27/2006  
 Agency or Company: M&E Major Street: KUKUAU ST  
 Analysis Period/Year: TOT PM 2027 Minor Street:  
 Comment: 2027 TOTAL PM W/4 LANES

Input Data

Lane Configuration	NB			SB			WB			EB		
	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	100	927	0	19	460	9	2	24	73	6	10	47
PHF	.84	.84	.84	.92	.92	.92	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	119	1104	0	21	500	10	2	27	81	7	11	52
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2: 8 Movement 5: 8  
 Length of study period (h): 25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 LTR	110	163	.674	4	63.7	F	63.7
2							
3							F
1 LTR	70	179	.392	2	37.5	E	37.5
2							
3							E
①	119	1045	.114	<1	8.9	A	
④	21	623	.033	<1	11	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information  
 Analyst WY 12/25/2007  
 Agency or Company M&E KOMOHANA ST  
 Analysis Period/Year EX AM 2007 KUKUAU ST  
 Comment 2007 EXISTING AM

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (east)	TR	TR	TR	LTR
Lane 2	L	L	L	
Lane 3				
Movement	1 (LT) 2 (TH) 3 (RT) 4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)			
Volume (veh/h)	11 761 17 25 278 18 8 15 70 21 49 54			
PHF	.94 .94 .94 .9 9 .9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			
Proportion of heavy vehicles, HV	3 3			
Flow rate	12 810 18 28 309 20 9 17 78 23 54 60			
Flare storage (# of vels)				
Median storage (# of vels)			0	0

Signal upstream of Movement 2 \_\_\_\_\_ R Movement 5 \_\_\_\_\_ R  
 Length of study period (h) \_\_\_\_\_ .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 TR	95	311	.306	1	21.6	C	23.6
WB 2 L	9	101	.089	<1	44	E	
3							C
1 LTR	137	223	.615	4	44	E	44
EB 2							
3							E
①	12	1246	.009	<1	7.9	A	
④	28	812	.034	<1	9.6	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information  
 Analyst WY 1/27/2008  
 Agency or Company M&E KOMOHANA ST  
 Analysis Period/Year AMB AM 2010 KUKUAU ST  
 Comment 2010 AMBIENT AM

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (east)	TR	TR	TR	LTR
Lane 2	L	L	L	
Lane 3				
Movement	1 (LT) 2 (TH) 3 (RT) 4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)			
Volume (veh/h)	11 822 18 26 380 19 8 16 73 21 51 55			
PHF	.94 .94 .94 .9 9 .9 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			
Proportion of heavy vehicles, HV	3 3			
Flow rate	12 874 19 29 422 21 9 18 81 23 57 61			
Flare storage (# of vels)				
Median storage (# of vels)			0	0

Signal upstream of Movement 2 \_\_\_\_\_ R Movement 5 \_\_\_\_\_ R  
 Length of study period (h) \_\_\_\_\_ .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 TR	99	265	.373	2	26.4	D	30.3
WB 2 L	9	62	.146	<1	72.9	F	
3							D
1 LTR	141	165	.853	6	90.9	F	90.9
EB 2							
3							F
①	12	1111	.011	<1	8.3	A	
④	29	755	.038	<1	10	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 1/27/2008  
 Agency or Company M&E KOMOHANA ST  
 Analysis Period/Year TOT AM 2010 KUKUAU ST  
 Comment 2010 TOTAL AM

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (outb)	TR	TR	TR	LTR
Lane 2	L	L	L	
Lane 3				

Movement	1 (LT)	2 (TR)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)	10 (LT)	11 (TR)	12 (RT)
Volume (veh/h)	11	823	18	26	389	19	8	16	73	21	51	55
PHF	.94	.94	.94	.9	.9	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	12	876	19	29	432	21	9	18	81	23	57	61
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft  
 Length of study period (h) .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LDS	Approach Delay and LOS
1 TR	99	263	.376	2	26.7	D	30.7
WB 2 L	9	60	.15	<1	75.1	F	
3							D
1 LTR	141	163	.867	6	94.9	F	94.9
EB 2							
3							
①	12	1102	.011	<1	8.3	A	F
④	29	754	.038	<1	10	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 1/27/2008  
 Agency or Company M&E KOMOHANA ST  
 Analysis Period/Year AMB AM 2017 KUKUAU ST  
 Comment 2017 AMBIENT AM

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (outb)	TR	TR	TR	LTR
Lane 2	L	L	L	
Lane 3				

Movement	1 (LT)	2 (TR)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)	10 (LT)	11 (TR)	12 (RT)
Volume (veh/h)	13	971	20	29	801	21	9	17	80	21	51	57
PHF	.94	.94	.94	.9	.9	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	14	1033	21	32	890	23	10	19	89	23	57	63
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ ft Movement 5 \_\_\_\_\_ ft  
 Length of study period (h) .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LDS	Approach Delay and LOS
1 TR	108	157	.689	4	67.5	F	67.5
WB 2 L	10			<1			F
3							
1 LTR	143	55	2.59	15	879.6	F	879.6
EB 2							
3							
①	14	742	.019	<1	9.9	A	
④	32	657	.049	<1	10.8	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information  
 Analyst: WY  
 Agency or Company: M&E  
 Analysis Period/Year: AMB AM W/MIT 2017  
 Comment: 2017 AMBIENT AM W/MITIGATION

Site Information  
 Jurisdiction/Date: KOMOHANA ST 2/6/2008  
 Major Street: KUKUAU ST  
 Minor Street: KUKUAU ST

Inputs/Details

Lane Configuration	NB	SB	WB	EB
Lane 1 (curb)	TR	TR	TR	R
Lane 2	L	L	L	LT
Lane 3				

Movement	1 (LT)	2 (TH)	3 (RT)	4 (LB)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)	10 (LT)	11 (TR)	12 (RT)
Volume (veh/h)	13	971	20	29	801	21	9	17	80	21	51	57
PHF	.94	.94	.94	.9	.9	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	14	1033	21	32	890	23	10	19	89	23	57	63
Flare storage (ft of vels)												
Median storage (ft of vels)												

Signal upstream of Movement 2: \_\_\_\_\_ R Movement 5: \_\_\_\_\_ R  
 Length of study period (h): .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 TR	108	157	.689	4	67.5	F	67.5
2 L	10			<1			
3							F
1 R	120	93	1.289	9	271.8	F	520.5
2 LT	80	33	2.402	9	893.7	F	F
3							F
①	14	742	.019	<1	9.9	A	
④	32	657	.049	<1	10.8	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information  
 Analyst: WY  
 Agency or Company: M&E  
 Analysis Period/Year: AMB AM 2017  
 Comment: 2017 AMBIENT AM W/4 LANES

Site Information  
 Jurisdiction/Date: KOMOHANA ST 1/27/2008  
 Major Street: KUKUAU ST  
 Minor Street: KUKUAU ST

Inputs/Details

Lane Configuration	NB	SB	WB	EB
Lane 1 (curb)	TR	TR	TR	LTR
Lane 2	T	T	L	
Lane 3	L	L		

Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)	10 (LT)	11 (TR)	12 (RT)
Volume (veh/h)	13	971	20	29	801	21	9	17	80	21	51	57
PHF	.94	.94	.94	.9	.9	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	14	1033	21	32	890	23	10	19	89	23	57	63
Flare storage (ft of vels)												
Median storage (ft of vels)												

Signal upstream of Movement 2: \_\_\_\_\_ R Movement 5: \_\_\_\_\_ R  
 Length of study period (h): .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 TR	99	185	.536	3	45	E	45
2 L	10			<1			
3							E
1 LTR	143	82	1.749	12	468.9	F	468.9
2							F
3							F
①	14	736	.019	<1	10	A	
④	32	650	.05	<1	10.8	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 12/25/2007  
 Agency or Company M&E KOMOHANA ST  
 Analysis Period/Year EX PM 2007 KUKUAU ST  
 Comment 2007 EXISTING PM

Input Data

Site Information	NB		SB		WB		EB	
Lane Configuration	TR		TR		TR		LTR	
Lane 1 (amb)	L		L		L		L	
Lane 2	L		L		L		L	
Lane 3	L		L		L		L	

Movement	1 (LT)	2 (TR)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)	10 (LT)	11 (TR)	12 (RT)
Volume (veh/h)	34	335	10	22	581	61	4	52	21	10	20	28
PHF	.94	.94	.94	.94	.94	.94	.94	.94	.94	.94	.94	.94
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	36	356	11	24	646	68	4	58	23	11	22	31
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R \_\_\_\_\_ Movement 5 \_\_\_\_\_ R \_\_\_\_\_  
 Length of study period (h) .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 TR	81	240	.337	1	27.4	D	27.6
2 L	4	136	.029	<1	32.3	D	
3							D
1 LTR	64	224	.285	1	27.3	D	27.3
2							
3							D
①	36	935	.039	<1	9	A	
④	24	1197	.02	<1	8.1	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 1/7/2008  
 Agency or Company M&E KOMOHANA ST  
 Analysis Period/Year AMB PM 2010 KUKUAU ST  
 Comment 2010 AMBIENT PM

Input Data

Site Information	NB		SB		WB		EB	
Lane Configuration	TR		TR		TR		LTR	
Lane 1 (amb)	L		L		L		L	
Lane 2	L		L		L		L	
Lane 3	L		L		L		L	

Movement	1 (LT)	2 (TR)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)	10 (LT)	11 (TR)	12 (RT)
Volume (veh/h)	35	437	10	23	667	64	4	54	22	10	20	29
PHF	.94	.94	.94	.94	.94	.94	.94	.94	.94	.94	.94	.94
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	37	465	11	26	741	71	4	60	24	11	22	32
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R \_\_\_\_\_ Movement 5 \_\_\_\_\_ R \_\_\_\_\_  
 Length of study period (h) .25

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 TR	84	182	.462	2	40.7	E	41
2 L	4	92	.043	<1	45.9	E	
3							E
1 LTR	65	163	.399	2	41	E	41
2							
3							E
①	37	861	.043	<1	9.4	A	
④	26	1091	.023	<1	8.4	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: Site Information  
 Analysis WY 12/2/2008  
 Agency or Company M&E KOMOHANA ST  
 Analysis Period/Year TOT PM 2010 Major Street KUKUAU ST  
 Comment 2010 TOTAL PM Minor Street

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (cont)	TR	TR	TR	LTR
Lane 2	L	L	L	
Lane 3				

Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	35	440	10	23	670	64	4	54	22	10	20	29
PHF	.94	.94	.94	.9	.9	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	37	468	11	26	744	71	4	60	24	11	22	32
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R \_\_\_\_\_ Movement 5 \_\_\_\_\_ R  
 Length of study period (h) \_\_\_\_\_ 2.5 \_\_\_\_\_

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 TR	84	180	.466	2	41.3	E	41.5
2 L	4	91	.044	<1	46.4	E	
3							E
1 LTR	65	161	.403	2	41.6	E	41.6
2							
3							E
①	37	859	.043	<1	9.4	A	
④	26	1088	.023	<1	8.4	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: Site Information  
 Analysis WY 12/2/2008  
 Agency or Company M&E KOMOHANA ST  
 Analysis Period/Year AMB PM 2017 Major Street KUKUAU ST  
 Comment 2017 AMBIENT PM Minor Street

Input Data

Lane Configuration	NB	SB	WB	EB
Lane 1 (cont)	TR	TR	TR	LTR
Lane 2	L	L	L	
Lane 3				

Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	39	818	11	25	837	70	4	60	24	10	21	30
PHF	.94	.94	.94	.9	.9	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	41	870	12	28	930	78	4	67	27	11	23	33
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R \_\_\_\_\_ Movement 5 \_\_\_\_\_ R  
 Length of study period (h) \_\_\_\_\_ 2.5 \_\_\_\_\_

Output Data

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 TR	94	77	1.221	7	269.3	F	265.4
2 L	4	25	.159	<1	173.7	F	
3							F
1 LTR	66	110	.602	3	78.3	F	78.3
2							
3							F
①	41	731	.057	<1	10.2	B	
④	28	770	.036	<1	9.8	A	

**CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET**

**Analysis Summary**

<b>General Information</b>		<b>Site Information</b>	
Analyst	WY	Jurisdiction/Date	1/27/2008
Agency or Company	M&E	Major Street	KOMOAHANA ST
Analysis Period/Year	AMB PM	Minor Street	KUKUAU ST
Comment	2017 AMBIENT PM W/ALANES		

Input Data	NB				WB				EB			
	1 (LT)	2 (TH)	3 (RD)	4 (LT)	5 (TH)	6 (RD)	7 (LT)	8 (TH)	9 (RD)	10 (LT)	11 (TH)	12 (RD)
Lane Configuration	TR				TR				L,TR			
Lane 1 (curb)	T				L				L			
Lane 2	L				L				L			
Lane 3	L				L				L			
Movement	3 (RD)				4 (LT)				5 (TH)			
Volume (veh/h)	39	818	11	25	837	70	4	60	24	10	21	30
PRF	.94	.94	.94	.9	.9	.9	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	41	870	12	28	930	78	4	67	27	11	23	33
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R Movement 5 \_\_\_\_\_ R  
 Length of study period (h) \_\_\_\_\_ .25

Output Data	Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS	
								Delay (s)	LOS
WB	1 TR	94	78	1.211	7	264.8	F	257.4	
	2 L	4	49	.081	<1	84	F	F	
	3							F	
EB	1 L,TR	66	118	.558	3	68.5	F	68.5	
	2							F	
	3							F	
	①	41	725	.057	<1	10.3	B		
	④	28	764	.036	<1	9.9	A		

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 2010 TOTAL AM  
 Agency or Company M&B PACIFIC  
 Analysis Period/Year 2010  
 Comment 2010 TOTAL AM

Site Information:

Jurisdiction/Date 2/6/2008  
 Major Street MOHOLI STREET  
 Minor Street PROJECT ACCESS

Input Data:

Lane Configuration	WB	EB	SB	NB
Lane 1 (cutb)	TR	I	R	
Lane 2		L	L	
Lane 3				
Movement	1 (LT) 2 (TH) 3 (RT) 4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)			
Volume (veh/h)	255 40 4 550			
PHF	.9 .9 .9 .9			
Proportion of heavy vehicles, HV	3 3 3 3			
Flow rate	283 44 4 611			
Flare storage (f of vels)				
Median storage (f of vels)			0	

Signal upstream of Movement 2 \_\_\_\_\_ R \_\_\_\_\_ Movement 5 \_\_\_\_\_ R

Length of study period (h) \_\_\_\_\_ .25 \_\_\_\_\_

Output Data:

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 R	1	732	.001	<1	9.9	A	15.8
2 L	4	296	.014	<1	17.3	C	
3							C
1							
2							
3							
①							
④	4	1226	.004	<1	7.9	A	A

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 2017 TOTAL AM  
 Agency or Company M&B PACIFIC  
 Analysis Period/Year 2017  
 Comment 2017 TOTAL AM

Site Information:

Jurisdiction/Date 2/6/2008  
 Major Street MOHOLI STREET  
 Minor Street PROJECT ACCESS

Input Data:

Lane Configuration	WB	EB	SB	NB
Lane 1 (cutb)	TR	I	R	
Lane 2		L	L	
Lane 3				
Movement	1 (LT) 2 (TH) 3 (RT) 4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)			
Volume (veh/h)	340 40 5 760			
PHF	.9 .9 .9 .9			
Proportion of heavy vehicles, HV	3 3 3 3			
Flow rate	378 44 6 844			
Flare storage (f of vels)				
Median storage (f of vels)			0	

Signal upstream of Movement 2 \_\_\_\_\_ R \_\_\_\_\_ Movement 5 \_\_\_\_\_ R

Length of study period (h) \_\_\_\_\_ .25 \_\_\_\_\_

Output Data:

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 R	1	648	.002	<1	10.6	B	22.8
2 L	6	187	.032	<1	24.8	C	
3							C
1							
2							
3							
①							
④	6	1132	.005	<1	8.2	A	A

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: Site Information: WY 2027  
 Analyst M&E PACIFIC Jurisdiction Date MOHOLI STREET 2/6/2008  
 Agency or Company M&E PACIFIC Major Street MOHOLI STREET  
 Analysis Period/Year TOT AM 2027 Minor Street PROJECT ACCESS  
 Comment 2027 TOTAL AM

Input Data:

Lane Configuration	WB	EB	SB	NB								
Lane 1 (carb)	TR	T	R									
Lane 2		L	L									
Lane 3												
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	400	45	5	885	5	1						
PHF	.9	.9	.9	.9	.9	.9						
Proportion of heavy vehicles, HV	3	3	3	3	3	3						
Flow rate	444	50	6	983	6	1						
Flare storage (# of vels)						0						
Median storage (# of vels)						0						

Signal upstream of Movement 2: R Movement 5: R  
 Length of study period (h): .25

Output Data:

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 R	1	592	.002	<1	11.1	B	28.9
2 L	6	140	.043	<1	31.9	D	
3							D
1							
NB 2							
3							
①							
④	6	1064	.005	<1	8.4	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: Site Information: WY 2027  
 Analyst M&E PACIFIC Jurisdiction Date MOHOLI STREET 2/6/2008  
 Agency or Company M&E PACIFIC Major Street MOHOLI STREET  
 Analysis Period/Year TOT AM 2027 Minor Street PROJECT ACCESS  
 Comment 2027 TOTAL AM W/4 LANES

Input Data:

Lane Configuration	WB	EB	SB	NB								
Lane 1 (carb)	TR	T	R									
Lane 2		L	L									
Lane 3												
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	400	45	5	885	5	1						
PHF	.9	.9	.9	.9	.9	.9						
Proportion of heavy vehicles, HV	3	3	3	3	3	3						
Flow rate	444	50	6	983	6	1						
Flare storage (# of vels)						0						
Median storage (# of vels)						0						

Signal upstream of Movement 2: R Movement 5: R  
 Length of study period (h): .25

Output Data:

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 R	1	750	.001	<1	9.8	A	18.5
2 L	6	247	.024	<1	19.9	C	
3							C
1							
NB 2							
3							
①							
④	6	1058	.005	<1	8.4	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

WY 2010  
 Agency or Company M&E PACIFIC  
 Analysis Period/Year TOT PM 2010  
 Comment 2010 TOTAL PM

Site Information

Jurisdiction/Date 2/6/2008  
 Major Street MOHOLI STREET  
 Minor Street PROJECT ACCESS

Inputs/Data

Lane Configuration	WB			EB			SB			NB		
	1 (LT)	2 (TR)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)		10 (LT)	11 (TR)
Lane 1 (cont)												
Lane 2												
Lane 3												
Movement												
Volume (veh/h)												
PHF												
Proportion of heavy vehicles, HV												
Flow rate												
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R \_\_\_\_\_ Movement 5 \_\_\_\_\_ R

Length of study period (h) \_\_\_\_\_ .25 \_\_\_\_\_

Output/Results

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (\$)	LOS	Approach Delay and LOS
1 R	4	442	.009	<1	13.2	B	22
SB 2 L	44	246	.179	1	22.8	C	
3							C
1							
NB 2							
3							
①							
④	3	892	.004	<1	9.1	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

WY 2017  
 Agency or Company M&E PACIFIC  
 Analysis Period/Year TOT PM 2017  
 Comment 2017 TOTAL PM

Site Information

Jurisdiction/Date 2/6/2008  
 Major Street MOHOLI STREET  
 Minor Street PROJECT ACCESS

Inputs/Data

Lane Configuration	WB			EB			SB			NB		
	1 (LT)	2 (TR)	3 (RT)	4 (LT)	5 (TR)	6 (RT)	7 (LT)	8 (TR)	9 (RT)		10 (LT)	11 (TR)
Lane 1 (cont)												
Lane 2												
Lane 3												
Movement												
Volume (veh/h)												
PHF												
Proportion of heavy vehicles, HV												
Flow rate												
Flare storage (# of vels)												
Median storage (# of vels)												

Signal upstream of Movement 2 \_\_\_\_\_ R \_\_\_\_\_ Movement 5 \_\_\_\_\_ R

Length of study period (h) \_\_\_\_\_ .25 \_\_\_\_\_

Output/Results

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (\$)	LOS	Approach Delay and LOS
1 R	6	336	.018	<1	15.9	C	35.1
SB 2 L	44	153	.288	1	37.8	E	
3							E
1							
NB 2							
3							
①							
④	3	744	.004	<1	9.9	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 2027, Agency of Company M&E PACIFIC, Analysis Period/Year 2027, Comment 2027 TOTAL PM

Input Data	WB	EB	SB	NB
Lane Configuration	TR	T	R	L
Lane 1 (cont)	L	L	L	L
Lane 2				
Lane 3				
Movement	1 (LT) 2 (TH) 3 (RT) 4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)			
Volume (veh/h)	925	20	3	625
PHF	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3
Flow rate	1028	22	3	694
Flare storage (# of vehicles)				0
Median storage (# of vehicles)				0

Signal upstream of Movement 2: R Movement 5: R

Length of study period (h): .25

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 R	6	279	.022	<1	18.2	C	72.9
2 L	50	95	.529	2	79.5	F	F
3							
1							
2							
3							
①							
④	3	659	.005	<1	10.5	B	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information: WY 2027, Agency of Company M&E PACIFIC, Analysis Period/Year 2027, Comment 2027 TOTAL PM W/4 LANES

Input Data	WB	EB	SB	NB
Lane Configuration	TR	T	R	L
Lane 1 (cont)	T	T	L	L
Lane 2				
Lane 3				
Movement	1 (LT) 2 (TH) 3 (RT) 4 (LT) 5 (TH) 6 (RT) 7 (LT) 8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)			
Volume (veh/h)	925	20	3	625
PHF	.9	.9	.9	.9
Proportion of heavy vehicles, HV	3	3	3	3
Flow rate	1028	22	3	694
Flare storage (# of vehicles)				0
Median storage (# of vehicles)				0

Signal upstream of Movement 2: R Movement 5: R

Length of study period (h): .25

Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	w/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
1 R	6	495	.012	<1	12.4	B	44.7
2 L	50	131	.382	2	48.6	E	E
3							
1							
2							
3							
①							
④	3	653	.005	<1	10.5	B	

## *Appendix C*

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### *Signalized Intersection Level of Service (LOS) Calculations*

### CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

**General Information**  
 WY: \_\_\_\_\_  
 Agency or Company: M&E  
 Analysis Period/Year: EX AM W/LOW 2007  
 Comment: 2007 EXISTING AM W/LOWER NB THRUFPJ

**Site Information**  
 Jurisdiction/Date: MOHOUJLI ST  
 EB/NB Street: KOMOHANA S  
 NB/SB Street: \_\_\_\_\_

**Intersection Data**

Area Type	Other	Analysis period	2.5	h	Signal type	Actuated-Field	% Back of queue	95					
Volume (veh/h)		LT	6	344	RT	121	153	134	697	490	145	288	6
RTOR volume (veh/h)		TH	8	8	9	9	9	92	92	92	91	91	91
Peak-hour factor		LT	2	2	2	2	2	2	2	2	2	2	2
Heavy vehicles (%)		TH	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $l_1$ (s)		RT	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		LT	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT		TH	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		RT	0	0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bc/h)		LT	0	0	0	0	0	0	0	0	0	0	0
Left/right parking (V or H)		TH	N	I	N	N	I	N	N	I	N	N	I

**Signal Phasing Plan**

L	LT	T	TH	R	RT	P	Pebs
EB							
WB							
NB							
SB							
Green (s)							
Yellow + All red (s)							
Cycle (s)							

**Intrasection Performance**

Lane group configuration	L	T	R	L	TR	WB	NB	SB
No. of lanes	1	1	1	1	1	1	1	1
Flow rate (veh/h)	8	430	190	177	282	146	758	478
Capacity (veh/h)	52	515	587	125	576	522	701	857
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1716	1770	1471	1583
v/c ratio	.144	.835	.324	1.414	.49	.279	1.081	.558
g/C ratio	.029	.276	.371	.071	.335	.571	.476	.541
Average back of queue (veh)	.4	21.8	6.8	15.7	11.3	3.6	48.8	16
Uniform delay (s)	80.4	57.9	38.3	79	44.9	18.4	44.5	25.6
Incremental delay (s)	0	11.4	0	226.9	.6	0	58.1	.8
Initial queue delay (s)	0	0	0	0	0	0	0	0
Delay (s)	80.4	69.3	38.3	305.9	45.5	18.4	102.6	26.4
LDS	F	E	D	F	D	B	F	C
Approach delay (s)/LDS	60	/	E	145.8	/	F	67.4	/
Intersection delay (s)/LDS	73	/			/			

### CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

**General Information**  
 WY: \_\_\_\_\_  
 Agency or Company: M&E  
 Analysis Period/Year: EX AM W/LOW 2007  
 Comment: 2007 EXISTING AM W/LOWER NB THRUFPJ

**Site Information**  
 Jurisdiction/Date: MOHOUJLI ST  
 EB/NB Street: KOMOHANA S  
 NB/SB Street: \_\_\_\_\_

**Intersection Data**

Area Type	Other	Analysis period	2.5	h	Signal type	Actuated-Field	% Back of queue	95					
Volume (veh/h)		LT	6	330	RT	116	147	123	641	451	139	190	6
RTOR volume (veh/h)		TH	8	8	9	9	9	92	92	92	91	91	91
Peak-hour factor		LT	2	2	2	2	2	2	2	2	2	2	2
Heavy vehicles (%)		TH	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $l_1$ (s)		RT	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		LT	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT		TH	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		RT	0	0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bc/h)		LT	0	0	0	0	0	0	0	0	0	0	0
Left/right parking (V or H)		TH	N	I	N	N	I	N	N	I	N	N	I

**Signal Phasing Plan**

L	LT	T	TH	R	RT	P	Pebs
EB							
WB							
NB							
SB							
Green (s)							
Yellow + All red (s)							
Cycle (s)							

**Intrasection Performance**

Lane group configuration	L	T	R	L	TR	WB	NB	SB
No. of lanes	1	1	1	1	1	1	1	1
Flow rate (veh/h)	8	413	135	116	281	134	697	436
Capacity (veh/h)	41	466	594	138	562	612	643	804
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1711	1770	1471	1583
v/c ratio	.181	.886	.227	.836	.501	.218	1.083	.542
g/C ratio	.023	.25	.375	.078	.328	.563	.438	.508
Average back of queue (veh)	.3	17	3.5	5	8.6	2.4	36.4	11.4
Uniform delay (s)	61.3	46.2	27.3	58.2	34.6	13.7	36	21.4
Incremental delay (s)	0	18.2	0	33.8	.7	0	60	.8
Initial queue delay (s)	0	0	0	0	0	0	0	0
Delay (s)	61.3	64.4	27.3	92	35.3	13.7	96	22.2
LDS	E	E	C	F	D	B	F	C
Approach delay (s)/LDS	55.4	/	E	51.8	/	D	61.9	/
Intersection delay (s)/LDS	53.8	/			/			

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

**General Information**  
 WY: 12/21/2008  
 Agency or Company: M&E  
 Analysis Period/Year: TOT AM W/LOW 2010  
 Comment: 2010 TOTAL AM W/LOWER NB THRU RU  
 Site Information  
 Jurisdiction/Date: MOHOULI ST  
 EB/WB Street: KOMOHANA S  
 NB/SB Street: KOMOHANA S

**Intersection Data**

Area Type	Other	Analysis period	h	Signal type	Actuated	Field	% Back of queue		95		
							EB	WB			
Volume (veh/h)		7	345	204	159	127	153	490	145	288	15
RTOR volume (veh/h)				50			20		50		0
Peak-hour factor		.8	.8	.9	.9	.9	.9	.92	.92	.91	.91
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_1$ (s)		2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2
Arrival type, AT		3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)											
Approach bicycle volume (b/h)											
Left/right parking (V or N)		N	/	N	/	N	/	N	/	N	/

**Signal Phasing Plan**

L	LT	T	TH	R	RT	P	Pebs
Phase 1							
Phase 2							
Phase 3							
Phase 4							
Phase 5							
Phase 6							
Phase 7							
Phase 8							

**Intersection Performance**

Lane group configuration	EB								WB								NB								SB																																																																												
	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R																																																																										
No. of lanes	9	431	193	177	289	171	758	478	159	333	52	515	587	125	577	514	701	857	197	881	1770	1863	1583	1770	1720	1770	1471	1583	1770	1949	.168	.837	328	1.414	.501	.332	1.081	.558	.811	.378	.029	.276	.371	.071	.335	.571	.476	.541	.571	.476	4	21.9	6.9	15.7	11.6	4.4	48.8	16	6.9	10.6	80.5	57.9	38.3	79	45.1	18.8	44.5	25.6	33.1	28.4	0	11.6	0	226.9	.7	0	58.1	.8	22	0	80.5	69.5	38.3	305.9	45.8	18.8	102.6	26.4	55.1	28.4	F	E	D	E	F	D	B	F	C	E	C
Approach delay (s)/LOS	60.2								72.5								/								E																																																																												
Intersection delay (s)/LOS	44.5																																																																																																				

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

**General Information**  
 WY: 1/28/2008  
 Agency or Company: M&E  
 Analysis Period/Year: AMB AM W/4 L 2010  
 Comment: 2010 AMBIENT AM W/4 LANES  
 Site Information  
 Jurisdiction/Date: MOHOULI ST  
 EB/WB Street: KOMOHANA S  
 NB/SB Street: KOMOHANA S

**Intersection Data**

Area Type	Other	Analysis period	h	Signal type	Actuated	Field	% Back of queue		95		
							EB	WB			
Volume (veh/h)		6	344	202	159	121	153	490	145	288	6
RTOR volume (veh/h)				50			20		50		0
Peak-hour factor		.8	.8	.9	.9	.9	.9	.92	.92	.91	.91
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_1$ (s)		2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2
Arrival type, AT		3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)											
Approach bicycle volume (b/h)											
Left/right parking (V or N)		N	/	N	/	N	/	N	/	N	/

**Signal Phasing Plan**

L	LT	T	TH	R	RT	P	Pebs
Phase 1							
Phase 2							
Phase 3							
Phase 4							
Phase 5							
Phase 6							
Phase 7							
Phase 8							

**Intersection Performance**

Lane group configuration	EB								WB								NB								SB																																																																											
	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R																																																																									
No. of lanes	1	1	1	1	1	1	1	1	1	8	430	190	177	282	146	758	478	159	323	132	418	666	281	594	248	961	636	248	958	.057	1.029	285	.628	.475	.587	.788	.752	.642	.337	.075	.224	.421	.159	.346	.14	.271	.402	.14	.271	2	18.5	4	5.5	7.1	4.5	12.6	13.8	5	4.3	46	41.5	20.4	42	27.4	43.1	36.2	27.4	43.5	31.3	0	51.7	0	4.4	.5	3.6	4.5	5	5.6	0	46	93.2	20.4	46.4	27.9	46.7	40.7	32.4	49.1	31.3	D	F	C	D	C	D	D	D	C	D	C
Approach delay (s)/LOS	70.6								35								/								D																																																																											
Intersection delay (s)/LOS	44.5																																																																																																			







**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information  
 WY: 1/27/2008  
 Agency or Company: M&E  
 Analysis Period/Year: AMB AM W/MIT 2017  
 Comment: 2017 AMB AM W/MITIGATION

Site Information  
 Jurisdiction/Date: MOHOLI ST  
 EB/WB Street: KOMOHANA S  
 NB/SB Street: KOMOHANA S

Intersection Data  
 Area type: Other  
 Analysis period: 25 h  
 Signal type: Actuated-Field  
 % Back of queue: 95

Volume (veh/h)	EB				WB				NB				SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
12	390	323	427	153	169	10	50	828	600	160	670	37				
RTOR volume (veh/h)	8				8				8				8			
Peak-hour factor	.8				.8				.8				.8			
Heavy vehicles (%)	2				2				2				2			
Start-up lost time, l (s)	2				2				2				2			
Extension of effective green, e (s)	2				2				2				2			
Arrival type, AI	3				3				3				3			
Approach pedestrian volume (p/h)	0				0				0				0			
Approach bicycle volume (b/h)	0				0				0				0			
Left/right parking (Y or N)	N				N				N				N			

Signal Phasing Plan

L	T	TH	R	RT	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
					R	L	L	TR												

Intersection Performance

Lane group configuration	EB				WB				NB				SB			
	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	
No. of lanes	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
Flow rate (veh/h)	15	488	341	474	347	165	900	598	176	777	244	1070	669	244	1062	
Capacity (veh/h)	122	856	682	504	593	1770	3547	1583	1770	3519	1770	3547	1583	1770	3519	
Adjusted saturation flow (veh/h)	123	569	5	942	584	677	841	894	72	732	677	841	894	72	732	
v/c ratio	.069	.241	.431	.147	.345	.138	.302	.422	.138	.302	.138	.302	.422	.138	.302	
Average back of queue (veh)	.5	7.9	8.6	10.3	10	5.7	16.7	21.6	6.2	13.2	7.2	16.7	21.6	6.2	13.2	
Uniform delay (s)	50.7	38.7	23.9	49	31.2	47.5	37.9	31.1	47.9	36.3	48.4	37.9	31.1	47.9	36.4	
Incremental delay (s)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Delay (s)	50.7	39.6	24.5	75.3	32.7	54.8	44.1	45.6	57.8	38.9	64.6	44.1	45.6	57.8	39.3	
LDS	D	D	C	E	C	D	D	D	E	D	D	D	D	E	D	
Approach delay (s)/LDS	33.7 / C				44.8 / E				45.7 / D				42.4 / D			
Intersection delay (s)/LDS	45.4 / D															

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information  
 WY: 1/27/2008  
 Agency or Company: M&E  
 Analysis Period/Year: TOT AM W/MIT 2017  
 Comment: 2017 TOT AM W/MITIGATION

Site Information  
 Jurisdiction/Date: MOHOLI ST  
 EB/WB Street: KOMOHANA S  
 NB/SB Street: KOMOHANA S

Intersection Data  
 Area type: Other  
 Analysis period: 25 h  
 Signal type: Actuated-Field  
 % Back of queue: 95

Volume (veh/h)	EB				WB				NB				SB			
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
13	391	326	427	160	169	10	50	828	600	160	670	46				
RTOR volume (veh/h)	8				8				8				8			
Peak-hour factor	.8				.8				.8				.8			
Heavy vehicles (%)	2				2				2				2			
Start-up lost time, l (s)	2				2				2				2			
Extension of effective green, e (s)	2				2				2				2			
Arrival type, AI	3				3				3				3			
Approach pedestrian volume (p/h)	0				0				0				0			
Approach bicycle volume (b/h)	0				0				0				0			
Left/right parking (Y or N)	N				N				N				N			

Signal Phasing Plan

L	T	TH	R	RT	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
					R	L	L	TR												

Intersection Performance

Lane group configuration	EB				WB				NB				SB			
	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	
No. of lanes	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	
Flow rate (veh/h)	16	489	345	474	354	193	900	598	176	787	244	1070	669	244	1060	
Capacity (veh/h)	122	856	682	504	594	1770	3547	1583	1770	3512	1770	3547	1583	1770	3512	
Adjusted saturation flow (veh/h)	123	571	506	942	596	793	841	894	72	742	677	841	894	72	742	
v/c ratio	.069	.241	.431	.147	.345	.138	.302	.422	.138	.302	.138	.302	.422	.138	.302	
Average back of queue (veh)	.5	7.9	8.7	10.3	10.3	7.2	16.7	21.6	6.2	13.5	7.2	16.7	21.6	6.2	13.5	
Uniform delay (s)	50.7	38.7	24	49	31.3	48.4	37.9	31.1	47.9	36.4	48.4	37.9	31.1	47.9	36.4	
Incremental delay (s)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Delay (s)	50.7	39.6	24.6	75.3	32.9	64.6	44.1	45.6	57.8	39.3	64.6	44.1	45.6	57.8	39.3	
LDS	D	D	C	E	C	D	D	D	E	D	D	D	D	E	D	
Approach delay (s)/LDS	33.7 / C				45.7 / E				47 / D				42.7 / D			
Intersection delay (s)/LDS	45.4 / D															

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information: WY: 2027, Agency or Company: M&E, Analysis Period/Year: TOT AM W/MIT, Comment: 2027 TOT AM W/MITIGATION, Site Information: Jurisdiction/Date: MOHOLI ST, EBWB Street: KOMOHANA S, NB/SB Street: KOMOHANA S, Date: 1/27/2008

Area type: Other, Analysis period: 25 h, Signal type: Actuated-Field, % Back of queue: 95

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	21	444	390	639	199	187	210	937	655	177	971	60
RTOR volume (veh/h)	9	9	9	9	9	9	9	9	9	9	9	9
Peak-hour factor	2	2	2	2	2	2	2	2	2	2	2	2
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_1$ (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type: AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	0	0	0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bc/h)	0	0	0	0	0	0	0	0	0	0	0	0
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan: L: L, T: T, R: R, E: E, P: P, C: C

	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R
EB																
WB																
NB																
SB																
Green (s)	15	63	8	16	28											
Yellow + All red (s)	5	6	1	5	6											
Cycle (s)	153	5	6	1	5	6										
Lost time per cycle (s)	12															
Critical v/c Ratio	.833															

Intersection Performance

	EB		WB		NB		SB					
	L	T	R	L	T	R	L	T				
Lane group configuration	1	2	1	2	1	2	1	2				
No. of lanes	2	1	2	1	2	1	2	1				
Flow rate (veh/h)	23	493	378	710	418	228	1018	658				
Capacity (veh/h)	93	649	507	562	554	173	1460	797				
Adjusted saturation flow (veh/h)	1770	3547	1583	3437	1731	1770	3547	1583				
v/c ratio	.252	.76	.745	1.264	.754	1.316	.697	.825				
g/C ratio	.052	.183	.32	.163	.32	.098	.412	.503				
Average back of queue (veh)	1	11.8	16	26.9	17.7	17.7	20.5	27				
Uniform delay (s)	69.6	59.3	46.4	64	46.6	69	37.1	32.3				
Incremental delay (s)	0	5.2	5.9	132.7	5.8	176.8	1.5	7.1				
Initial queue delay (s)	0	0	0	0	0	0	0	0				
Delay (s)	69.6	64.5	52	196.7	51.5	180.1	38.6	39.4				
LOS	E	E	D	F	D	F	D	D				
Approach delay (s)/LOS	59.4	/	E	143.2	/	F	63.7	/				
Intersection delay (s)/LOS	79.4								E	61.2	/	E

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information: WY: 2027, Agency or Company: M&E, Analysis Period/Year: TOT AM W/MIT, Comment: 2027 TOT AM W/MITIGATION, Site Information: Jurisdiction/Date: MOHOLI ST, EBWB Street: KOMOHANA S, NB/SB Street: KOMOHANA S, Date: 1/27/2008

Area type: Other, Analysis period: 25 h, Signal type: Actuated-Field, % Back of queue: 95

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	20	443	387	639	191	187	182	937	655	177	971	50
RTOR volume (veh/h)	9	9	9	9	9	9	9	9	9	9	9	9
Peak-hour factor	2	2	2	2	2	2	2	2	2	2	2	2
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_1$ (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type: AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	0	0	0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bc/h)	0	0	0	0	0	0	0	0	0	0	0	0
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan: L: L, T: T, R: R, E: E, P: P, C: C

	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R
EB																
WB																
NB																
SB																
Green (s)	15	63	8	16	28											
Yellow + All red (s)	5	6	1	5	6											
Cycle (s)	153	5	6	1	5	6										
Lost time per cycle (s)	12															
Critical v/c Ratio	.827															

Intersection Performance

	EB		WB		NB		SB					
	L	T	R	L	T	R	L	T				
Lane group configuration	1	2	1	2	1	2	1	2				
No. of lanes	2	1	2	1	2	1	2	1				
Flow rate (veh/h)	22	492	374	710	409	198	1018	658				
Capacity (veh/h)	93	649	507	562	554	173	1460	797				
Adjusted saturation flow (veh/h)	1770	3547	1583	3437	1728	1770	3547	1583				
v/c ratio	.24	.758	.738	1.264	.739	1.14	.697	.825				
g/C ratio	.052	.183	.32	.163	.32	.098	.412	.503				
Average back of queue (veh)	1	11.8	15.8	26.9	17.2	13.2	20.5	27				
Uniform delay (s)	69.6	59.3	46.3	64	46.3	69	37.1	32.3				
Incremental delay (s)	0	5.2	5.7	132.7	5.2	111.1	1.5	7.1				
Initial queue delay (s)	0	0	0	0	0	0	0	0				
Delay (s)	69.6	64.5	52	196.7	51.5	180.1	38.6	39.4				
LOS	E	E	D	F	D	F	D	D				
Approach delay (s)/LOS	59.4	/	E	143.6	/	F	53.8	/				
Intersection delay (s)/LOS	73.9								E	61.1	/	E

### CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

**General Information**

WY: 1/27/2008  
 M&E: MOHOLI ST  
 EX PM: KOMOHANA S  
 2007  
 2007 EXISTING PM

**Site Information**

Jurisdiction/Date: MOHOLI ST  
 EMB Street  
 NB/SB Street: KOMOHANA S

**Intersection Data**

Area type: Other  
 Analysis period: 25 h  
 Signal type: Actuated-Field  
 % Back of queue: 95

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	5	146	141	300	329	91	193	256	156	118	451	2
RTOR volume (veh/h)		25		10			50					0
Peak-hour factor	.95	.95	.86	.86	.85	.85	.85	.85	.93	.93	.93	0
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_l$ (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	0											
Approach bicycle volume (bc/h)	0											
Left/right parking (l or r)	N / N / N / N / N / N / N / N / N / N / N / N											
Signal Phasing/Plan	N / N / N / N / N / N / N / N / N / N / N / N											

**Intersection Performance**

	Phase 1			Phase 2			Phase 3			Phase 4			Phase 5			Phase 6			Phase 7			Phase 8					
	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R			
Lane group configuration	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R			
No. of lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Flow rate (veh/h)	5	154	122	349	477	227	301	125	127	487																	
Capacity (veh/h)	47	499	650	253	742	319	649	551	503	499																	
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1808	1770	1863	1583	1770	1862																	
v/c ratio	.111	.308	.188	1.38	.642	.711	.464	.226	.252	.977																	
g/C ratio	.027	.268	.411	.143	.411	.464	.348	.348	.411	.268																	
Average back of queue (veh)	.2	4	2.6	24	13	6.4	7.8	2.9	2.7	20																	
Uniform delay (s)	53.2	32.7	21.1	48	26.4	25.4	28.4	25.8	20.9	40.7																	
Incremental delay (s)	0	0	0	193.8	1.9	7.2	.4	0	0	34.3																	
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0																	
Delay (s)	53.2	32.7	21.1	241.8	28.3	32.6	28.8	25.8	20.9	75																	
LDS	D	C	C	F	C	C	C	C	C	E																	
Approach delay (s)/LDS	28	/	C	118.5	/	F	29.5	/	C	63.8	/	E															
Intersection delay (s)/LDS	69.2												/												E		

Loss time per cycle (s): 13  
 Critical v/c Ratio: .758

### CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

**General Information**

WY: 1/27/2008  
 M&E: MOHOLI ST  
 AMB PM: KOMOHANA S  
 2010  
 2010 AMBIENT PM

**Site Information**

Jurisdiction/Date: MOHOLI ST  
 EMB Street  
 NB/SB Street: KOMOHANA S

**Intersection Data**

Area type: Other  
 Analysis period: 25 h  
 Signal type: Actuated-Field  
 % Back of queue: 95

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	5	152	167	354	343	95	268	355	217	123	531	2
RTOR volume (veh/h)		40		20			40					0
Peak-hour factor	.95	.95	.86	.86	.86	.86	.85	.85	.85	.93	.93	0
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_l$ (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	0											
Approach bicycle volume (bc/h)	0											
Left/right parking (l or r)	N / N / N / N / N / N / N / N / N / N / N / N											
Signal Phasing/Plan	N / N / N / N / N / N / N / N / N / N / N / N											

**Intersection Performance**

	Phase 1			Phase 2			Phase 3			Phase 4			Phase 5			Phase 6			Phase 7			Phase 8					
	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R			
Lane group configuration	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R			
No. of lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Flow rate (veh/h)	5	160	134	412	486	223	352	474	390	557																	
Capacity (veh/h)	223	352	474	390	557	1770	1863	1583	1770	1813																	
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1813	1770	1863	1583	1770	1862																	
v/c ratio	.024	.455	.282	1.055	.873	.024	.455	.282	1.055	.873																	
g/C ratio	.126	.189	.299	.22	.307	.48	.394	.394	.409	.299																	
Average back of queue (veh)	.2	5.4	3.8	21	19.3	16.3	12.4	5.4	3.2	27.8																	
Uniform delay (s)	48.7	45.7	34.1	49.5	41.7	40	30.1	26.9	23.9	44.5																	
Incremental delay (s)	0	0	0	0	0	0	0	0	0	0																	
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0																	
Delay (s)	48.7	46.3	34.1	110.3	56	111.2	31.2	26.9	23.9	90.2																	
LDS	D	D	C	F	E	D	D	C	F	E																	
Approach delay (s)/LDS	40.9	/	D	80.9	/	F	57	/	E	77.8	/	E															
Intersection delay (s)/LDS	68												/												E		

Loss time per cycle (s): 7  
 Critical v/c Ratio: .969

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information  
 WY: 12/21/2008  
 Agency or Company: M&E MOHOLI ST  
 Analysis Period/Year: TOT PM 2010 KOMOHANA S  
 Comment: 2010 TOTAL PM

Site Information  
 Jurisdiction/Date: MOHOLI ST  
 EB/NB Street: KOMOHANA S  
 NB/SB Street: KOMOHANA S

Intersection Data  
 Area Type: Other  
 Analysis period: 25 h  
 Signal type: Actuated-Field  
 % Back of queue: 95

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	8	156	178	354	347	95	278	355	217	123	531	5
RTOR volume (veh/h)			40			20			40			0
Peak-hour factor		.95	.95	.86	.86	.86	.85	.85	.85	.93	.93	.93
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $l_1$ (s)		2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT		3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		0	0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bc/h)		0	0	0	0	0	0	0	0	0	0	0
Left/right parking (V or R)		N	/	N	/	N	/	N	/	N	/	N

Signal Timing Plan  
 L: L L R: R P: Ped  
 Phase 1: R Phase 2: L Phase 3: LTR Phase 4: LTR Phase 5: LTR Phase 6: TR Phase 7: TR Phase 8: TR

Green (s): 8 8 8 38 16 11 24  
 Yellow + All red (s): 4 4 6 1 4 6  
 Cycle (s): 127  
 Lost time per cycle (s): 7  
 Critical v/c Ratio: 1.049

Intersection Performance

	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Line group configuration	L	T	R	L	T	R	L	T	R	L	T	R
No. of lanes	8	164	145	412	491	327	418	208	132	576	576	576
Flow rate (veh/h)	223	352	474	390	557	296	733	623	446	557	557	557
Capacity (veh/h)	1770	1863	1583	1770	1813	1770	1863	1583	1770	1863	1770	1863
Adjusted saturation flow (veh/h)	.038	.466	.307	1.055	.881	1.107	.569	.334	.297	1.036	1.036	1.036
v/c ratio	.126	.189	.299	.22	.307	.48	.394	.394	.409	.299	.299	.299
Average back of queue (veh)	3	5.5	4.2	21	19.6	17.8	12.4	5.4	3.2	28.2	28.2	28.2
Uniform delay (s)	48.7	45.8	34.3	49.5	41.8	40	30.1	26.9	23.9	44.5	44.5	44.5
Incremental delay (s)	0	.7	0	60.8	15.2	84.1	1.1	0	0	47.6	47.6	47.6
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Delay (s)	48.7	46.5	34.3	110.3	57	124.1	31.2	26.9	23.9	92.1	92.1	92.1
LOS	D	D	C	F	E	F	C	C	C	F	F	F
Approach delay (s)/LOS	41 / D	81.3 / D	70 / D	62.1 / F	79.4 / E	79.4 / E	62.1 / E	62.1 / E	62.1 / E	79.4 / E	79.4 / E	79.4 / E
Intersection delay (s)/LOS	41 / D	81.3 / D	70 / D	62.1 / F	79.4 / E	79.4 / E	62.1 / E	62.1 / E	62.1 / E	79.4 / E	79.4 / E	79.4 / E

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information  
 WY: 1/28/2008  
 Agency or Company: M&E MOHOLI ST  
 Analysis Period/Year: AMB PM W/AL 2010 KOMOHANA S  
 Comment: 2010 AMBIENT PM W/4 LANES

Site Information  
 Jurisdiction/Date: MOHOLI ST  
 EB/NB Street: KOMOHANA S  
 NB/SB Street: KOMOHANA S

Intersection Data  
 Area Type: Other  
 Analysis period: 25 h  
 Signal type: Actuated-Field  
 % Back of queue: 95

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	5	152	167	354	343	95	268	355	217	123	531	2
RTOR volume (veh/h)			40			20			40			0
Peak-hour factor		.95	.95	.86	.86	.86	.85	.85	.85	.93	.93	.93
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $l_1$ (s)		2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT		3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		0	0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bc/h)		0	0	0	0	0	0	0	0	0	0	0
Left/right parking (V or R)		N	/	N	/	N	/	N	/	N	/	N

Signal Timing Plan  
 L: L L R: R P: Ped  
 Phase 1: R Phase 2: LTR Phase 3: LTR Phase 4: LTR Phase 5: LTR Phase 6: TR Phase 7: TR Phase 8: TR

Green (s): 15 15 5 23 5 20 24  
 Yellow + All red (s): 1 1 6 6 1 5 6  
 Cycle (s): 116  
 Lost time per cycle (s): 12  
 Critical v/c Ratio: .734

Intersection Performance

	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Line group configuration	L	T	R	L	T	R	L	T	R	L	T	R
No. of lanes	5	160	134	412	486	315	418	208	132	573	573	573
Flow rate (veh/h)	76	385	614	397	766	320	1009	450	229	703	703	703
Capacity (veh/h)	1770	1863	1583	1770	1813	1770	1863	1583	1770	1863	1770	1863
Adjusted saturation flow (veh/h)	.069	.415	.218	1.038	.835	.984	.414	.462	.578	.815	.815	.815
v/c ratio	.043	.207	.388	.224	.422	.181	.284	.284	.129	.198	.198	.198
Average back of queue (veh)	2	4.8	3	19.2	13.5	13.8	6.1	6	4.4	10.9	10.9	10.9
Uniform delay (s)	53.3	39.9	23.7	45	26.4	47.3	33.7	34.2	47.5	44.5	44.5	44.5
Incremental delay (s)	0	3	0	55.3	1.7	45.8	1	6	0	0	0	0
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Delay (s)	53.3	40.2	23.7	100.3	28.1	93.1	33.8	34.8	51.1	51.9	51.9	51.9
LOS	D	D	C	F	C	F	C	C	F	C	C	D
Approach delay (s)/LOS	33.1 / D	61.2 / E	53.5 / D	51.7 / D	51.7 / D	51.7 / D	61.2 / E	61.2 / E	51.7 / D	51.7 / D	51.7 / D	51.7 / D
Intersection delay (s)/LOS	33.1 / D	61.2 / E	53.5 / D	51.7 / D	51.7 / D	51.7 / D	61.2 / E	61.2 / E	51.7 / D	51.7 / D	51.7 / D	51.7 / D

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information  
 Analyst: WY  
 Agency or Company: M&E  
 Analysis Period/Year: TOT PM W/4L 2010  
 Comment: 2010 TOTAL PM W/4 LANES  
 Site Information  
 Jurisdiction/Date: MOHOU LI ST 1/28/2008  
 EBWB Street  
 NB/SB Street: KOMOHANA S

Intersection Data

Area type	Officer	Analysis period	.25	h	Signal type	Actuated		Field		% Back of queue	95	
						EB	WB	NB	SB			
Volume (veh/h)			8	156	178	354	95	278	355	217	123	531
RTOR volume (veh/h)						40	20		40			0
Peak-hour factor			.95	.95	.86	.86	.85	.85	.85	.85	.93	.93
Heavy vehicles (%)			2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_1$ (s)			2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)			2	2	2	2	2	2	2	2	2	2
Arrival type, RT			3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)			0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (b/h)			0	0	0	0	0	0	0	0	0	0
Left/right parking (Y or N)			N	N	N	N	N	N	N	N	N	N

Signal Phasing/Plan

L	T	R	P	Phases
L	L	L	L	Phase 1
R	R	R	R	Phase 2
L	L	L	L	Phase 3
L	L	L	L	Phase 4
L	L	L	L	Phase 5
L	L	L	L	Phase 6
L	L	L	L	Phase 7
L	L	L	L	Phase 8

Intersection Performance

Lane group configuration	EB		WB		NB		SB	
	L	T	R	L	T	R	L	T
No. of lanes	1	1	1	1	1	1	1	1
Flow rate (veh/h)	8	164	145	412	491	327	418	208
Capacity (veh/h)	76	385	614	397	766	320	1009	450
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1813	1770	3547	1583
v/c ratio	.11	.426	.236	1.038	.641	1.021	.414	.462
g/C ratio	.043	.207	.388	.224	.422	.181	.284	.284
Average back of queue (veh)	.3	4.9	3.3	19.2	13.7	15.1	6.1	6
Uniform delay (s)	53.4	40	23.9	45	26.5	47.5	33.7	34.2
Incremental delay (s)	0	.4	0	55.3	1.8	55.7	.1	.6
Initial queue delay (s)	0	0	0	0	0	0	0	0
Delay (s)	53.4	40.4	23.9	100.3	28.3	103.2	33.8	34.8
LDS	D	D	C	F	C	F	C	D
Approach delay (s)/LOS	33.2 / C							
Intersection delay (s)/LOS	54.7 / E							

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information  
 Analyst: WY  
 Agency or Company: M&E  
 Analysis Period/Year: AMB PM W/MW 2010  
 Comment: 2010 AMBIENT PM W/MOHOU LI WIDENING  
 Site Information  
 Jurisdiction/Date: MOHOU LI ST 1/28/2008  
 EBWB Street  
 NB/SB Street: KOMOHANA S

Intersection Data

Area type	Officer	Analysis period	.25	h	Signal type	Actuated		Field		% Back of queue	95	
						EB	WB	NB	SB			
Volume (veh/h)			5	152	167	354	95	268	355	217	123	531
RTOR volume (veh/h)						40	20		40			0
Peak-hour factor			.95	.95	.86	.86	.86	.85	.85	.85	.93	.93
Heavy vehicles (%)			2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_1$ (s)			2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)			2	2	2	2	2	2	2	2	2	2
Arrival type, RT			3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)			0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (b/h)			0	0	0	0	0	0	0	0	0	0
Left/right parking (Y or N)			N	N	N	N	N	N	N	N	N	N

Signal Phasing/Plan

L	T	R	P	Phases
L	L	L	L	Phase 1
R	R	R	R	Phase 2
L	L	L	L	Phase 3
L	L	L	L	Phase 4
L	L	L	L	Phase 5
L	L	L	L	Phase 6
L	L	L	L	Phase 7
L	L	L	L	Phase 8

Intersection Performance

Lane group configuration	EB		WB		NB		SB	
	L	T	R	L	T	R	L	T
No. of lanes	1	1	1	1	1	1	1	1
Flow rate (veh/h)	5	160	134	412	486	315	418	208
Capacity (veh/h)	110	753	490	487	594	317	824	701
Adjusted saturation flow (veh/h)	1770	3547	1583	3437	1813	1770	3547	1583
v/c ratio	.048	.212	.273	.846	.819	.996	.507	.297
g/C ratio	.062	.212	.31	.142	.327	.504	.442	.407
Average back of queue (veh)	.2	2.3	3.4	7.9	16.3	13.5	10.1	4.5
Uniform delay (s)	49.9	36.7	29.4	47.3	34.9	34.6	22.6	20.2
Incremental delay (s)	0	0	0	13	8.9	49.5	.5	0
Initial queue delay (s)	0	0	0	0	0	0	0	0
Delay (s)	49.9	36.7	29.4	60.3	43.8	84.1	23.1	20.2
LDS	D	D	C	E	D	F	C	C
Approach delay (s)/LOS	33.7 / C							
Intersection delay (s)/LOS	50 / D							

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information		Site Information	
Agency	WY	Jurisdiction/Date	1/28/2008
Agency or Company	M&E	EB/WB Street	MOHOULI ST
Analysis Period/Year	TOT PM W/MW 2010	NB/SB Street	KOMOHANA S
Comment	2010 TOTAL PM W/MOHOUJI WIDENING		

Intersection Data		Analysis period		Signal type		Actuated-Field		% Back of queue		95	
Area type	Other	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB
Volume (veh/h)		8	156	178	354	347	95	278	355	217	123
RTOR volume (veh/h)		40				20				40	531
Peak-hour factor		.95	.95	.86	.86	.85	.85	.85	.85	.93	.93
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_1$ (s)		2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2
Arrival type, AT		3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bc/h)		0	0	0	0	0	0	0	0	0	0
Left/right parking (l or r)		N	/	N	N	/	N	N	/	N	N

Signal Phasing/Plan		Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
L	L	R	R	L	L	L	L	L	L	L	L	L	L	L	L	L	L
EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB
Green (s)	5	10	35	7	8	24											
Yellow + All red (s)	1	5	6	1	5	6											
Cycle (s)	113			Lost time per cycle (s)			6			Critical v/c Ratio			.885				

Intersection Performance		Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
Lane group configuration		L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L
No. of lanes		1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Flow rate (veh/h)		8	164	145	412	491	327	418	208	132	576						
Capacity (veh/h)		110	753	490	487	594	317	824	701	428	576						
Adjusted saturation flow (veh/h)		1770	3547	1583	3437	1813	1770	1863	1583	1770	1866						
v/c ratio		.077	.218	.296	.846	.827	1.033	.507	.297	.309	1						
g/C ratio		.062	.212	.31	1.42	.327	.504	.442	.442	.407	.31						
Average back of queue (veh)		.3	2.4	3.7	7.9	16.5	14.7	10.1	4.5	2.9	24.5						
Uniform delay (s)		50	36.8	29.6	47.3	35	34.7	22.6	20.2	21.5	39						
Incremental delay (s)		0	0	0	0	0	59.5	.5	0	0	37.6						
Initial queue delay (s)		0	0	0	0	0	0	0	0	0	0						
Delay (s)		50	36.8	29.6	60.3	44.4	94.2	23.1	20.2	21.5	76.6						
LOS		D	D	C	E	D	F	C	C	C	E						
Approach delay (s)/LOS		33.9 / C			51.7 / D			46.9 / D			66.3 / E			D			
Intersection delay (s)/LOS		51.7 /			/			/			/			/			

General Information		Site Information	
Agency	WY	Jurisdiction/Date	1/27/2008
Agency or Company	M&E	EB/WB Street	MOHOULI ST
Analysis Period/Year	AMB PM 2017	NB/SB Street	KOMOHANA S
Comment	2017 AMBIENT PM		

Intersection Data		Analysis period		Signal type		Actuated-Field		% Back of queue		95	
Area type	Other	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB
Volume (veh/h)		37	208	217	499	383	105	408	694	440	136
RTOR volume (veh/h)		40				20				40	683
Peak-hour factor		.95	.95	.86	.86	.85	.85	.85	.85	.93	.93
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_1$ (s)		2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2
Arrival type, AT		3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bc/h)		0	0	0	0	0	0	0	0	0	0
Left/right parking (l or r)		N	/	N	N	/	N	N	/	N	N

Signal Phasing/Plan		Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
L	L	R	R	L	L	L	L	L	L	L	L	L	L	L	L	L	L
EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB	NB	SB	EB	WB
Green (s)	6	12	62	16	11	24											
Yellow + All red (s)	1	4	6	1	4	6											
Cycle (s)	153			Lost time per cycle (s)			7			Critical v/c Ratio			3.086				

Intersection Performance		Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
Lane group configuration		L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L
No. of lanes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Flow rate (veh/h)		39	219	186	580	544	480	816	471	146	742						
Capacity (veh/h)		185	292	373	324	462	268	950	807	366	754						
Adjusted saturation flow (veh/h)		1770	1863	1583	1770	1812	1770	1863	1583	1770	1860						
v/c ratio		.21	.749	.5	1.792	1.178	1.788	.86	.583	.4	.984						
g/C ratio		.195	.157	.235	.183	.255	.569	.51	.51	.484	.405						
Average back of queue (veh)		1.6	10.1	7.4	37.8	36.5	47.7	34.7	15.1	4.1	39.1						
Uniform delay (s)		62.7	61.6	30.7	62.5	57	52.9	32.7	26.2	22.3	45						
Incremental delay (s)		0	0	0	0	0	369.2	8.1	1.1	.2	28.8						
Initial queue delay (s)		0	0	0	0	0	0	0	0	0	0						
Delay (s)		62.7	71.9	51.8	430.9	157.7	422.1	40.8	27.3	22.5	73.8						
LOS		E	E	D	F	F	F	D	C	C	E						
Approach delay (s)/LOS		62.7 / E			298.7 / F			140.8 / F			65.4 / E			F			
Intersection delay (s)/LOS		158.7 /			/			/			/			/			

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information: WY 12/28/2008  
 Analyst M&E MOHOUJI ST  
 Agency or Company M&E EB/WB Street  
 Analysis Period/Year AMB PM W/4L 2017 NB/SB Street  
 Comment 2017 AMBIENT PM W/4 LANES KOMOHANA S

Site Information: Jurisdiction/Date  
 EB/WB Street  
 NB/SB Street

Intersection Data: Area Type Other Analysis period 25 h Signal type Actuated-Field % Back of queue 95

	EB			WB			NB			SB		
	LT	TH	RT									
Volume (veh/h)	38	208	217	499	383	105	408	694	440	136	683	7
RTOR volume (veh/h)		40		20			40			40		0
Peak-hour factor	.95	.95	.95	.86	.86	.86	.85	.85	.85	.93	.93	.93
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	0			0			0			0		0
Approach bicycle volume (b/h)	0			0			0			0		0
Left/right parking (V or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing & Timing:

L: LT T: TH R: RT P: Ped

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB	R			L				
WB		L		L				
NB	L	L	TR	TR				
SB	L							
Green (s)	10	30	35	5	35	20		
Yellow + All red (s)	1	5	6	1	5	6		
Cycle (s)	139			12				
Lost time per cycle (s)								1.002

Intersection Performance

	EB	T	R	L	TR	WB	NB	T	R	L	TR	SB
Lane group configuration	L	T	R	L	TR	L	T	R	L	TR	L	TR
No. of lanes	1	1	1	1	1	1	2	1	1	1	2	2
Flow rate (veh/h)	40	219	186	580	544	480	816	471	146	742	780	780
Capacity (veh/h)	56	234	358	456	684	456	1561	697	111	780	3541	3541
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1812	1770	3547	1583	1770	3541	1770	3541
v/c ratio	.031	.126	.226	.258	.377	.258	.44	.44	.063	.22	.22	.22
g/C ratio	2.1	12.1	7.8	43.6	24	28.9	14.7	18.1	11.7	21.1	21.1	21.1
Average back of queue (veh)	76.3	68.9	53.9	59	44.1	59	32.4	35.4	74.5	61.2	61.2	61.2
Uniformity delay (s)	36.1	41.1	1.4	138.5	6.5	56.4	3	2.6	191.3	21.3	21.3	21.3
Incremental delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Initial queue delay (s)	112.4	110	55.3	197.5	50.6	115.4	32.7	38	265.8	82.5	82.5	82.5
Delay (s)	F	F	F	F	F	F	C	D	F	F	F	F
LDS	87.3	/	F	126.4	/	F	56.6	/	E	112.7	/	F
Approach delay (s)/LDS												
Intersection delay (s)/LDS												
Approach delay (s)/LOS												
Intersection delay (s)/LOS												

Intersection Performance

	EB	T	R	L	TR	WB	NB	T	R	L	TR	SB
Lane group configuration	L	T	R	L	TR	L	T	R	L	TR	L	TR
No. of lanes	1	1	1	1	1	1	2	1	1	1	2	2
Flow rate (veh/h)	49	226	203	580	549	493	816	471	146	745	745	745
Capacity (veh/h)	56	237	363	462	681	462	1559	696	113	789	3539	3539
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1812	1770	3547	1583	1770	3539	1770	3539
v/c ratio	.032	.127	.229	.261	.376	.261	.439	.439	.064	.223	.223	.223
g/C ratio	2.8	12.6	8.5	42.6	24.2	29.8	14.5	17.9	11.5	20.8	20.8	20.8
Average back of queue (veh)	75.7	68	53.5	58	43.9	58	32	35.1	73.5	60	60	60
Uniformity delay (s)	77.2	45.5	2	131.7	7.1	60.8	3	2.6	184.4	19.8	19.8	19.8
Incremental delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Initial queue delay (s)	152.9	113.5	55.5	189.7	51	118.8	32.3	37.7	257.9	79.8	79.8	79.8
Delay (s)	F	F	F	F	F	F	C	D	F	F	F	F
LDS	93	/	F	122.3	/	F	57.7	/	E	109.1	/	F
Approach delay (s)/LDS												
Intersection delay (s)/LDS												
Approach delay (s)/LOS												
Intersection delay (s)/LOS												

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information: WY 12/27/2008  
 Analyst M&E MOHOUJI ST  
 Agency or Company M&E EB/WB Street  
 Analysis Period/Year TOT PM W/4L 2017 NB/SB Street  
 Comment 2017 TOTAL PM W/4 LANES KOMOHANA S

Site Information: Jurisdiction/Date  
 EB/WB Street  
 NB/SB Street

Intersection Data: Area Type Other Analysis period 25 h Signal type Actuated-Field % Back of queue 95

	EB			WB			NB			SB		
	LT	TH	RT									
Volume (veh/h)	47	215	233	499	387	105	419	694	440	136	683	10
RTOR volume (veh/h)		40		20			40			40		0
Peak-hour factor	.95	.95	.95	.86	.86	.86	.85	.85	.85	.93	.93	.93
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	0			0			0			0		0
Approach bicycle volume (b/h)	0			0			0			0		0
Left/right parking (V or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing & Timing:

L: LT T: TH R: RT P: Ped

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB	R			L				
WB		L		L				
NB	L	L	TR	TR				
SB	L							
Green (s)	10	30	35	5	35	20		
Yellow + All red (s)	1	5	6	1	5	6		
Cycle (s)	157			12				
Lost time per cycle (s)								1.024

Intersection Performance

	EB	T	R	L	TR	WB	NB	T	R	L	TR	SB
Lane group configuration	L	T	R	L	TR	L	T	R	L	TR	L	TR
No. of lanes	1	1	1	1	1	1	2	1	1	1	2	2
Flow rate (veh/h)	49	226	203	580	549	493	816	471	146	745	745	745
Capacity (veh/h)	56	237	363	462	681	462	1559	696	113	789	3539	3539
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1812	1770	3547	1583	1770	3539	1770	3539
v/c ratio	.032	.127	.229	.261	.376	.261	.439	.439	.064	.223	.223	.223
g/C ratio	2.8	12.6	8.5	42.6	24.2	29.8	14.5	17.9	11.5	20.8	20.8	20.8
Average back of queue (veh)	75.7	68	53.5	58	43.9	58	32	35.1	73.5	60	60	60
Uniformity delay (s)	77.2	45.5	2	131.7	7.1	60.8	3	2.6	184.4	19.8	19.8	19.8
Incremental delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Initial queue delay (s)	152.9	113.5	55.5	189.7	51	118.8	32.3	37.7	257.9	79.8	79.8	79.8
Delay (s)	F	F	F	F	F	F	C	D	F	F	F	F
LDS	93	/	F	122.3	/	F	57.7	/	E	109.1	/	F
Approach delay (s)/LDS												
Intersection delay (s)/LDS												
Approach delay (s)/LOS												
Intersection delay (s)/LOS												

Intersection Performance

	EB	T	R	L	TR	WB	NB	T	R	L	TR	SB
Lane group configuration	L	T	R	L	TR	L	T	R	L	TR	L	TR
No. of lanes	1	1	1	1	1	1	2	1	1	1	2	2
Flow rate (veh/h)	49	226	203	580	549	493	816	471	146	745	745	745
Capacity (veh/h)	56	237	363	462	681	462	1559	696	113	789	3539	3539
Adjusted saturation flow (veh/h)	1770	1863	1583	1770	1812	1770	3547	1583	1770	3539	1770	3539
v/c ratio	.032	.127	.229	.261	.376	.261	.439	.439	.064	.223	.223	.223
g/C ratio	2.8	12.6	8.5	42.6	24.2	29.8	14.5	17.9	11.5	20.8	20.8	20.8
Average back of queue (veh)	75.7	68	53.5	58	43.9	58	32	35.1	73.5	60	60	60
Uniformity delay (s)	77.2	45.5	2	131.7	7.1	60.8	3	2.6	184.4	19.8	19.8	19.8
Incremental delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Initial queue delay (s)	152.9	113.5	55.5	189.7	51	118.8	32.3	37.7	257.9	79.8	79.8	79.8
Delay (s)	F	F	F	F	F	F	C	D	F	F	F	F
LDS	93	/	F	122.3	/	F	57.7	/	E	109.1	/	F
Approach delay (s)/LDS												
Intersection delay (s)/LDS												
Approach delay (s)/LOS												
Intersection delay (s)/LOS												

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information  
 Agency: WY  
 Agency or Company: M&E  
 Analysis Period/Year: AMB PM W/MIT 2017  
 Comment: 2017 AMBIENT PM W/MITIGATION  
 Site Information  
 Jurisdiction/Date: MOHOLI ST  
 EB/WB Street: KOMOHANA S  
 NB/SB Street: KOMOHANA S  
 Date: 1/28/2008

Intersection Data

Area type	Other	Analysis period	h	Signal type	Actuated-Field												% Back of queue	95
					EB		WB		NB		SB		L		R			
Volume (veh/h)		38	208	217	499	383	105	408	694	440	136	683	7					
RTOR volume (veh/h)		40				20				40			0					
Peak-hour factor		.95	.95	.86	.86	.85	.85	.85	.85	.85	.93	.93	.93					
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2	2	2					
Start-up lost time, $l_1$ (s)		2	2	2	2	2	2	2	2	2	2	2	2					
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2	2	2					
Arrival type, AT		3	3	3	3	3	3	3	3	3	3	3	3					
Approach pedestrian volume (pb/h)		0				0				0			0					
Approach bicycle volume (bch/h)		0				0				0			0					
Left/right parking (Y or N)		N	/	N	/	N	/	N	/	N	/	N	/					

Signal Phasing/Plan

L	T	R	P	Phases
L	L	L	L	Phase 1
T	T	T	T	Phase 2
R	R	R	R	Phase 3
P	P	P	P	Phase 4
				Phase 5
				Phase 6
				Phase 7
				Phase 8

Intersection Performance

Lane group configuration	Last time per cycle (s)												Critical v/c Ratio	.876	
	EB		WB		NB		SB		L		R				T
No. of lanes	1	2	1	2	1	2	1	2	1	1	1	1	1	2	
Flow rate (veh/h)	40	219	186	580	544	480	816	471	146	742					
Capacity (veh/h)	106	794	567	539	636	423	1403	626	158	766					
Adjusted saturation flow (veh/h)	1770	3547	1583	3437	1812	1770	3547	1583	1770	3541					
v/c ratio	.379	.276	.329	1.077	.856	1.136	.582	.751	.923	.968					
g/C ratio	.06	.224	.358	.157	.351	.239	.396	.396	.09	.216					
Average back of queue (veh)	1.6	3.7	5.3	16.6	21.9	28.1	13.5	16.9	7.1	18.6					
Uniform delay (s)	60.6	43	31.3	56.5	40.4	51	31.8	34.8	60.5	52					
Incremental delay (s)	.3	0	0	61.3	11.2	86.3	.6	5.1	49.3	24.8					
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0					
Delay (s)	60.9	43	31.3	117.8	51.6	137.3	32.4	39.9	109.8	76.8					
LDS	E	D	C	F	D	F	C	D	F	E					
Approach delay (s)/LDS	39.7	/	D	85.7	/	F	62.9	/	E	82.3	/	F			
Intersection delay (s)/LDS	70.6														E

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information  
 Agency: WY  
 Agency or Company: M&E  
 Analysis Period/Year: TOT PM W/MIT 2017  
 Comment: 2017 TOTAL PM W/MITIGATION  
 Site Information  
 Jurisdiction/Date: MOHOLI ST  
 EB/WB Street: KOMOHANA S  
 NB/SB Street: KOMOHANA S  
 Date: 1/28/2008

Intersection Data

Area type	Other	Analysis period	h	Signal type	Actuated-Field												% Back of queue	95
					EB		WB		NB		SB		L		R			
Volume (veh/h)		47	215	233	499	387	105	419	694	440	136	683	10					
RTOR volume (veh/h)		40				20				40			0					
Peak-hour factor		.95	.95	.86	.86	.86	.86	.85	.85	.85	.93	.93	.93					
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2	2	2					
Start-up lost time, $l_1$ (s)		2	2	2	2	2	2	2	2	2	2	2	2					
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2	2	2					
Arrival type, AT		3	3	3	3	3	3	3	3	3	3	3	3					
Approach pedestrian volume (pb/h)		0				0				0			0					
Approach bicycle volume (bch/h)		0				0				0			0					
Left/right parking (Y or N)		N	/	N	/	N	/	N	/	N	/	N	/					

Signal Phasing/Plan

L	T	R	P	Phases
L	L	L	L	Phase 1
T	T	T	T	Phase 2
R	R	R	R	Phase 3
P	P	P	P	Phase 4
				Phase 5
				Phase 6
				Phase 7
				Phase 8

Intersection Performance

Lane group configuration	Last time per cycle (s)												Critical v/c Ratio	.893	
	EB		WB		NB		SB		L		R				T
No. of lanes	1	2	1	2	1	2	1	2	1	1	1	1	2		
Flow rate (veh/h)	49	226	203	580	549	493	816	471	146	745					
Capacity (veh/h)	106	794	567	539	636	423	1403	626	158	766					
Adjusted saturation flow (veh/h)	1770	3547	1583	3437	1812	1770	3547	1583	1770	3539					
v/c ratio	.468	.285	.358	1.077	.863	1.166	.582	.751	.923	.973					
g/C ratio	.06	.224	.358	.157	.351	.239	.396	.396	.09	.216					
Average back of queue (veh)	2	3.9	5.9	16.6	22.3	29.9	13.5	16.9	7.1	18.8					
Uniform delay (s)	60.9	43.1	31.7	56.5	40.5	51	31.8	34.8	60.5	52.1					
Incremental delay (s)	2.5	0	0	61.3	11.8	97.8	.6	5.1	49.3	25.9					
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0					
Delay (s)	63.4	43.1	31.7	117.8	52.3	148.8	32.4	39.9	109.8	78					
LDS	E	D	C	F	D	F	C	D	F	E					
Approach delay (s)/LDS	40.4	/	D	86	/	F	66.6	/	E	83.2	/	F			
Intersection delay (s)/LDS	72.2														E

**CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET**

General Information: WY \_\_\_\_\_ Site Information: Jurisdiction/Date \_\_\_\_\_  
 Agency or Company: M&E MOHOUILL ST  
 Analysis Period/Year: AMB PM W/MIT 2027 KOMOHANA S  
 Comment: 2027 AMBIENT PM W/MITIGATION

Intersection Data

Area type	Other	Analysis period	25	h	Signal type	Actuated-Field				% Back of queue	95		
						WB	TH	RT	NB				
Volume (veh/h)		126	266	257	602	432	116	477	902	617	150	786	15
RTOR volume (veh/h)		60	60	60	20	20	20	20	60	60	60	60	0
Peak-hour factor		.95	.95	.86	.86	.85	.85	.85	.85	.93	.93	.93	.93
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_l$ (s)		2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT		3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		0	0	0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bicy/h)		0	0	0	0	0	0	0	0	0	0	0	0
Left/right parking (Y or N)		N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing/Plan

L	LT	T	TH	R	RT	P	Peeds
							Phase 1
							Phase 2
							Phase 3
							Phase 4
							Phase 5
							Phase 6
							Phase 7
							Phase 8

Intersection Performance

EB	T	R	RT	WB	TH	TR	NB	T	R	TR	NB	T	R	TR	NB
133	280	207	700	614	561	1061	655	161	861	574	1061	655	161	861	
59	709	591	481	604	460	1442	644	236	896	460	1442	644	236	896	
1770	3547	1583	3437	1812	1770	3547	1583	3437	1812	1770	3547	1583	3437	1812	
2.248	.395	.351	1.455	1.017	1.22	.736	1.018	.684	.961	1.248	.736	1.018	.684	.961	
.033	2	.373	.14	.333	.26	.407	.407	.133	.253	.26	.407	.407	.133	.253	
1.5	5.7	6.6	30.3	33.5	38.2	21.7	35.7	7.2	23.4	40.7	21.7	35.7	7.2	23.4	
72.5	52.1	33.9	64.5	50	55.5	37.7	44.5	62	55.3	55.5	37.7	44.5	62	55.4	
612.3	.1	0	216.1	40.8	117.2	2	40	7.9	21.2	128.6	2	40	7.9	22	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
694.8	52.2	33.9	280.6	90.8	172.7	39.7	84.5	69.9	76.5	184.1	39.7	84.5	69.9	77.4	
181.4	/	F	191.9	/	F	85.3	/	F	75.4	/	F	76.2	/	E	

Intersection Performance

EB	T	R	RT	WB	TH	TR	NB	T	R	TR	NB	T	R	TR	NB
143	288	237	700	620	574	1061	655	161	865	574	1061	655	161	865	
59	709	591	481	604	460	1442	644	236	895	460	1442	644	236	895	
1770	3547	1583	3437	1812	1770	3547	1583	3437	1812	1770	3547	1583	3437	1812	
2.427	.407	.401	1.455	1.026	1.248	.736	1.018	.684	.965	1.248	.736	1.018	.684	.965	
.033	2	.373	.14	.333	.26	.407	.407	.133	.253	.26	.407	.407	.133	.253	
16.8	5.8	7.7	30.3	34.2	40.7	21.7	35.7	7.2	23.6	40.7	21.7	35.7	7.2	23.6	
72.5	52.2	34.6	64.5	50	55.5	37.7	44.5	62	55.4	55.5	37.7	44.5	62	55.4	
690.4	.1	0	216.1	43.4	128.6	2	40	7.9	22	128.6	2	40	7.9	22	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
762.9	52.3	34.7	280.6	92.4	184.1	39.7	84.5	69.9	77.4	184.1	39.7	84.5	69.9	77.4	
198.3	/	F	192.7	/	F	88.7	/	F	76.2	/	F	76.2	/	E	

General Information: WY \_\_\_\_\_ Site Information: Jurisdiction/Date \_\_\_\_\_  
 Agency or Company: M&E MOHOUILL ST  
 Analysis Period/Year: TOT PM W/MIT 2027 KOMOHANA S  
 Comment: 2027 TOTAL PM W/MITIGATION

Intersection Data

Area type	Other	Analysis period	25	h	Signal type	Actuated-Field				% Back of queue	95		
						WB	TH	RT	NB				
Volume (veh/h)		136	274	285	602	437	116	488	902	617	150	786	18
RTOR volume (veh/h)		60	60	60	20	20	20	20	60	60	60	60	0
Peak-hour factor		.95	.95	.86	.86	.85	.85	.85	.85	.93	.93	.93	.93
Heavy vehicles (%)		2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, $t_l$ (s)		2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, $e$ (s)		2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT		3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		0	0	0	0	0	0	0	0	0	0	0	0
Approach bicycle volume (bicy/h)		0	0	0	0	0	0	0	0	0	0	0	0
Left/right parking (Y or N)		N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing/Plan

L	LT	T	TH	R	RT	P	Peeds
							Phase 1
							Phase 2
							Phase 3
							Phase 4
							Phase 5
							Phase 6
							Phase 7
							Phase 8

Intersection Performance

EB	T	R	RT	WB	TH	TR	NB	T	R	TR	NB	T	R	TR	NB
143	288	237	700	620	574	1061	655	161	865	574	1061	655	161	865	
59	709	591	481	604	460	1442	644	236	895	460	1442	644	236	895	
1770	3547	1583	3437	1812	1770	3547	1583	3437	1812	1770	3547	1583	3437	1812	
2.427	.407	.401	1.455	1.026	1.248	.736	1.018	.684	.965	1.248	.736	1.018	.684	.965	
.033	2	.373	.14	.333	.26	.407	.407	.133	.253	.26	.407	.407	.133	.253	
16.8	5.8	7.7	30.3	34.2	40.7	21.7	35.7	7.2	23.6	40.7	21.7	35.7	7.2	23.6	
72.5	52.2	34.6	64.5	50	55.5	37.7	44.5	62	55.4	55.5	37.7	44.5	62	55.4	
690.4	.1	0	216.1	43.4	128.6	2	40	7.9	22	128.6	2	40	7.9	22	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
762.9	52.3	34.7	280.6	92.4	184.1	39.7	84.5	69.9	77.4	184.1	39.7	84.5	69.9	77.4	
198.3	/	F	192.7	/	F	88.7	/	F	76.2	/	F	76.2	/	E	

Intersection Performance

EB	T	R	RT	WB	TH	TR	NB	T	R	TR	NB	T	R	TR	NB
143	288	237	700	620	574	1061	655	161	865	574	1061	655	161	865	
59	709	591	481	604	460	1442	644	236	895	460	1442	644	236	895	
1770	3547	1583	3437	1812	1770	3547	1583	3437	1812	1770	3547	1583	3437	1812	
2.427	.407	.401	1.455	1.026	1.248	.736	1.018	.684	.965	1.248	.736	1.018	.684	.965	
.033	2	.373	.14	.333	.26	.407	.407	.133	.253	.26	.407	.407	.133	.253	
16.8	5.8	7.7	30.3	34.2	40.7	21.7	35.7	7.2	23.6	40.7	21.7	35.7	7.2	23.6	
72.5	52.2	34.6	64.5	50	55.5	37.7	44.5	62	55.4	55.5	37.7	44.5	62	55.4	
690.4	.1	0	216.1	43.4	128.6	2	40	7.9	22	128.6	2	40	7.9	22	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
762.9	52.3	34.7	280.6	92.4	184.1	39.7	84.5	69.9	77.4	184.1	39.7	84.5	69.9	77.4	
198.3	/	F	192.7	/	F	88.7	/	F	76.2	/	F	76.2	/	E	