HAWAII COMMUNITY DEVELOPMENT AUTHORITY

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FILE COPY

FEB - 8 2020

DAVID Y. IGE
GOVERNOR

JOHN WHALEN
CHAIR

AEDWARD LOS BANOS
EXECUTIVE DIRECTOR

January 6, 2020

Mr. Keith Kawaoka, Acting Director
Office of Environmental Quality Control
State Office Tower
235 South Beretania Street, Room 702
Honolulu, Hawai'i 96813-2437

Dear Mr. Kawaoka:

Re: Submittal of Draft Environmental Assessment Pursuant to Hawai'i Revised Statutes, Chapter 343 Hunt Kalaeloa Subdivision Roads District of 'Ewa, Island of O'ahu, Hawai'i

The State of Hawai'i, Hawai'i Community Development Authority is transmitting the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFNSI) for the Hunt Kalaeloa Subdivision Roads project, Kalaeloa Community Development District, District of 'Ewa, Island of O'ahu, Hawai'i, Tax Map Keys (TMKs):

(1) 9-1-013:002, 003, 004, 010, 093, 107, 128, 129;
(1) 9-1-015:013, 028, 029, 032;
(1) 9-1-016:027, 035;
(1) 9-1-118:013, 014;
(1) 9-1-148:011, 031; and
(1) 9-1-160:006, 009, 012, 013, 015, 018, 036.

Please issue publication of the subject DEA-AFNSI in the next available edition of the Environmental Notice. Enclosed are:

- One (1) hard copy of the DEA-AFNSI;
- One (1) hard copy of the OEQC Applicant Publication Form; and
- One (1) CD containing an electronic text searchable copy of the DEA-AFNSI document in PDF and the OEQC Applicant Publication Form in MS Word.

Please contact Tesha H. Malama, Kalaeloa Director of Planning, Kalaeloa Community Development District, at (808) 594-0352 should you have questions.

Sincerely,

Aedward Los Banos
Executive Director

Enclosures
c: Jinny Cheung, Hunt Companies
Brian Takeda RMTC

20-201

From: webmaster@hawaii.gov
To: HI Office of Environmental Quality Control
Subject: New online submission for The Environmental Notice
Date: Monday, February 3, 2020 2:04:35 PM

Action Name

Hunt Kalaeloa Subdivision Roads, Kalaeloa, Ewa, Island of Oahu, Hawaii

Type of Document/Determination

Draft environmental assessment and anticipated finding of no significant impact (DEA-AFNSI)

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds

Judicial district

ʻEwa, Oʻahu

Tax Map Key(s) (TMK(s))

(1) 9-1-013:002, 003, 004, 010, 093, 107, 026, 128, 129;
(1) 9-1-015:013, 028, 029, 032;
(1) 9-1-016:027, 035;
(1) 9-1-118:013, 014;
(1) 9-1-148:011, 031; and
(1) 9-1-160:006, 009, 012, 013, 015, 018, 036

Action type

Applicant

Other required permits and approvals

Numerous

Discretionary consent required

na

Approving agency

Hawaii Community Development Authority

Agency contact name

Tesha Malama

Agency contact email (for info about the action)

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Map It

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Map It

Was this submittal prepared by a consultant?

Yes

Consultant

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R. M. Towill Corporation
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Map It

Action summary

Hunt Communities Hawaiʻi LLC, proposes to construct improvements to roadways, intersections and utility systems within the former Barbers Point Naval Air Station property in ʻEwa, Oʻahu, Hawaiʻi. The project site is bound by the existing Franklin D. Roosevelt (FDR) Avenue to the north, Kamokila Boulevard to the west, Franklin Street to the east, and Saratoga Avenue to the south. The proposed

improvements will involve an area of approximately 42.73 acres comprised of the following: approximately 32.31 acres for improvements to existing road right-of-ways (ROW), approximately 0.56 acres for installation of an on-site sewer line, and approximately 10.42 acres for the construction off-site improvements including drainage facilities and left turn lanes, and installation or modification of traffic signals. When complete, the project will support the future development of public, residential and commercial uses within the State of Hawai‘i, Kalaeloa Community Development District (Kalaeloa CD

Reasons supporting determination

This Draft EA has preliminarily determined that the project will have no significant adverse impact to air and water quality, existing utilities, noise, archaeological or cultural sites, or wildlife habitat. All anticipated impacts will be temporary and will not adversely impact the environmental quality of the area.

Attached documents (signed agency letter & EA/EIS)

- OEQC-Hunt-Kalaeloa-Subdiv-Rds-DEA.pdf
- 20_0106-Letter-to-OEQC-Kalaeloa-Subdivision-Roads.pdf

Action location map

- HUNT_PrjLocation.zip

Authorized individual

Colette Sakoda

Authorization

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

Draft Environmental Assessment
Prepared in Accordance with Hawaii Revised Statutes,
Chapter 343, and Hawaii Administrative Rules, Title 11, Chapter 200.1

Hunt Kalaeloa Subdivision Roads

District of ʻEwa, Island of Oʻahu, Hawaiʻi

February 2020

Proposing Applicant:
Hunt Communities Hawaii LLC
737 Bishop Street, Suite 2750
Honolulu, Hawaiʻi 96813

Accepting Agency:
State of Hawaiʻi
Hawaiʻi Community Development Authority
547 Queen Street
Honolulu, Hawaiʻi 96813

Draft Environmental Assessment
Prepared in Accordance with Hawai‘i Revised Statutes, Chapter 343, and Hawai‘i Administrative Rules, Title 11, Chapter 200.1

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Prepared By:
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Project No. 1-23105-00P

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Appendix B Phase I Environmental Site Assessment, Element Environmental LLC, December 2017

Appendix C Biological surveys for proposed road improvements at Kalaeloa, Kapolei, Oʻahu, AECOS, Inc., January 2018

Appendix D Archaeological Literature Review and Field Inspection, Cultural Surveys Hawaiʻi, Inc., December 2017

Appendix E Draft Report: Traffic Impact Analysis Report for the Development of Parcels 1, 2, and 3 in Kalaeloa. Fehr & Peers, December 29, 2017.

Appendix F Early Consultation: Comments Received during the First Draft Environmental Assessment Comment Period from December 28, 2018 to February 19, 2019 and Responses

Acronyms and Abbreviations

AC	Asphalt Concrete
ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AMSL	above mean sea level
bgs	below ground surface
BMPs	Best Management Practices
BPNAS	Barbers Point Naval Air Station
BWS	Honolulu Board of Water Supply
CAB	Clean Air Branch
CDD	Community Development District
CFR	Code of Federal Regulations
cm	centimeter
COPC	Contaminants of potential concern
CWA	Clean Water Act
CWB	Clean Water Branch
CZMA	Coastal Zone Management Act
CZM	Coastal Zone Management Federal Consistency Review
CZO	Comprehensive Zoning Ordinance
CZMP	Coastal Zone Management Program
dBA	Decibels
DBEDT	Department of Business, Economic Development, and Tourism, State of Hawaiʻi
DEA	Draft Environmental Assessment
DEAL	Direct Exposure Action Level
DLNR	Department of Land and Natural Resources, State of Hawaiʻi
DOBOR	Division of Boating and Ocean Recreation, DLNR
DOE	Department of Education, State of Hawaiʻi
DOFAW	Department of Forestry and Wildlife, State of Hawaiʻi
DOH	Department of Health, State of Hawaiʻi
DPP	Department of Planning and Permitting
EA	Environmental Assessment
ECP	Erosion Control Plan

Acronyms and Abbreviations

EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FEA	Final Environmental Assessment
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FONSI	Finding of No Significant Impact
ft	Feet
GHG	Green House Gas
H-1	Interstate Highway 1
HAR	Hawaiʻi Administrative Rules
HDOH	Department of Health, State of Hawaiʻi
HDOT	Department of Transportation, State of Hawaiʻi
HCDA	Hawaiʻi Community Development Authority
HFD	Honolulu Fire Department
HPD	Honolulu Police Department
HRS	Hawaiʻi Revised Statutes
HSTP	Hawaiʻi State Transportation Plan
IMPU	Infrastructure Master Plan Update
JCIP	James Campbell Industrial Park
LOS	Level of Service
lf	Linear Feet
MP	Master Plan
MOU	Memorandum of Understanding
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OEQC	Office of Environmental Quality Control

Acronyms and Abbreviations

OP	DBEDT, Office of Planning
OR&L	Oʻahu Railway and Land Company
OTS	Oʻahu Transit Services
POLs	Petroleum, Oils, and Lubricants
PM	Particulate Matter
ppt	parts per thousand
PVC	Polyvinyl Chloride
ROW	Right-of-way
SCS	Soil Conservation Service, U. S. Department of Agriculture
SHPD	State Historic Preservation Division
SMA	Special Management Area
SO_2	Sulfur Dioxide
SOEST	School of Ocean and Earth Science and Technology, University of Hawaiʻi
SWPPP	Storm Water Pollution Prevention Plan
sy	Square Yard
TAM	Technical Assistance Memorandum
TIAR	Traffic Impact Analysis Report
TMDL	Total Maximum Daily Loads
TMP	Traffic Management Plan
TMK	Tax Map Keys
USACE	U. S. Army Corps of Engineers
USC	United States Code
USDA	U. S. Department of Agriculture
USFWS	U. S. Fish & Wildlife Service
USGS	U. S. Geological Survey

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Section 1
Project Summary

Project:	Hunt Kalaeloa Subdivision Roads, ʻEwa , Island of Oʻahu, Hawaiʻi
Project Applicant:	Hunt Communities Hawaiʻi LLC
Accepting Authority:	Hawaiʻi Community Development Authority
Agent:	R. M. Towill Corporation
Location:	Kalaeloa, ʻEwa Island of Oʻahu, Hawaiʻi 96707
Proposed Action:	Construction of subdivision roads serving the Hunt Kalaeloa Subdivision
Present Use:	Existing Barbers Point Elementary School, Wakea Gardens multi-unit apartments, vacant lots
Tax Map Keys (TMKs):	(1) 9-1-013:002, 003, 004, 010, 026, 093, 107, 128, 129; (1) 9-1-015:013, 028, 029, 032; (1) 9-1-016:027, 035 (1) 9-1-118:013, 014; (1) 9-1-148:011, 031; (1) 9-1-160:006, 009, 012, 013, 015, 018, 036
Land Area Used:	Approximately 42.7 acres
Flood Zones:	Zone D
State Land Use District:	Urban
Special Management Area (SMA):	No
HCDA	Kalaeloa Community Development District
City and County of Honolulu Zoning:	F-1 (Federal)
Land Ownership:	Various, State of Hawaiʻi, City and County of Honolulu, and Private
Permits That May be Required:	STATE: Environmental Assessment (EA) under Hawaiʻi Revised Statutes (HRS), Chapter 343; National Pollutant Discharge Elimination System (NPDES) permit for construction storm water.
Anticipated Determination	Finding of No Significant Impact (FONSI)

Section 2
Project Purpose and Location

2.1 Background

Hunt Communities Hawaiʻi LLC (Hunt), proposes to construct improvements to roadways, intersections and utility systems within the former Barbers Point Naval Air Station (BPNAS) property located in ʻEwa , Oʻahu, Hawaiʻi and located approximately 16 miles west of downtown Honolulu. The project site is bounded by the existing Franklin D. Roosevelt (FDR) Avenue to the north, Kamokila Boulevard to the west, Franklin Street to the east, and Saratoga Avenue to the south. See **Figure 2-1, Project Location**.

The proposed improvements will involve an area of approximately 42.73 acres comprised of the following: 32.31 acres using existing road right-of-ways (ROW), 0.56 acres for an on-site sewer line, and approximately 10.42 acres for off-site improvements including construction of drainage facilities, construction of left turn lanes, and installation or modification of traffic signals. See **Figure 2-2, Work Areas**. When complete, the project will support the future development of public, residential and commercial uses within the State of Hawaiʻi, Kalaeloa Community Development District (Kalaeloa CDD).

The site encompasses land and roadways on portions of multiple tax map keys (TMKs): (1) 9-1-013:002, 003, 004, 010, 093, 107, 128, 129; (1) 9-1-015:013, 028, 029, 032; (1) 9-1-016: 027, 035; (1) 9-1-118:013, 014; (1) 9-1-148:011, 031; (1) 9-1-160:006, 009, 012, 013, 015, 018, 036. The roadways are under various jurisdictions, including the U. S. Navy (Navy); State Department of Business, Economic Development, & Tourism, Hawaiʻi Community Development Authority (HCDA); State Department of Transportation (HDOT); and, the City and County of Honolulu (CCH).

The U.S. Congress authorized the closure of the BPNAS at Kalaeloa in 1993 under the Navy's Base Realignment and Closure (BRAC) process. BPNAS at Kalaeloa is bounded by the Pacific Ocean to the south and lands within FDR Avenue, West Perimeter, East Hansen, and Essex Roads, and consisted of 3,833 acres of land, including 110 acres of non-contiguous area at Kaula Island and Iroquois Point (Department of the Navy, 1999). In 1994, the Hawaiʻi State Legislature established the BPNAS Redevelopment Commission to prepare for the conveyance and reuse of the surplus lands at Kalaeloa. The commission was comprised of 15 members, including representatives from the State, CCH, neighboring communities, and representatives of the small business, labor, and the homeless communities. All meetings of the commission were open to the public. The commission adopted the Kalaeloa Community Redevelopment Plan in 1997, which served as the principal guiding document to coordinate the conveyances (Helber, Hastert & Fee, 1997). The Kalaeloa Community Redevelopment Plan was amended five times between 1997 and 2001 to respond to new site conditions and changes in interest of government agencies designated to receive surplus land.

Figure 2-1, Project Location

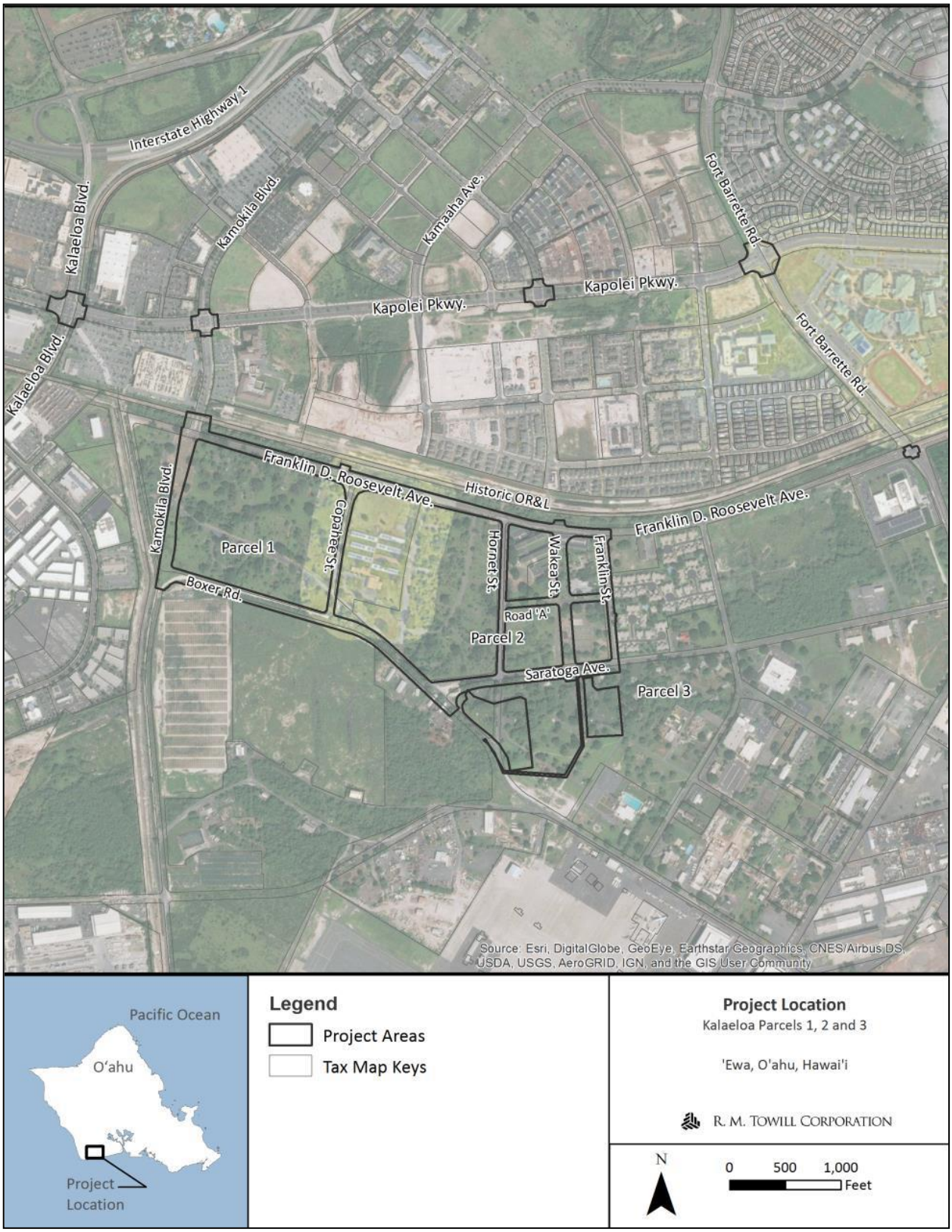
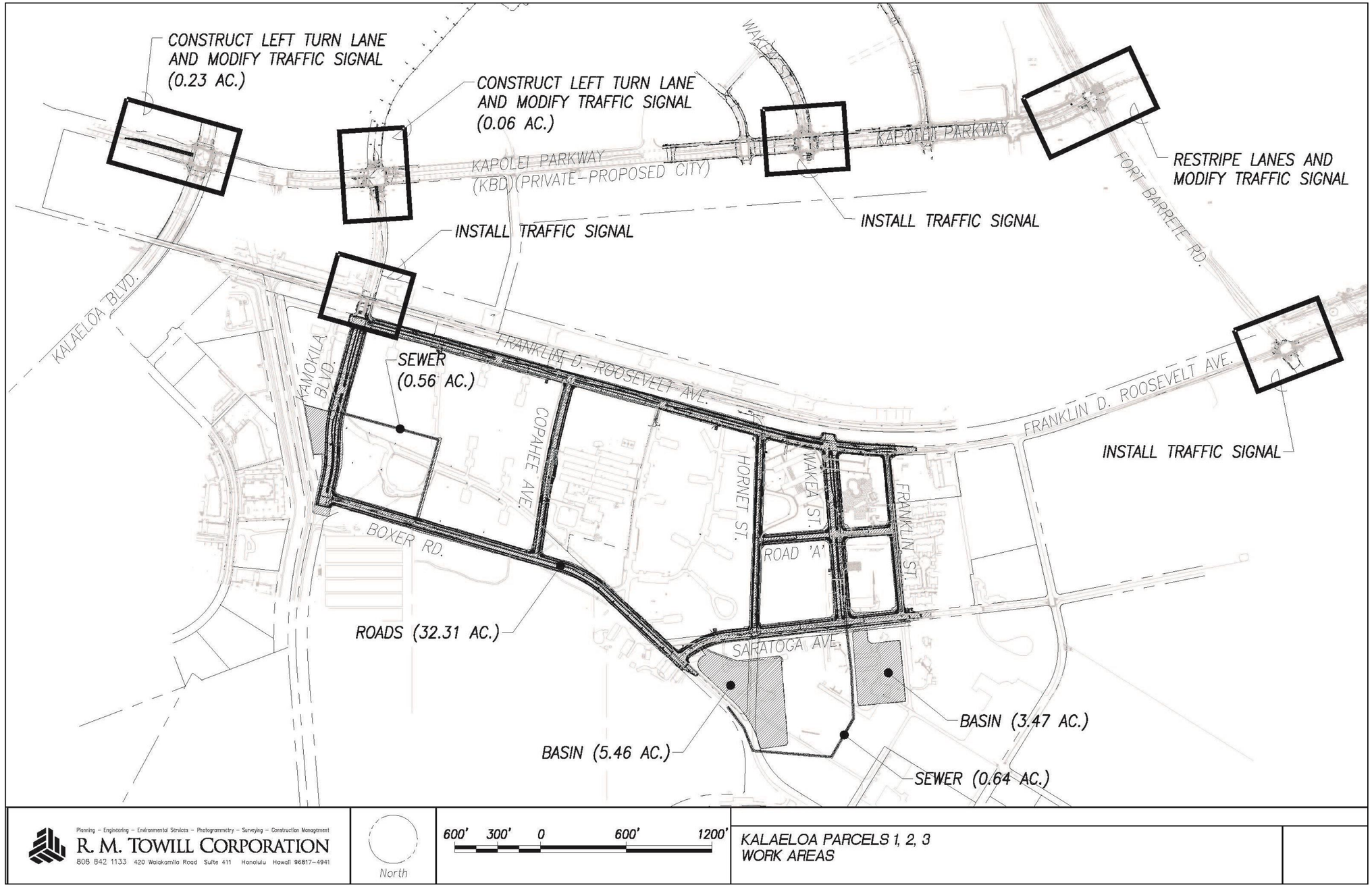


Figure 2-2, Work Areas



A *Final Environmental Impact Statement (FEIS) for the Disposal and Reuse of Naval Air Station Barbers Point, Hawaiʻi* was published in February 1999 to assist the Secretary of the Navy in determining the environmental impacts of the disposal and alternative scenarios for the reuse of surplus properties at the BPNAS.

The Navy planned to retain 1,238 acres, convey one acre to the West Oʻahu Community Federal Credit Union, transfer 457 acres to other federal agencies, and, dispose of 2,137 acres as surplus in a manner consistent with the 1997 Kalaeloa Community Redevelopment Plan. The Navy and State-preferred alternative consisted of reusing the existing Kalaeloa Airport as a general aviation reliever airport for the Daniel K. Inouye International Airport and designating land for park and recreational uses, commercial/private recreation and light industrial uses, residential uses, and homeless providers. The remaining lands would be for public facilities, roads, open space, and utilities. A supplemental Final EA to the 1999 FEIS was published in August 2011 to evaluate changes that occurred since 1999, including the availability of five new parcels and a change in proposed land use for one parcel (Department of the Navy, 2011).

Following the formal closure of the BPNAS on July 2, 1999, the Navy finally retained roughly 1,055 acres, designated approximately 457 acres of excess land for transfer to various federal agencies, including the Veterans Administration, Federal Aviation Administration (FAA), U.S. Postal Service, National Guard Bureau, U.S. Fish and Wildlife Service (USFWS), and the U.S. Coast Guard. Roughly 2,180 acres of the remaining land were designated as surplus for State, CCH, and other private parties (HCDA, 2006).

Subsequently, Act 184 of the 2002 Hawaiʻi State Legislature transferred redevelopment responsibility for Kalaeloa from the BPNAS Redevelopment Commission to the HCDA. HCDA, therefore, assumed responsibility for implementation of the Community Redevelopment Plan. HCDA presently retains development responsibility over the former BPNAS, now known as the Kalaeloa CDD. In 2004, HCDA discussed the need for establishing a vision and direction for the Kalaeloa CDD and agreed to prepare a Strategic Plan. HCDA conducted an outreach process that involved government officials, stakeholders, and the community, and incorporated comments into its Kalaeloa Strategic Plan, adopted in May 2005. The Kalaeloa Strategic Plan also established a mission statement for HCDA to lead a sustained, long-term public/private commitment for the realization of Kalaeloa as a Center for Excellence through partnerships, planning, advocacy, and stewardship.

HCDA published the Kalaeloa Master Plan in March 2006. The Kalaeloa Master Plan is intended to serve as an update to the 1997 Kalaeloa Community Redevelopment Plan. The plan now serves as the principal policy and planning document for HCDA's use in coordinating with federal, state, and county government agencies, developers, private landowners, and the community.

Kalaeloa CDD land under development by Hunt encompasses 538 acres across 23 parcels. The Navy conveyed the properties to Hunt in 2009 as part of the Ford Island Master Development Agreement. Through the agreement, the Navy exchanged five underutilized properties on Oʻahu, including housing in and around the former BPNAS, for infrastructure work and development services on Ford Island (Hunt, 2012). In Kalaeloa, Hunt is currently undertaking a long-range planning effort as outlined in the Hunt Kalaeloa Strategic Implementation Plan (AECOM, 2013). The plan envisions a residential, mixed-use community anchored by a walkable town center in the ʻEwa region of West Oʻahu. See **Section 7.1.11** for further discussion. In 2015, Hunt completed its first residential project in the Kalaeloa CDD by renovating and converting a former

officers' quarters to 100 reserved housing units called the Wakea Garden Apartments. The proposed action involves construction of roadway and infrastructure improvements which would serve a future, proposed subdivision development of three parcels. The proposed project would lay the foundation for future residential development envisioned by the State and Hunt. By investing resources to redevelop the area, the proposed project would help to improve the social and economic outlook in Kalaeloa by enhancing security, upgrading landscaping, keeping ball fields open, and attract business tenants that employ residents into the district.

Roadways continue to be an infrastructure challenge in the Kalaeloa CDD. The existing roadways do not meet State or CCH standards and are in varied states of disrepair. On February 27, 2001, the former BPNAS Redevelopment Commission, HDOT, and CCH entered into a Memorandum of Understanding (MOU) which transferred the ownership of various roadways at Kalaeloa to HDOT and CCH. More detail regarding road ownership is further provided in **Section 3.2**. Under this MOU, the HDOT and CCH both accepted ownership and the responsibility to construct, operate, and maintain roadways, associated drainage systems, and future roadway rights. Once roads were constructed to CCH standards, it was intended that roadways transferred to HDOT would be dedicated to the CCH.

Commencing in 2014, at the request of Councilmember Kymberly Marcos Pine, quarterly meetings were held with the HCDA, HDOT, the CCH Department of Planning and Permitting (DPP), the CCH Department of Transportation Services (DTS), and the CCH Department of Facility Maintenance (DFM) to discuss the status of the roadways in Kalaeloa. On July 25, 2016, a second MOU was executed between HCDA, HDOT, and CCH to initiate a demonstration project to improve FDR Avenue. The MOU stipulated that HDOT would transfer their ownership of FDR Avenue from West Perimeter Road to Enterprise Avenue (referred to in the MOU as "FDR-West") and a portion of West Perimeter Road (referred to in the MOU as "WPR-Mauka) to HCDA. This would effectively allow the portions of the improved roads to undergo much-needed repair. Upon completion of improvements to proposed roadways, the ownership of FDR-West and WPR-Mauka would be transferred from HCDA to CCH. The improvements to FDR Avenue proposed as a component of the subject project would enable HCDA to fulfill its obligation as set forth in the 2016 MOU. See **Section 9.5. Consultation** for further outreach that has occurred to date.

The project will provide significant roadway improvements around and within the interior of the three parcels, totaling 15,100 feet (ft) or nearly three miles in length. The roadways will have ROW widths of between 50-ft and 108-ft wide. All roadways will be designed to meet CCH DPP subdivision and HCDA Kalaeloa CDD standards set forth in Hawaiʻi Revised Statutes (HAR), Chapter 15-215, Rules for Health and Safety within the Kalaeloa CDD, §15-215-24, Thoroughfare Plan. In addition, significant road reconfiguration is indicated for the following: the new southern extension of Kamokila Boulevard between Saratoga and FDR Avenues; construction of a new "Road A" connecting Hornet Street to Franklin Street; and, improvements to Copahee Avenue between Saratoga and FDR Avenues in order to conform to roadway standards set forth in HAR, §15-215-24. The proposed infrastructure improvements will also consist of regional flood control and roadway drainage systems, private potable water and sewer systems, electrical power systems, street lighting, and telecommunications systems. The total acreage for on-site improvements, including the proposed roadway system, intersection improvements, and utilities, is approximately 32.87 acres. The total acreage for off-site improvements, including construction of two drainage basins, utilities, and left turn lanes, and the modification and installation of traffic signals and pavement striping along Kapolei Parkway

and FDR Avenue totals approximately 9.86 acres. The total acreage for on-site and off-site improvements is 42.73 acres.

The project location encompasses Barbers Point Elementary School, Wakea Garden Apartments, vacant lots containing remnants of the former BPNAS, and a set of Navy roads in conjunction with the conveyance of the former BPNAS to the State of Hawaiʻi. Currently, the poor condition of the existing roads reduces safe and efficient vehicular and pedestrian movement.

2.2 Purpose and Need of Project

Hunt proposes to construct new access roadways, improve existing roadways to conform with HCDA and CCH standards, construct drainage, and construct pedestrian improvements to support a future residential community on its Parcels 1, 2, and 3 within the HCDA Kalaeloa CDD. Off-site installation of traffic signals and left turn lanes at six sites are also planned. The proposed project would fulfill the 2001 and 2016 MOUs between HCDA, HDOT, and CCH to improve and maintain roadways and associated drainage in the Kalaeloa CDD to enable and encourage redevelopment and new development in the district. The project would improve three of approximately 20 miles of roadways within the Kalaeloa CDD that need to meet HCDA and CCH standards. Furthermore, the project would fulfill the vision set forth in the HCDA Kalaeloa Master Plan to improve the roadway network within and adjacent to Kalaeloa as an opportunity to connect Kalaeloa to the City of Kapolei and overall enhance connectivity and vehicular circulation in the ʻEwa region (HCDA, 2006). The proposed project would also fulfill the planned extension of Kamokila Boulevard from the City of Kapolei into Kalaeloa. The project further fulfills the vision set forth in the ʻEwa Development Plan (DP) prepared by DPP in 2013. Improvements to the roadways would lay the foundation for a residential community that fosters a pedestrian- and bicycle-friendly environment that encourages public transit use envisioned by both the Kalaeloa Master Plan and the ʻEwa DP.

Kalaeloa forms a distinct district in the emerging secondary urban center taking shape in West Oʻahu. The proposed project helps Hunt achieve an initial step of constructing necessary major infrastructure system improvements that are required to provide the backbone to its future 40-acre residential subdivision reflected in the 2013 Hunt Kalaeloa Strategic Implementation Plan, which envisions a new, livable, sustainable community adjacent to and makai of Kapolei. This plan is consistent with the HCDA Kalaeloa Master Plan. The design of the community would be consistent with HAR, Chapter 15-215, Kalaeloa Community Development District Rules. Hunt's planned development on Parcels 1, 2, and 3 would be a residential community consisting of 672 single- and multi-family homes and approximately 358,934 square feet of open recreation space that will connect the neighborhoods and promote a sense of community. Hunt is working with the HCDA to obtain a Development Permit for the residential and commercial component of the development. The proposed improvements to the roadways that are the subject of this reissued Draft EA will also be included in that application. The future residential and commercial uses that support both the Kalaeloa and Hunt Master Plans will be analyzed in the Development Permit application.

The development responds to the shortage of housing supply in West Oahu and aims to address the market-driven demand for both single- and multi-family home product. By 2035, the population in the ʻEwa DP area is estimated to grow from 68,700 in 2000 to over 164,000 by 2035. Over 35,000 new housing units will be needed to be built in a series of master planned communities over this time to support the growing population. Furthermore, the new secondary

urban center in the City of Kapolei is projected to provide 17,000 private jobs and 2,400 government jobs by 2035. When the BPNAS closed in 1999, 618 jobs were lost. However, only about 100 new jobs have been created since (HCDA, 2006). An opportunity exists for Hunt's proposed roadways and development on Parcels 1, 2, and 3 in the Kalaeloa CDD to contribute to the projected housing need in the region, recover lost jobs, and contribute to the overall development of the secondary urban center envisioned for Kapolei. See **Section 7.1.10, HCDA Kalaeloa Reserved Housing Rules (HAR, Chapter 15-216) and Section 7.1.11, Hunt Kalaeloa Strategic Implementation Plan** for further discussion.

Future residential and commercial uses that support both the Kalaeloa (and Hunt) master plans are being analyzed in a Development Permit application, as stipulated by HCDA's HAR, Chapter 15-215, Kalaeloa Community Development District Rules for development. These uses envisioned for future development would not contribute to potential cumulative impact in the area due to the discreet distinction in the evaluation and assessment.

2.3 Purpose of Environmental Assessment

The purpose of this reissued Draft Environmental Assessment (EA) is to address the requirements of HRS, Chapter 343, and Hawaiʻi Administrative Rules (HAR), Chapter 11-200.1. Governor Ige intends to sign HAR, Chapter 11-200.1 into law on July 30, 2019, which would repeal HAR, Chapter 11-200. This revised DEA seeks to meet the requirements of the new law. The specific action that requires the preparation of this Draft EA includes the use of state land and/or funds for the proposed action.

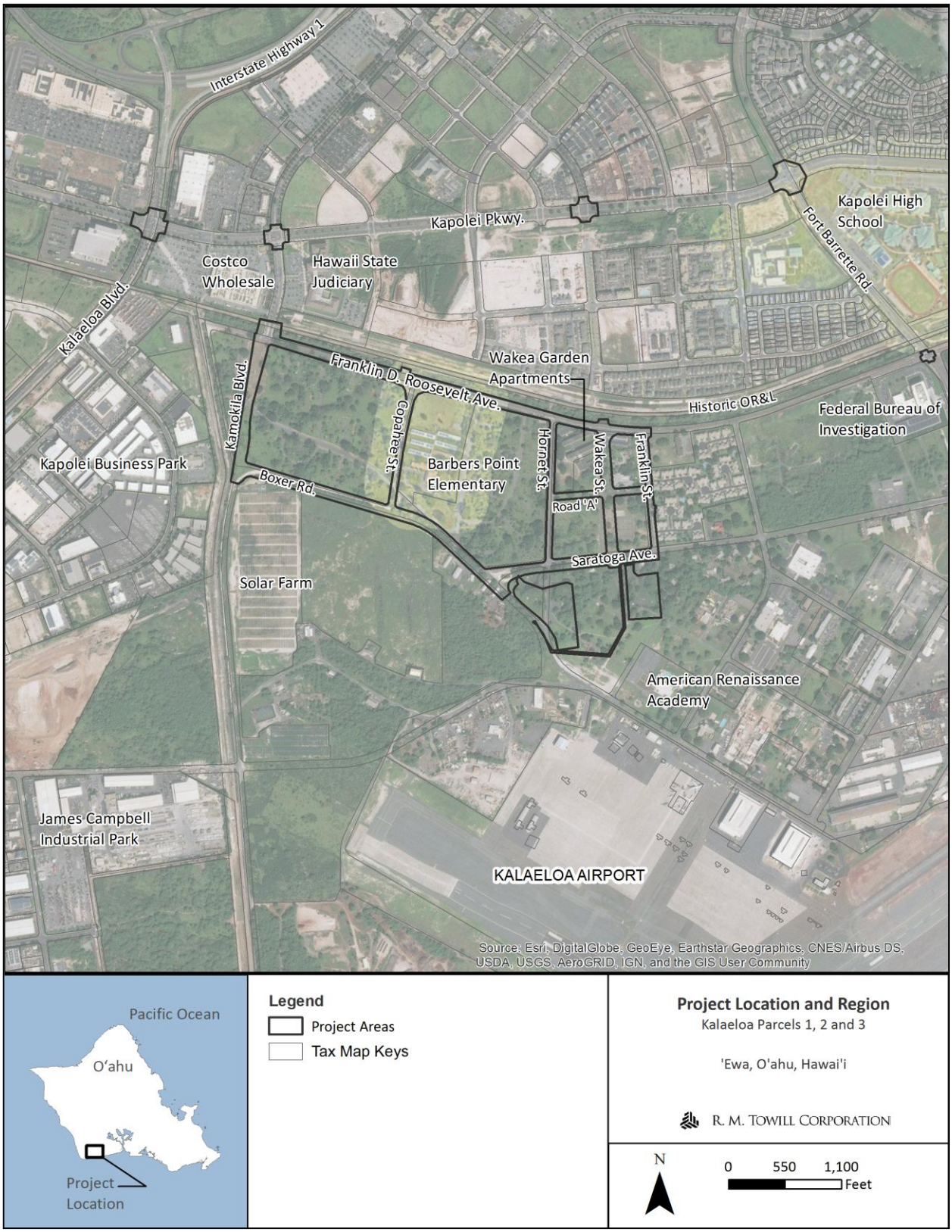
A Draft EA was published in the State Office of Environmental Quality Control (OEQC) *Environmental Notice* on December 23, 2018. During the 30-day public comment period, comments were received from agencies and the public regarding the subject project. In order to address the comments and incorporate new information regarding project background and current coordination, a reissued Draft EA was deemed warranted.

This reissued Draft EA incorporates comments received during the initial Draft EA public comment period and provides information and evaluation of the potential for adverse environmental impacts on the natural and built environment associated with the proposed project. This Draft EA will also inform interested parties of the proposed project. The filing and publication of this Draft EA with the OEQC will be followed by a 30-day public comment period. All relevant written public comments received during the 30-day public comment period will receive a written response for inclusion and use in the preparation in the project's forthcoming Final EA.

2.4 Project Location

The subdivision roadways site is located in the southwest of Oʻahu along the northern perimeter of Kalaeloa and within the former BPNAS. The project site is bounded by FDR Avenue to the north, Franklin Avenue to the east, Kamokila Boulevard to the west, and Saratoga Avenue to the south. Kalaeloa Airport is located further south of Saratoga Avenue. A linear east-west drainage basin and historic railroad forms a barrier between Kapolei and Kalaeloa along much of the north side of FDR Avenue. See **Figure 2-3, Project Location and Region**, depicting the area surroundings. See **Section 5.1** for further discussion on the project location and its surroundings.

Figure 2-3, Project Location and Region



Section 3
Project Description, Estimated Construction Cost and Schedule

3.1 Description of Proposed Project

The proposed improvements will involve the use 32.87 acres of existing road ROWs, and approximately 9.86 acres for off-site drainage facilities, construction of left turn lanes, and traffic signal installation. When completed the project will support the future development of public and residential land uses, schools and commercial uses within Kalaeloa.

The Hunt Kalaeloa community goal will be to provide different ways of accomplishing short-distance trips with options that include the use of rail, bus, bicycles and walking. The proposed subdivision roadways project will help provide an environment where it is safe and convenient for people to utilize conventional and alternative modes of transportation.

The Hunt subdivision roadway system will consist of five north-south and two east-west thoroughfares, and improvements to six intersections. Kamokila Boulevard will extend south to provide continued connectivity from Kapolei Parkway to Boxer Road, effectively connecting the City of Kapolei with Kalaeloa CDD.

Specific work activities will include the following:

> **Roadways** – On-site improvements to the 32.87-acre project area will be roughly bounded by FDR Avenue to the north, Saratoga Avenue to the south, Kamokila Boulevard to the west, and Franklin Street to the east. The length of roadway improvements will be approximately 15,100 ft and will be constructed to meet CCH standards.
>
> Off-site improvements will be to six roadway intersections: four intersections will be located along Kapolei Parkway at Kalaeloa Boulevard, Kamokila Boulevard, Wakea Street, and Fort Barrette Road. The other three intersections will be located along FDR Avenue at Kamokila Boulevard and Fort Barrette Road-Enterprise Street.
>
> **Landscaping** – Will be provided within the road ROW for all areas where roadwork is proposed.
>
> **Utilities** – Improvements will be made to water, sewer, drainage, power, street lighting, cable television (CATV) and telephone systems.
>
> **Grading and Improvements** – Project related grading and improvements will support master planning for the Kalaeloa CDD. Drainage and water quality infrastructure consisting of retention basins/catch basins/rain gardens or other appropriate facilities will be designed to address this requirement.

Proposed improvements on each of the three Hunt-owned parcels are described below. Parcel 1 is bounded by FDR Avenue to the north, Saratoga Avenue to the south, Copahee Street to the east, and Kamokila Boulevard to the west. Parcel 2 is bounded by FDR Avenue to the north, Saratoga Avenue to the south, Copahee Street to the west, and Hornet Street to the east. Finally, Parcel 3 is bounded by FDR Avenue to the north, Saratoga Avenue to the south, Hornet Street to

the west, and Franklin Street to the east. See **Figure 2-2, Work Areas** and **Appendix A, Preliminary Construction Drawings** for locations and details of the proposed improvements.

- FDR Avenue 10-foot widening and a 14-foot setback for a future 108-foot ROW Reserve
- Copahee Avenue 11-foot widening and an 11-foot setback for a future 66-foot ROW Reserve
- Saratoga Avenue 18-foot widening and a 24-foot setback for a future 108-foot ROW Reserve
- Kamokila Boulevard Extension from FDR Avenue to Saratoga Avenue with a 108-foot ROW
- West Perimeter Road Extension (owned by HCDA) is to be closed after the construction of Kamokila Boulevard Extension
- The GTE Building located within the former OR&L ROW and on the FDR Avenue 10-foot widening and 14-foot setback near the intersection of Copahee Avenue to remain in use

Parcel 2 roadway improvements include the following:

- FDR Avenue 10-foot widening and a 14-foot setback for a future 108-foot ROW Reserve
- Hornet Street widening to an 80-foot ROW
- Saratoga Avenue 18-foot widening and a 6-foot setback for a future 108-foot ROW Reserve
- Boxer Road 18-foot widening and a 6-foot setback for a future 108-foot ROW Reserve
- Copahee Avenue 11-foot widening and an 11-foot setback for a future 66-foot ROW Reserve
- A portion of lot 272: Transformer Station A to remain

Parcel 3 roadway improvements include the following:

- FDR Avenue 10-foot widening and a 14-foot setback for future 108-foot ROW Reserve
- Franklin Avenue 50-foot ROW
- Saratoga Avenue 18-foot widening and a 6-foot setback for future 108-foot ROW Reserve
- Hornet Street widening to an 80-foot ROW
- Construction of Road A with a 66-foot ROW
- Demolition of lot 73: Paradise West Club Complex partially within the proposed Road A ROW
- Construction of the Wakea Street Extension with a 108-foot ROW
- Demolition of lot 1906: Tennis Pro Shop within the proposed Wakea Street Extension ROW
- Demolition of lot 68C: concrete pad partially within the proposed Wakea Street Extension ROW

Typical roadway sections of the proposed roadways would vary but conform to CCH standards and HCDA thoroughfare standards set forth in HAR, §15-215-24, Thoroughfare Plan. Features of the proposed roadway sections are as follows:

- Franklin Street: 50-foot wide ROW, including one 12-foot wide travel lane in each direction; designated 8-foot wide parking lane on each side; 6-foot wide planter strip on each side; and, 5-foot wide sidewalks on each side. See **Figure 3-1, Typical Sections – 1**.
- Hornet Street: 60-foot wide ROW, including one 10-foot wide travel lane in each direction; designated 8-foot wide parking lane on each side; 7-foot wide plater strip on each side; and, 5-foot wide sidewalks on each side. See **Figure 3-1, Typical Sections – 1**.
- Copahee Avenue and Road ʻAʼ: 66-foot wide ROW, including one 10-foot travel lane in each direction; designated 8-foot wide parking lane on each side; 10-foot wide planter strip on each side; and, 5-foot wide sidewalks on each side. See **Figure 3-2, Typical Sections – 2**.
- Kamokila Boulevard and Wakea Street: 108-foot wide ROW, including one 10-foot wide travel lane in each direction; one 12-foot wide travel lane in each direction; 6-foot wide bike lane on each side; 10-foot wide planter strip on each side; and, 6-foot wide sidewalks on each side. See **Figure 3-2, Typical Sections – 2**.
- Saratoga Avenue and Boxer Road (Interim): 78-foot wide ROW, including one 10-foot travel lane in each direction; 6-foot wide bike lane on each side; 8-foot wide parking lane on each side; 10-foot wide planter strip on each side, and 5-foot wide sidewalks on each side. See **Figure 3-3, Typical Sections – 3**.
- FDR Avenue (Interim): 80-foot wide ROW, including a 20-foot wide median with landscaping; two 12-foot wide travel lanes for each direction of traffic; and, 6-foot wide sidewalks on each side. See **Figure 3-3, Typical Sections – 3**.

Ultimate conditions for FDR Avenue, Boxer Road, and Saratoga Avenue are proposed after construction of the subject project to bring the roadways into conformance with applicable HCDA and CCH rules and design guidelines, as further discussed in **Sections 7.1.6, Act 54, Session Laws of Hawaiʻi, Complete Streets** and **7.1.9, HCDA Kalaeloa CDD Rules** of this reissued Draft EA. The ultimate condition of these roadways would be the same as the Kamokila Boulevard and Wakea Street roadway sections. See **Figure 3-2, Typical Sections – 2**.

In addition to conforming to CCH and HCDA roadway standards, proposed improvements would meet fire safety requirements as suggested by the Honolulu Fire Department (HFD) in its comment letter dated January 16, 2019. All relevant CCH departments and HCDA will continue to be consulted in the review and approval process of the proposed project.

Figure 3-1, Typical Sections – 1

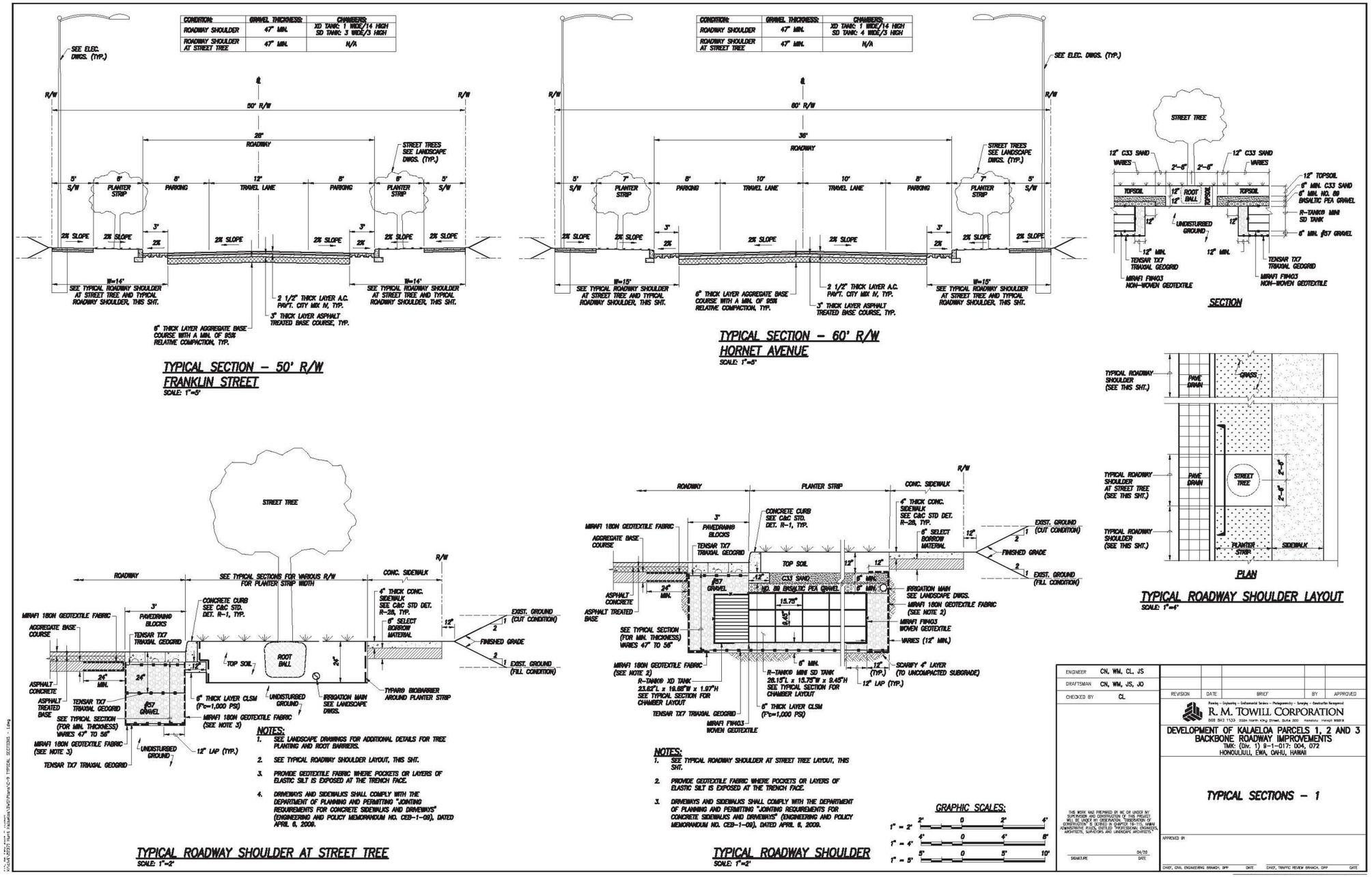
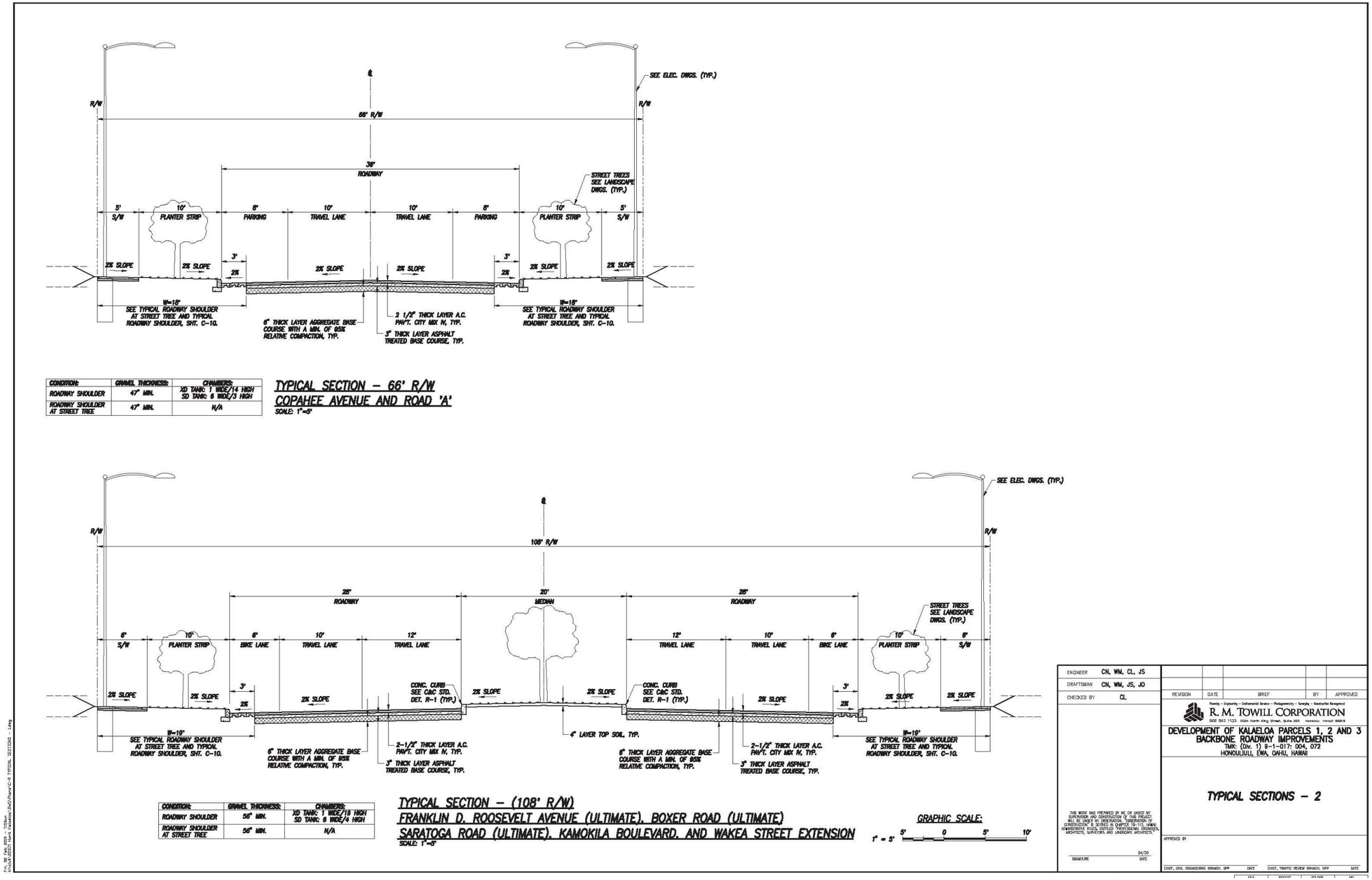


Figure 3-2, Typical Sections – 2



CONDITION:	GRAVEL THICKNESS:	CHAMBERS:
ROADWAY SHOULDER	47" MIN.	XD TANK: 1 WIDE/14 HIGH SD TANK: 6 WIDE/3 HIGH
ROADWAY SHOULDER AT STREET TREE	47" MIN.	N/A

TYPICAL SECTION – 66' R/W
COPAHEE AVENUE AND ROAD 'A'
SCALE: 1"=5'

CONDITION:	GRAVEL THICKNESS:	CHAMBERS:
ROADWAY SHOULDER	56" MIN.	XD TANK: 1 WIDE/18 HIGH SD TANK: 8 WIDE/4 HIGH
ROADWAY SHOULDER AT STREET TREE	56" MIN.	N/A

TYPICAL SECTION – (108' R/W)
FRANKLIN D. ROOSEVELT AVENUE (ULTIMATE), BOXER ROAD (ULTIMATE)
SARATOGA ROAD (ULTIMATE), KAMOKILA BOULEVARD, AND WAKEA STREET EXTENSION
SCALE: 1"=5'

GRAPHIC SCALE:
1" = 5'
5' 0 5' 10'

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R.M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

TYPICAL SECTIONS – 2

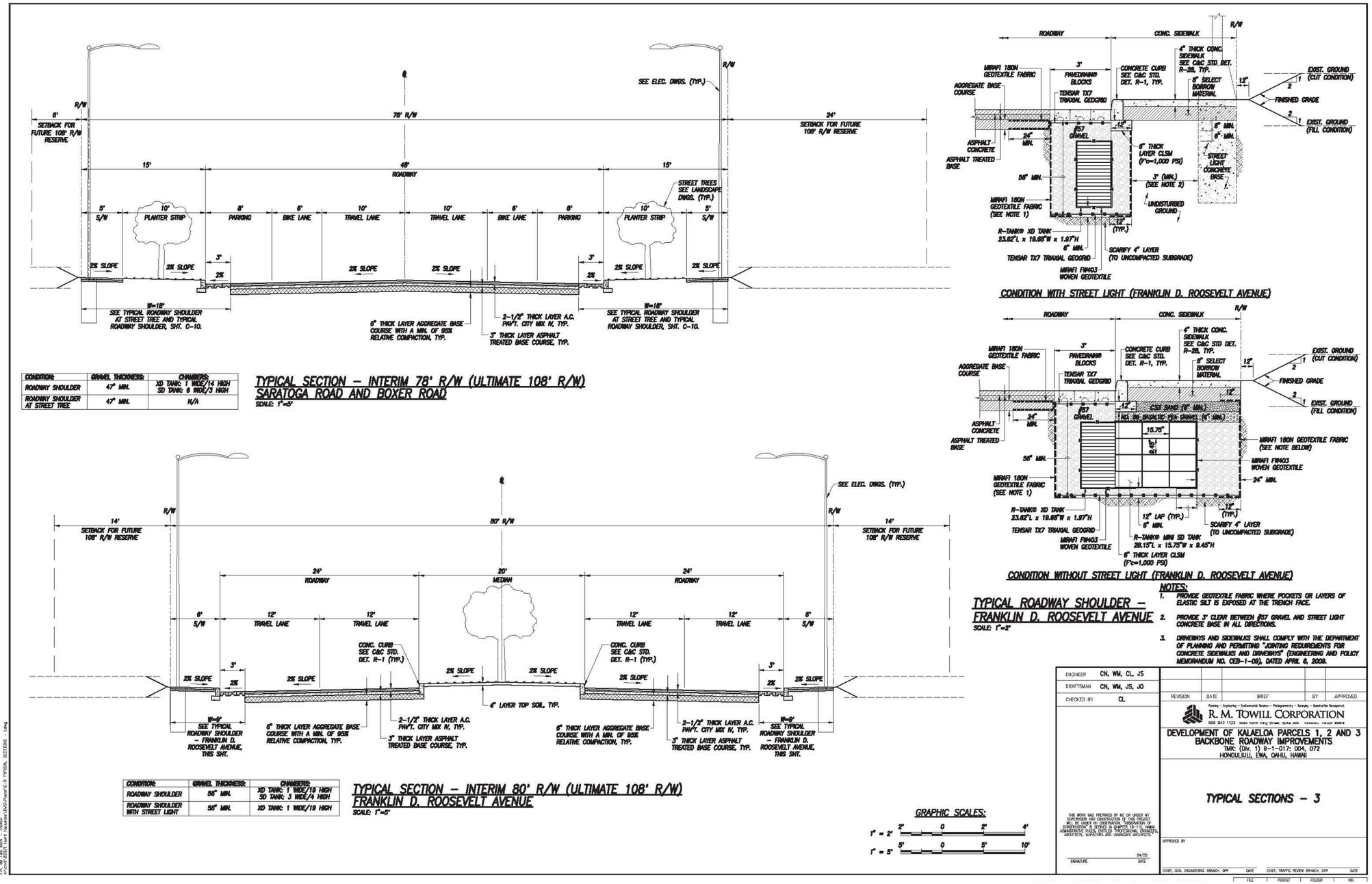
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATIONAL "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE 04/20 DATE

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

Figure 3-3, Typical Sections – 3



Off-site improvements are also proposed as a component of the subject project. Off-site improvements include the construction of utilities and drainage basins and improvements to various intersections to provide traffic signals**,** signal timing**,** Americans with Disabilities Act (ADA) compliance, landscaped medians, additional lanes, road widening, restriping, and sidewalk improvements at the following locations:

Intersection of Kapolei Parkway and Kalaeloa Boulevard improvements include the following:

- Removal of the existing landscaped median on the ewa-bound approach
- Construction of a second Diamond Head bound left-turn lane on Kapolei Parkway
- Optimization of a signal cycle length and splits

Intersection of Kapolei Parkway and Kamokila Boulevard improvements include the following:

- Optimization of a signal cycle length and splits to accommodate for new demand volumes at intersection

Intersection of Kapolei Parkway and Wakea Street improvements include the following:

- Installation of a traffic signal

Intersection of Kapolei Parkway and Fort Barrette Road improvements include the following:

- Restriping of Kapolei Parkway to provide a separate left-turn lane and second through lane on both the ewa-bound and Diamond Head-bound approaches
- Modification and optimization of the signal to provided protected left-turn phasing on Kapolei Parkway

Intersection of FDR Avenue and Kamokila Boulevard improvements include the following:

- Installation of a traffic signal

Intersection of FDR Avenue and Copahee Avenue improvements include the following:

- Widening of FDR Avenue to provide a refuge island median for the mauka-bound left-turn storage and an ewa-bound merge lane

Intersection of FDR Avenue and Fort Barrette Road-Enterprise Street improvements include the following:

- Installation of a traffic signal

3.2 Property Ownership

The project involves improvements to roadways and installation of utilities across various parcels, as indicated in **Figure 3-4, Tax Map Key Boundaries** and **Table 3-1, Tax Map Key**. Pursuant to a 2001 MOU executed between the former BPNAS Redevelopment Commission, HDOT, and CCH, ownership of the existing roadways was transferred to HDOT and CCH as indicated in **Table 3-2, Roadway Ownership**. Note that the MOU refers to FDR Avenue as "Roosevelt Road" and Saratoga Avenue as "Saratoga Road". HDOT accepted temporary ownership of the roadways assigned to the agency with the agreement that, upon improvements to roadways and associated drainage systems, all roadways and future ROW ownership would be transferred to the CCH. As such, all improvements to roads will be designed to meet HCDA and CCH standards.

The roadways would serve Hunt's development on Parcels 1, 2 and 3, designated as TMKs (1) 9-1-013:002 and 004, which is privately owned by Hunt. The roadways would also serve TMKs (1) 9-1-013:128 and 129, which are owned by the Wakea Garden Apartments. Two proposed off-site detention basins and sewer line would be constructed on TMK (1) 9-1-013:010, owned by Kalaeloa Ventures, LLC. Proposed off-site improvements, including construction of left turn lanes, installation of traffic signals, and restriping, would occur at several other parcels**.**

Commencing in 2014, at the request of Councilmember Kymberly Marcos Pine, quarterly meetings were held with the HCDA, HDOT, and CCH DPP, DTS, and DFM to discuss the status of the roadways in Kalaeloa. On July 25, 2016, a second MOU was executed between HCDA, HDOT, and CCH to initiate a demonstration project to improve FDR Avenue. The MOU stipulated that HDOT would transfer their ownership of FDR Avenue from West Perimeter Road to Enterprise Avenue (referred to in the MOU as "FDR-West") and a portion of West Perimeter Road (referred to in the MOU as "WPR-Mauka) to HCDA. This would effectively allow the portions of the improved roads to undergo much-needed repair. Upon completion of improvements to proposed roadways, the ownership of FDR-West and WPR-Mauka would be transferred from HCDA to CCH. The improvements to FDR Avenue proposed as a component of the subject project would enable HCDA to fulfill its obligation as set forth in the 2016 MOU.

3.3 Construction Activities

Construction related traffic, noise, and air quality (dust) disturbances are anticipated. Construction equipment used for this project may include, but are not limited to: use of a loader, bulldozers, dump trucks, loader-backhoe, trencher, grader, water trucks, concrete hauler pumper, and flatbed trucks. The contractor will be required to observe and comply with all federal, state, and CCH laws required for the protection of public health, safety, and the environment.

The contractor will prepare a Best Management Practices (BMPs) Plan for this project. The BMPs Plan will consist of erosion control measures such as planting or hydromulching grass seedling**,** erecting silt fencing/curtains, berms, and/or other applicable erosion control devices to prevent construction related soils and silt from mixing with storm water runoff.

Figure 3-4, Tax Map Key Boundaries

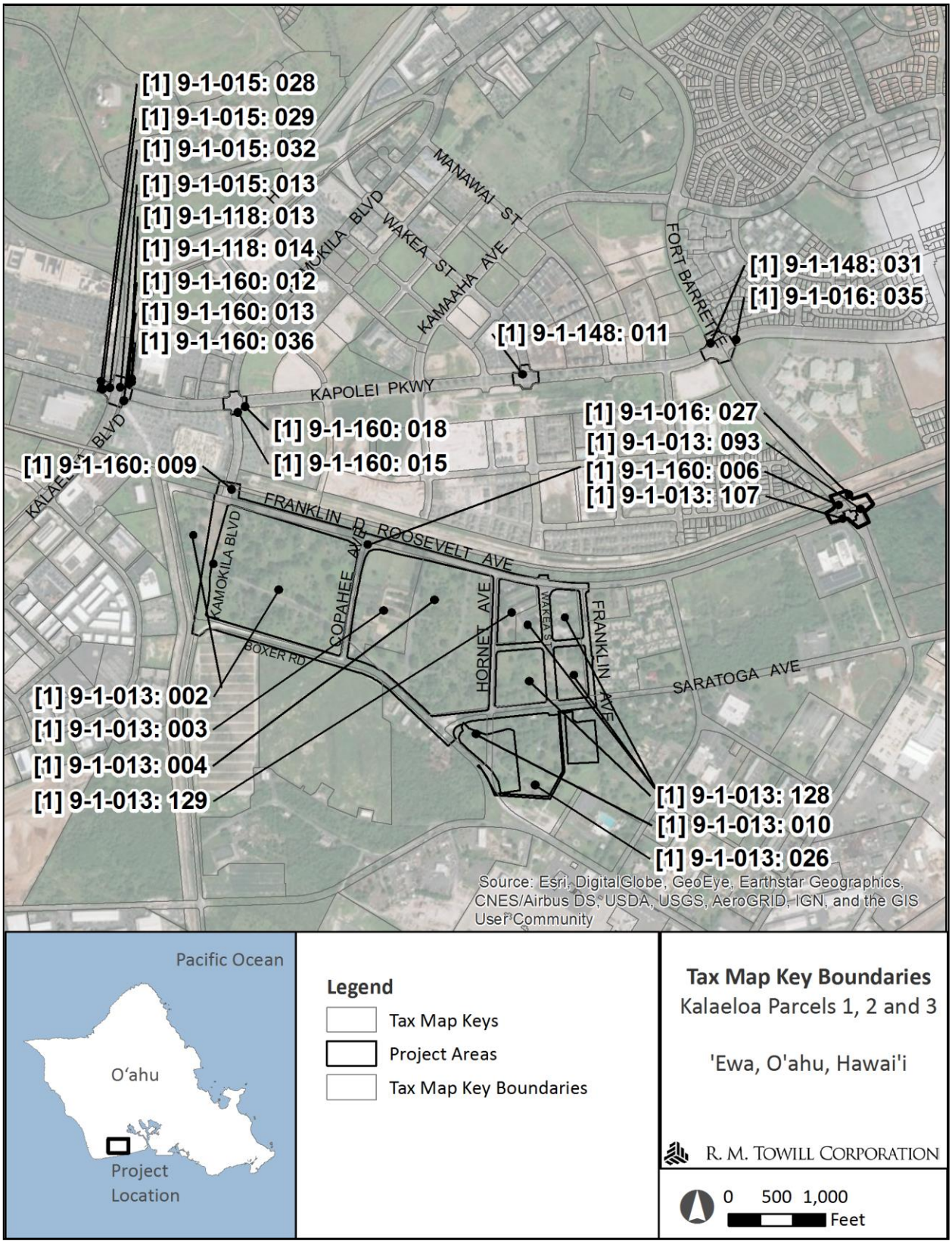


Table 3-1, Tax Map Key of Affected Properties

Project Component		Tax Map Keys (TMKs)	Parcel Area (Acres)	Ownership
On Site:	Roadway Improv. & Sewer Installation	(1) 9-1-013:002, 003, 004, 010, 128, 129	32.87	Hunt, Kalaeloa Ventures LLC, Department of Education (DOE), Wakea Garden Apartments
	Install traffic signal	(1) 9-1-160:009	--	City and County of Honolulu, Hunt
Off Site:	Construct left turn lane & modify traffic signal	(1) 9-1-015:013, 028, 029, 032; (1) 9-1-118:013, 014; (1) 9-1-160:012, 013, 036	0.23	City & County of Honolulu; Kapolei Infrastructure LLC
	Construct left turn lane & modify traffic signal	(1) 9-1-160:015, 018	0.06	Kapolei Properties LLC; City & County of Honolulu
	Install traffic signal	(1) 9-1-148:011	--	Kapolei Properties LLC
	Restripes lanes and modify traffic signal	(1) 9-1-016:035; (1) 9-1-148:031	--	Hawaiʻi Housing Finance & Development Corporation FKA Housing & Community Development Corporation of Hawaiʻi; City & County of Honolulu
	Install traffic signal	(1) 9-1-013:093, 107; (1) 9-1-160:006; (1) 9-1-016:027	--	Eagle River Investors – Hawaiʻi LLC, Kalaeloa Ventures LLC, Hunt, Kapolei Infrastructure LLC
	Detention basin and sewer	(1) 9-1-013: 026	9.57	Kalaeloa Ventures LLC
		Total Project Area:	**42.73**	

Notes: -- Does not include significant work area since proposed work is minor.
*TMK record not found. Area based on on-line parcel info. identified by the State of Hawaiʻi GIS. See: http://planning.Hawaiʻi.gov/gis/download-gis-data/.
**Approximate acreage, see above

Table 3-2, Roadway Ownership

Owner	Roadway
CCH	Saratoga Avenue between Midway and Boxer Road
	Existing portion of Independence Rd. and ROW for future extension of Independence Rd. for connection with Geiger and Midway Rds.
	Midway Rd. from FDR Avenue to Saratoga Avenue from Enterprise Rd. to Hornet Rd. and existing portion and ROW for future extension of Midway Rd. to Malakole Street within Campbell Industrial Park
	Boxer Road from Hornet to Copahee Road to West Perimeter Road
	Copahee Rd. from FDR Avenue to Midway Rd.
	Hornet Rd. from FDR Avenue to Boxer Rd.
	Lexington Rd. from Roosevelt Rd. to Midway Rd.
	Shangrila Rd. between Lexington and Enterprise Rds.
	Yorktown Rd. between Lexington and Enterprise Rds.
	Tripoli Rd. between Coral Sea and Essex Rds.
HDOT	Enterprise Rd.
	FDR Avenue
	Coral Sea Rd.
	West Perimeter Rd.
	Future: North-south road connector ROW and the realignment of Coral Sea Rd. to Independence Rd.

Shoring (sheet piles or other related method), if required, will be used in accordance with the Occupational Safety and Health Administration requirements (part 3, Chapter 132). No blasting will be required or allowed.

Upon the completion of work, areas surrounding the project site that have been affected by construction will be restored as much as practicable to pre-existing conditions. The following will be required:

- All construction-related debris, including excavated material, fill material, and refuse shall be removed from the project site and disposed of properly by the contractor.
- All construction equipment shall be removed from the project site promptly after construction is complete.
- Any temporary modification to existing utilities, such as power or communications lines, shall be repaired to their pre-existing condition.
- Roadways providing access to the site shall be cleared of construction debris and any damage from construction traffic repaired.
- All areas damaged by construction staging shall be restored. Exposed ground areas shall be seeded or hydromulched as appropriate.
- Temporary utility lines will be removed from the site and all surplus excavation material and construction debris will be removed and disposed of off-site in compliance with applicable State, and City and County of Honolulu regulations.

3.4 Project Schedule and Cost

The planned project schedule will include working with government agencies, perform site and environmental studies, and process the required permitting and design documents. The total project costs, estimated to be approximately $50 million, will be borne by Hunt and other agencies/developers' fair share contributions. Construction is tentatively scheduled in the second half of the 2019 timeframe with a duration of approximately two years.

Section 4
Project Alternatives and Preferred Alternative

4.1 Alternatives to the Proposed Action

Alternatives to the proposed project include: (1) the No Action Alternative; (2) the Delayed Action Alternative; and (3) The Preferred Action Alternative. A description of each is provided below.

4.1.1 No Action

The No Action alternative involves no action to develop the subdivision roadways. Taking No Action would avert the potential for negative adverse environmental impacts associated with construction activities and would eliminate the need for the expenditure of approximately $50 million in construction costs.

The No Action alternative, however, would fail to accomplish the project objective to improve the roadway network that would serve the planned future residential community which is consistent with the HCDA *Kalaeloa Master Plan* (HCDA, 2006) long range plan to redevelop the former BPNAS. The failure to develop the new roadway infrastructure system would also result in failure to implement the residential and recreational components of the Hunt Strategic Implementation Plan (Hunt, June 2013), intended to create new opportunities for families in the growing Kalaeloa neighborhood.

Because the No Action alternative would fail to accomplish the objective of the project to achieve development of both the Kalaeloa Master Plan and the Strategic Implementation Plan to provide subdivision roadways to support the master planned new community, it is rejected from further consideration.

4.1.2 Delayed Action

The Delayed Action alternative involves the construction of the project, but at a later date. Delaying the project would temporarily avoid the potential for adverse environmental effects and the need for the expenditure of funds for planning, design, development, and construction activities. However, because the potential for environmental impacts and project costs would only be delayed, impacts and costs associated with the project would eventually be borne when the project is implemented.

Delaying the project to a later time is expected to have virtually the same effect as the No Action alternative:

- Construction costs would be averted in the short-term, but are expected to ultimately be higher due to inflation and other factors while resulting in environmental outcomes similar to the Preferred Alternative of proceeding with the proposed project.
- Delayed Action would also delay the project's implementation schedule for improvements to existing roads, and construction of drainage and street lighting work that would fail to address the existing environmental conditions associated with untreated storm water runoff.

Because the Delayed Action alternative would fail to accomplish the project objective to provide infrastructure and drainage improvements that would support the long term goal for development of new residences, recreational, and commercial uses in Kalaeloa, it is also rejected from further consideration.

4.1.3 Preferred Alternative

Based on the above, the Preferred Alternative is to develop the Hunt subdivision roadway system as described in **Section 3, Project Description, Estimated Construction Cost and Schedule**, of this document. The Preferred Alternative is the only alternative that (1) meets the objective of addressing roadway infrastructure system development to support Hunt's master planned residential subdivision; and (2) is consistent with the HCDA Kalaeloa Master Plan (HCDA, March 1, 2006) which envisions Kalaeloa as a "Center for Excellence" or Wahi Hoʻokela within the ʻEwa region of Oʻahu, promoting improved conditions conducive to more efficient vehicular movement and pedestrian traffic from while meeting the need to directly connect Kalaeloa to an under construction rail transit station, as well as improve connectivity with Kapolei, the ʻEwa region, and Oʻahu.

Section 5
Description of Existing Site Conditions, Potential Impacts, and Proposed Mitigation

This section summarizes the existing environmental setting, potential short- and long-term, secondary, and cumulative effects of the proposed project, and mitigation measures. Short-term effects are from construction and infrastructure improvement activities, while long-term effects continue or occur after the project is completed. Although the subject EA document does not require an assessment of impacts according to National Environmental Policy Act (NEPA) requirements, the definition of impacts, according to NEPA, provides guidance toward understanding potential environmental impacts and applicability to this project.

Secondary impacts are generally defined as those induced or caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR §§ 1500-1508). Potential cumulative effects may result from the incremental consequences of an action when added to other past, present, and reasonably foreseeable future actions (40 C.F.R. §1508.7).

5.1 Existing Site Conditions

5.1.1 Description

The project site is located in the southwest portion of a large urban block bounded by FDR Avenue to the north, Franklin Avenue to the east, Kamokila Boulevard to the west, and Saratoga Avenue to the south. The project site is approximately 500 meters (m) (1,640.42 ft) northwest of the Kalaeloa Airport runway in Barbers Point. The project area is within the former BPNAS area and contains vestiges of the former structures and roads associated with previous military development. The present project site contains one operating school, a rental apartment complex, and foundations of former military building sites, roads in various states of repair, and a few unpaved trails made by off-road vehicles. Thus, parts of the project site contain remnants of structures that are associated with the former military reservation.

The western third of the 35-acre project site is in the northern sector of the former BPNAS now under leasehold by Hunt since 2009. The northwestern Kamokila Boulevard and FDR Avenue corner, Lot 1C, is the future site of a Veterans' Administration (VA) clinic. Barbers Point Elementary School is located in the approximate center of the project site. The school serves students from kindergarten to grade 5, and enrolled approximately 518 students in the 2017 to 2018 school year (DOE, 2019).

Further east of Barbers Point Elementary School and in the northeastern portion of the project site is the Wakea Apartments, a 100-unit reserved housing complex. Hunt renovated the former Navy officers' quarters in 2015. The former BPNAS Administrative Office site and tennis courts are located off of Saratoga Avenue in the southeastern portion of the project area.

The land north of a majority of the project site was formerly used for sugarcane cultivation and is presently vacant. The land north of the northwestern portion of the site includes the Costco Wholesale and Hawaiʻi State Judiciary, both located along FDR Avenue and Kamokila Boulevard. Land further north includes commercial uses and the Kapolei Satellite City Hall, located approximately 0.4 mile northwest of the FDR Avenue limit of the project site.

American Renaissance Academy, which is a Pre-K to grade 12 private school with an enrollment of approximately 110 students, is located approximately 0.2 mile southeast of Saratoga Avenue. The Kalaeloa Professional Center and various privately-owned recreation facilities, such as an airsoft park and go-kart facility, are located approximately 0.3 mile southeast of the Saratoga Avenue. The Kalaeloa Airport is located approximately 0.3 mile further south of the project limits at Saratoga Avenue. Following the BRAC closure of the airport in 1999, HDOT-Airports assumed ownership and operation of the airport. Today, the airport serves as a general aviation reliever airport for the Daniel K. Inouye International Airport. Users of the airport include the U.S. Coast Guard, Hawaiʻi National Coast Guard, and the general aviation community. Maintenance Hangars 110 and 111 remain, with Hangar 111 also provides space for the University of Hawaiʻi, Honolulu Community College Pacific Aerospace Training Center located on Midway Road.

Directly southwest of the project site, south of Boxer Road and Kamokila Boulevard, is a five-megawatt solar farm on land leased by the State of Hawaiʻi, Department of Hawaiian Homelands. Kapolei Business Park is located approximately 450 ft. west of the proposed Kamokila Boulevard extension. Industrial uses at the James Campbell Industrial Park are located further southwest of the project site.

The Kalaeloa Rental Homes residential development is located directly east of the project site, along FDR Avenue and Franklin Avenue. The development includes 120 multi-family units. Further east of Franklin Avenue is the Federal Bureau Investigation Honolulu field office is located on Enterprise Street.

5.1.2 Potential Impacts and Proposed Mitigation

The proposed project has the potential for adverse environmental impacts resulting from short term construction activities including grubbing, grading, and trenching. Safe driveway access into and out of existing uses including those of the Barbers Point Elementary School and Wakea Gardens apartments would not be seriously impacted, although drivers may experience minor delays during peak construction periods. A traffic safety and control plan will be prepared and implemented by the contractor to ensure unimpeded traffic flow through the Kalaeloa neighborhood to minimize traffic circulation problems during the period of construction.

The proposed action will have positive long-term effects on utility systems, drainage and traffic circulation and improve conditions for the Hunt planned residential community of Kalaeloa.

Upon completion of construction, all equipment and personnel will be removed, and the site will be returned to existing conditions with no permanent intrusion to the site. Because the direct impacts from the proposed action would be only short-term and other past, present, and reasonably foreseeable future actions are expected to be consistent with the existing development and use of the area, the project would make no persistent contribution to secondary or cumulative impacts.

Under the No Action Alternative, the proposed project improvements and infrastructure upgrades would not be implemented, and Hunt's plans to further its improvements of urbanization of Kalaeloa in accordance with the HCDA master plan would be delayed or not realized. Improved access (Wakea Street extension) to the planned transit station near Kapolei Parkway would not be realized. Unsafe traffic conditions may result due to the lack of traffic signals at major

intersections in Kalaeloa, as well as limited accessibility to Kalaeloa Airport and shoreline and existing beach parks.

5.2 Climate

5.2.1 Description

The climate in the region of the Kalaeloa has monthly mean temperatures ranging from 62 to 88 degrees Fahrenheit (Western Regional Climate Center 2017) with an average annual rainfall of approximately 21.49 inches per year (Giambelluca et al. 2013).

The prevailing wind direction is from the east and northeast. Northeasterly trade winds prevail over Oʻahu approximately 80 percent of the time, with average wind speeds ranging from 10 to 15 miles per hour. The trade winds blow most strongly and consistently from April through November. Southerly or "Kona" winds occur roughly less than half the time during December through March.

In 2017, the *Hawaiʻi Sea Level Rise Vulnerability and Adaptation Report* was published to provide a basis for recommendations on reducing exposure and increasing adaptability to the impacts of sea level rise (SLR) resulting from human-generated global greenhouse gas (GHG) emissions, including carbon dioxide, methane, nitrous oxide, and fluorinated gases (Hawaiʻi Climate Change Mitigation and Adaptation Commission, 2017). Research is also in agreement that GHG emission are a key contributor to the unprecedented increases in global atmospheric warming over the past century. Research within the report notes that the intensity and frequency of natural disasters have increased and will continue to do so, and further provides technical projections of areas along the coast that are vulnerable to SLR based on the latest available science. The report includes recommendations to address risks associated with climate change. The report finds that for Oʻahu, with no mitigative actions, 3.2 feet of SLR, which is projected by 2100, and its associated erosion, flooding, and waves will have significant impacts to the island's land, building and land values, residents, structures, and major roadways. See **Section 5.7, Natural Hazards** for an assessment of the possible impacts of SLR on the Project Site.

5.2.2 Potential Impacts and Proposed Mitigation

The development and operation of the Hunt Kalaeloa subdivision roadways project will not individually affect the climate. However, the proposed action to construct improvements to existing roads on the project site would produce GHGs. Further discussion on mitigation measures is provided in **Section 5.7.2**.

The subdivision roads development is not expected to have an impact on the region's climate; therefore, no mitigation measures are warranted.

5.3 Geology and Topography

5.3.1 Description

Geology. The Hawaiian Islands represent the southernmost portion of the Hawaiian Archipelago, a series of northwest-trending ridges produced by a succession of volcanic eruptions during the Pliocene Epoch. The Island of Oʻahu was formed by two shield volcanoes; Koʻolau to the east

and the older Wai‘anae, to the west. The volcanoes are believed to have formed during the late tertiary to early Pleistocene periods (MacDonald, Abbott, & Peterson, 1983). The Wai‘anae Volcano erupted between 3.9 and 2.5 million years ago and the Ko’olau Volcano erupted between 2.5 and 1.7 million years ago. The volcanoes are separated by the Schofield Plateau of central O‘ahu which was formed by lavas of the Ko‘olau Range banking against the older Wai‘anae Range. North and south of the Schofield Plateau is O‘ahu 's coastal plain, which is composed of marine and terrigenous sediments deposited when the sea stood at a higher level. The Project Area is located within the ‘Ewa Coastal Plain, which is comprised of interbedded coral reef and alluvial volcanic sediments (caprock) overlying basalt (volcanic rock). The caprock ranges from 50 to 400 ft (15 to 122 m) thick along the northern boundary of BPNAS and from 750 to 1,000 ft (229 to 305 m) thick along the coast. The upper 100 ft (31 m) of caprock is marine sediment, consisting mainly of coral reef with minor layers of shell fragments and beach sand. The terrain generally consists of limestone and alluvial deposits, overlying flows of the Wai‘anae volcanic series (Macdonald et al. 1983:423).

The island of O‘ahu is of volcanic origin and was built by the Wai‘anae and the Ko‘olau Volcanoes, which are now deeply eroded (MacDonald et al. 1983). The Wai‘anae Range rises 1.2 kilometers above mean sea level (AMSL), making it higher than the younger, adjacent Ko‘olau Range (MacDonald et al. 1983). The Wai‘anae and Ko‘olau Volcanic Shields were built during the late Pliocene and early Pleistocene by thin-bedded lava flows. The main shield building activities ceased approximately 3.5 to 2.5 million years ago (Stearns 1985).

The site is situated on the ‘Ewa Coastal Plain which extends seaward off the southeastern flank of the Wai‘anae Volcano and the southwestern flank of the Ko‘olau Volcano. This plain was formed by the accumulation of a thick wedge of sediments and coral reef formations on the flanks of the two volcanoes.

High sea level stands during the Pleistocene Epoch caused the formation of reef deposits at correspondingly higher elevation. Subaerial exposure of the sediments and calcareous materials caused consolidation of the lagoonal deposits and induration of the reef materials.

Sinkholes, depressions in the surface of the earth where there is little fill over the coral reef limestone, are found across the ‘Ewa Plain. Unique anchialine pools, which are sinkholes that connect to the ocean through cracks in the substrate, are preserved at the Kalaeloa Unit of the Pearl Harbor National Wildlife Refuge, approximately 1.4 miles south of the proposed roadways.

Topography. Topographic map coverage of the site is included on the U. S. Department of the Interior Geological Survey (USGS) 7.5-minute Ewa quadrangle map. The property is located approximately 1.5 miles north of the shoreline. The site is located at 21° 19’ 23.95” north latitude and 158° 4’ 45.66’’ west longitude. Kalaeloa is relatively flat, with an average slope across the entire area of about 0.5 percent (%). The ground surface slopes gently southward with an elevation of approximately 52 ft AMSL.

The project area is generally level, with an elevation of approximately 48 to 55 ft (14.6 to 16.8 m) AMSL. U.S. Department of Agriculture (USDA) soil survey data shows that sediments consist of Mamala stony silty clay loam (MnC) within the western 75 percent of the project area, and Coral (limestone) Outcrop (CR) in the eastern 25 percent of the project area (Foote et al. 1972). It is believed that the limestone coral outcrop is the base material and that the overlying stony silty clay loam may be of no great thickness. Furthermore, commercial agriculture sought

to transport soil onto the limestone coral outcrop plains and it may be that soil cover in the western project area is only about a century old.

5.3.2 Potential Impacts and Proposed Mitigation

The potential for significant adverse effects to topography and geology are not anticipated based on the limited scope and scale of the proposed project. The total project area is approximately 35 acres and includes the area required for earthwork, construction, and staging and storage of construction equipment and materials. Activities will be limited to the general vicinity of existing roadways and involve clearing and grading, and the construction of the roadway surface, walkway, concrete slab, utilities, and drainage features. The new pavement will be at or near their existing elevation and would not affect the geology or topography of the area. No mitigation measures are necessary or recommended. See **Section 5.5, Soils and Potential for Hazardous Materials**, for further discussion. No secondary or cumulative impacts to topography and geology are expected during the operation of the proposed project, or during the implementation of other past, present, and reasonably foreseeable future actions.

5.4 Water Resources and Hydrology

5.4.1 Surface Water

5.4.1.1 Description

There are no surface waters in the form of perennial stream flows throughout the proposed project site bordered by Roosevelt, Franklin, Saratoga Avenues, and Kamokila Boulevard. Makakilo Gulch skirts the western boundary of the proposed improvements at the Fort Barrette Road-Kapolei Parkway intersection. See **Figure 5-1, Surface Waters**. The closest surface water body to the site is the James Campbell Industrial Park (JCIP) Drainage Canal adjacent to the west of the property. Makakilo Gulch is located parallel to the far northeastern boundary of Fort Barrette Road where traffic signal improvements are planned at Fort Barrette Road-Kapolei Parkway and Fort Barrette Road Enterprise Street-FDR Avenue intersections. Kalaeloa is relatively dry, with little precipitation, and the soils in the area are well-drained. There are no streams or rivers in the Kalaeloa area. The Barbers Point portion of the Pacific Ocean is located approximately 1.3 miles to the south of the proposed roadways. During use of the former BPNAS by the Navy, more than 250 dry wells were installed, primarily for regional stormwater drainage. Sixteen of the dry wells are identified within the area bounded by the proposed roadways project.

The flat topography of the project area combined with the highly permeable soil and rock, allow storm water runoff to readily infiltrate and collect in man-made detention basins, dry wells, natural sinkholes, or pits for infiltrating into the subsurface. During extreme precipitation events however, storm water typically overflows and sheet-flows into the ocean.

The Flood Insurance Rate Maps (FIRMs) published by the Federal Emergency Management Agency (FEMA 2011), identifies the entire project area within Zone D, which denotes areas in which flood hazards are undetermined, but possible. There are no streams or surface water features in or near the subject lots that could cause potential flood hazards. See **Figure 5-2, FEMA FIRM**.

Figure 5-1, Surface Waters

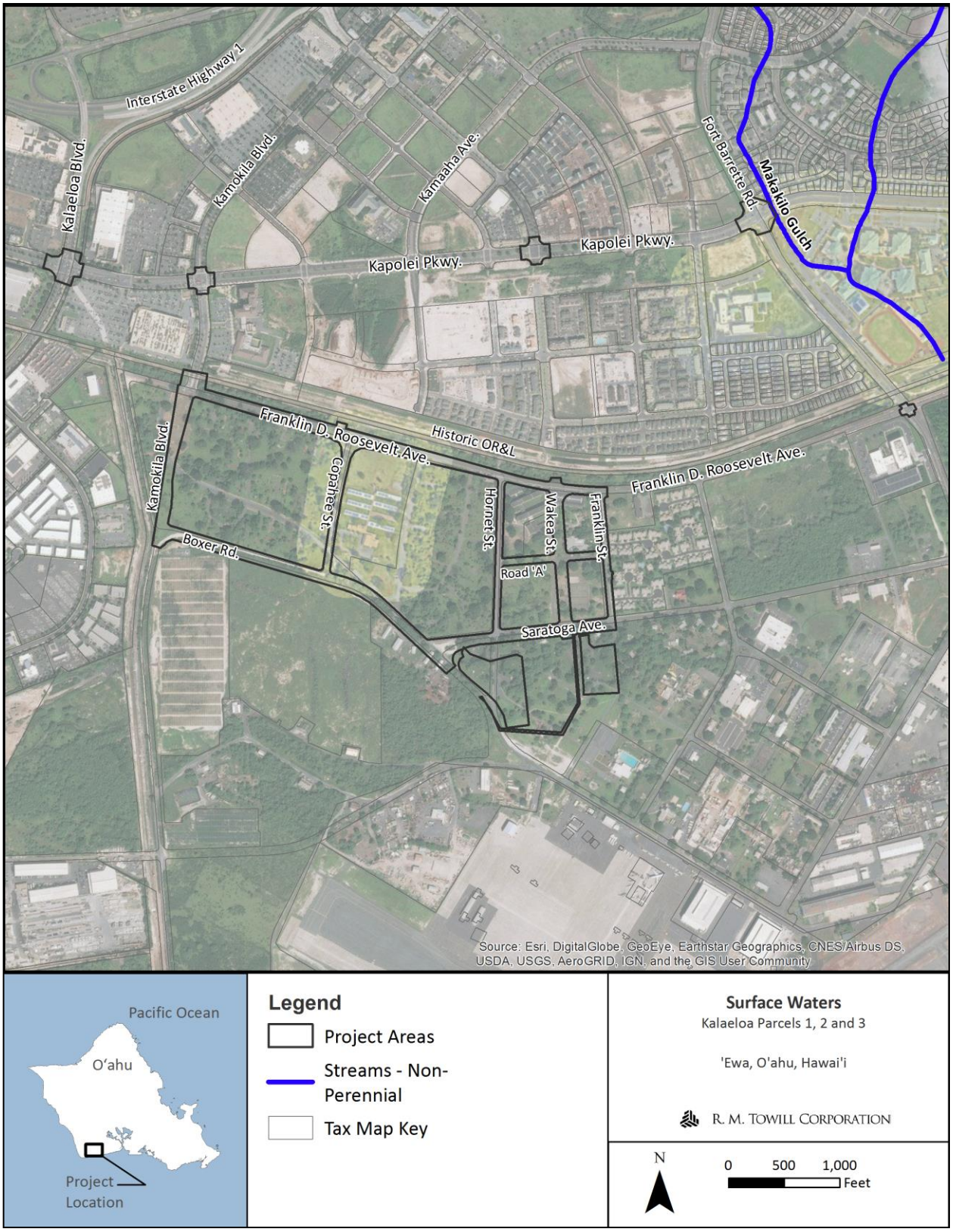
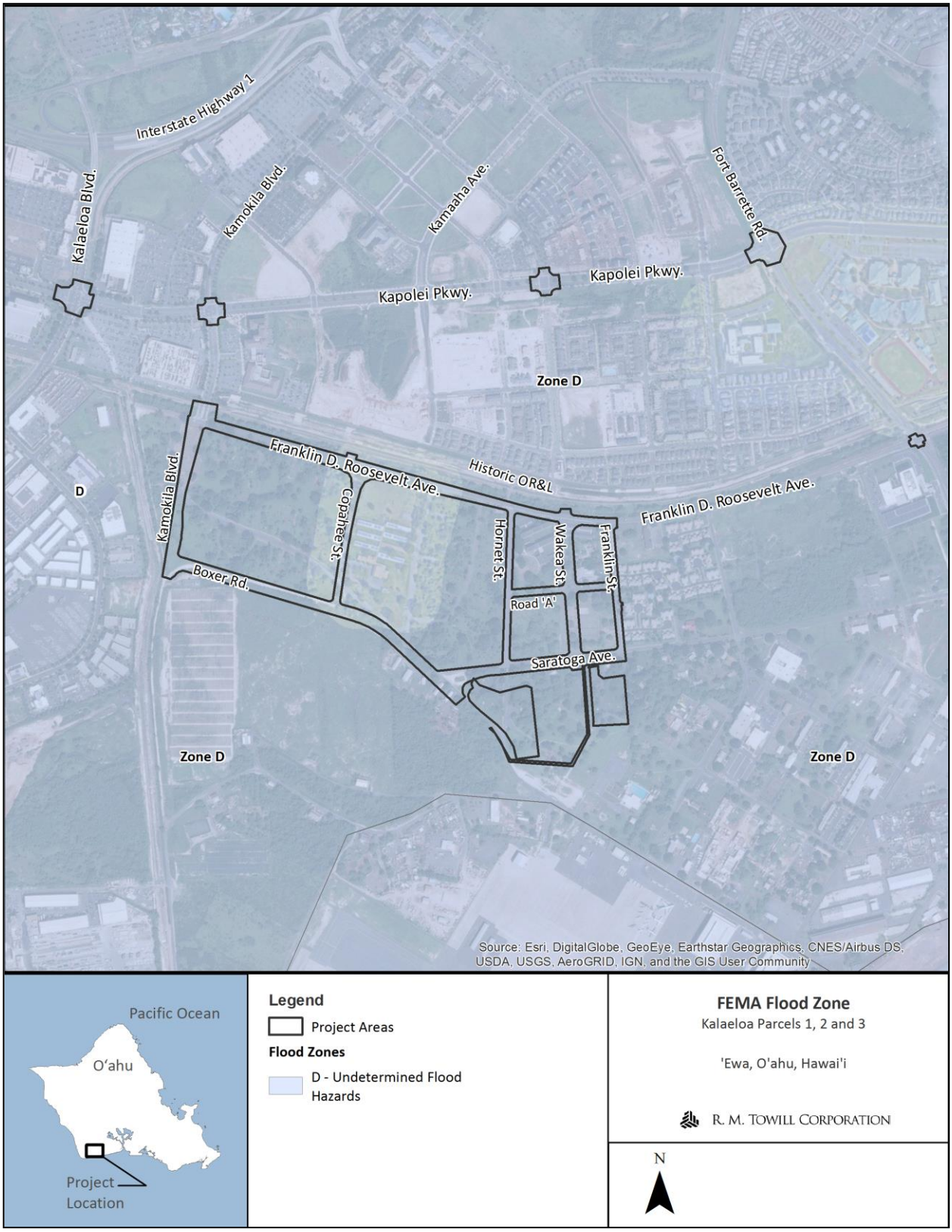


Figure 5-2, FEMA FIRM



5.4.2 Potential Impacts and Proposed Mitigation

The proposed project will not impact any perennial stream flows or channels. In addition, the proposed infrastructure will not come into contact with any 303(d) Water Quality Limited Segment waters, and thus would not burden waters that are already impaired. Some of the proposed road alignments will be located in areas that are already developed, while others will be in areas where development is forthcoming. In both instances, proposed underground utilities will be designed within road ROWs to the extent possible, so as to confine the area of potential impact(s). Whether a particular alignment is located in an existing or future ROW, necessary approvals and permits will be obtained during planning and design phases covering federal, state, and county requirements to address water quality regulations (i.e., HAR, Chapter 11-54, Water Quality Standards). In addition, the contractor will be required to adhere to temporary erosion control BMPs and must retain a storm water pollution prevention plan (SWPPP) on-site during construction to document the maintenance of all storm water controls. Special attention will address work at the Fort Barrette-Kapolei Parkway and Fort Barrette Enterprise Street-FDR Avenue intersections due to their proximity to Makakilo Gulch.

Positive long-term cumulative effects would result from the proposed action in conjunction with ongoing projects in the watershed to improve water quality.

During construction, pollution control measures will be implemented and included in the filing of a National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit, in accordance with Clean Water Act regulations. As required Site-Specific Construction Storm Water BMPs and SWPPP will be prepared and followed by the project contractor to handle the treatment of storm water runoff, erosion, and sediment control[1].

5.4.2 Groundwater

5.4.2.1 Description

Mink and Lau (1990) identify the following two types of groundwater beneath the majority of the subject property: a shallow, predominantly caprock groundwater system and an underlying deep basal aquifer. They classify the groundwater as within the Ewa Aquifer System of the Pearl Harbor Aquifer Sector:

- The uppermost member is characterized as an unconfined basal aquifer contained in sedimentary nonvolcanic lithology layers. This caprock groundwater is given a Status Code of 13321 which indicates that the groundwater has moderate salinity (i.e., with a chloride content of 1,000 to 5,000 milligrams per liter [mg/L]). Under the Mink and Lau system, the code indicates that the shallow caprock groundwater is currently used but not as a drinking or ecologically important groundwater source, is a replaceable resource, and has a high vulnerability to contamination.
- The deep, underlying aquifer is characterized as a confined basal aquifer contained in dike compartments. Under the Mink and Lau system, the groundwater contained in

[1] The project's BMPs and SWPPP will be provided as part of the NPDES general construction storm water permit (NOI Form C) in accordance with HAR Chapter 11-55, Water Pollution Control.

the deep aquifer is given a Status Code of 13213, indicating that the groundwater has a low salinity (i.e., with a chloride content of 250 to 1,000 mg/L). Under the Mink and Lau system, the code indicates that the deep groundwater is currently used as neither a drinking-water or ecologically important source and has a low susceptibility to contamination because of confinement and the overlying caprock.

Up to about 1,650 ft from the coast, the water table is from 3 to 10 ft below the surface and thus is accessible from sinkholes.

The Underground Injection Control (UIC) line was established by HDOH to protect the quality of Hawaiʻi's underground sources of drinking water from chemical, physical, radioactive, and biological contamination that could originate from injection well activity. The UIC line is used to determine the level of protectiveness afforded an aquifer as reflected by water quality standards criteria. In general, groundwater situated mauka of the UIC line is considered a potential source of drinking water. Groundwater situated makai of the UIC line is generally considered not to be a potential source of drinking water. The subject site lies mauka of the UIC line and groundwater beneath the site is considered a potential source of drinking water.

5.4.2.2 Potential Impacts and Proposed Mitigation

Groundwater would not be significantly impacted by the proposed project. The project area is situated over deep confined basalt aquifers and overlying shallow caprock aquifers. The basalt aquifer of the ʻEwa System is considered too deep to be contaminated from the surface. The shallow aquifer of the ʻEwa System, although considered highly vulnerable to contamination, is brackish and not suitable for consumption or irrigation without desalination.

No short- or long-term, secondary*, or cumulative adverse impacts to groundwater resources are anticipated during construction or operation of the proposed project, or during the implementation of other past, present, and reasonably foreseeable future actions*.

5.5 Soils and Potential Hazardous Materials

5.5.1 Description

According to the U.S. *Department* of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the soil in the area of the site is classified as follows:

- Coral outcrop land consists of coral or cemented calcareous sand (CR). The coral reefs formed in shallow ocean water during the time the ocean stand was at a higher level. Small areas of coral outcrop are exposed on the ocean shore, on the coastal plains, and at the foot of the uplands. This type of land is used for military installations, quarries, and urban development.
- Mamala cobbly silty clay loam, 9 to 12 percent slopes (MnC), consists of shallow, well-drained soils along the coastal plains formed in alluvium deposited over coral limestone and consolidated calcareous sand. Runoff is very slow, the erosion hazard slight to moderate, and the permeability is moderate. In a representative profile, the surface layer is dark-reddish-brown stony silty clay loam about 8 inches thick. The subsoil is dark reddish-brown silty clay loam about 11 inches thick. The substratum is coral limestone and consolidated calcareous sand.

Land under off-site improvements is comprised of CR, MnC, and the following:

- Ewa silty clay loam, moderately shallow, 0 to 2 percent slopes (EmA), characterized by very slow runoff, and an erosion hazard that is no more than slight. The depth to coral limestone is 20 to 50 inches. This soil is typically used for sugarcane, truck crops, and pasture.
- Honouliuli clay, 0 to 2 percent slopes (HxA) occurs in the lowlands along the coastal plains. The soil is characterized by moderately slow permeability, slow runoff, and an erosion hazard that is no more than slight. This soil is used for sugarcane, truck crops, and pasture.

See **Figure 5-3** for soil types located within the project site.

Potential Hazardous Materials

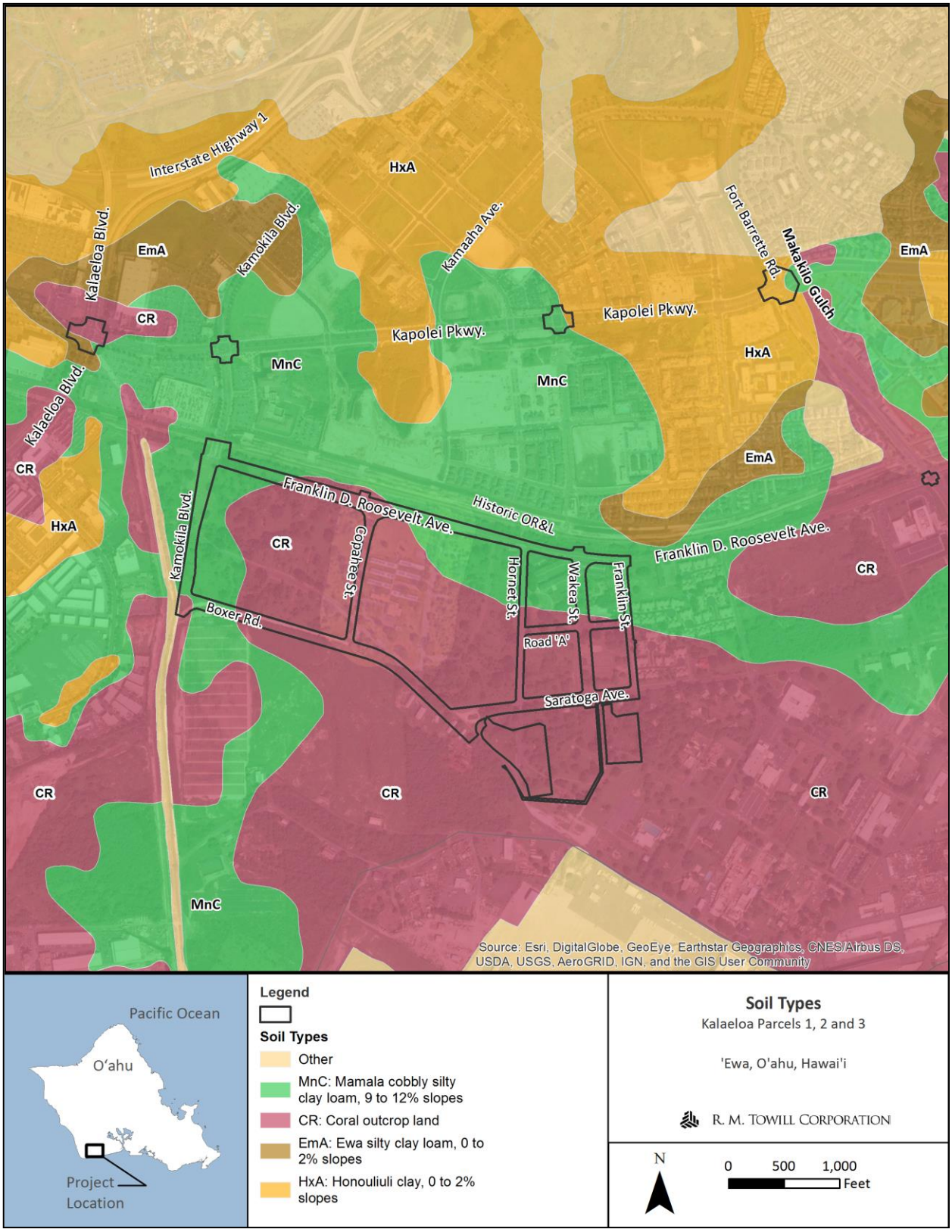
On December 2017, a draft Phase 1 Environmental Site Assessment (ESA) was completed by Element Environmental, LLC, to identify presence of any environmental issues associated with the proposed roadways on four parcels (TMKs) of developed land. The ESA included literature and records research, field investigation, and personal interviews with individuals familiar with past usage of the project site. The findings of data collected in the 2016 timeframe are summarized below. See **Appendix B, Phase I Environmental Site Assessment** (Element Environmental, LLC December 2017).

Area of Study

The subject property is located within the Kalaeloa CDD, designated as TMKs: (1) 9-1-013: portions of parcels 002, 003, 004, 010, 128, and 129. The parcels are located on former BPNAS property and are owned by the U. S. and leased by Kalaeloa Ventures, LLC (for Hunt). The roadways are under various jurisdictions, including the Navy; HCDA; HDOT, and the CCH. The subject property is identified as three distinct areas:

- Parcel 1 includes proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcel 002, including:
  - Copahee Avenue, West Perimeter Road and the Kamokila Boulevard Extension and
  - Portions of Saratoga Avenue, FDR Avenue, and the OR&L utility corridor (including the GTE building).
- Parcel 2 includes the proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcel 003, 004, and 010, including:
  - Portions of Hornet Street, FDR Avenue, Saratoga Avenue, Boxer Road, and 272: Transformer Station A.
- Parcel 3 includes proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcels 128 and 129, including:
  - Road “A” and the Wakea Street Extension;
  - Portions of Hornet Street, FDR Avenue, Franklin Avenue, Saratoga Avenue, and the OR&L utility corridor;
  - 1906: Tennis Pro Shop; and
  - Portions of 73: Paradise West Club Complex, 68C: concrete pad, and 713: tennis courts.

Figure 5-3, Soil Types



Findings

The assessment identified evidence of Recognized Environmental Conditions (RECs), as defined by the American Society for Testing and Materials (ASTM). ATSM guidance defines an REC as the presence or likely presence of any hazardous substances or petroleum products, in, on, or at the property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

ASTM defines a Controlled REC (CREC) as a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (Element Environmental, LLC December 2017).

A summary of the identified RECs indicated the following on-site and off-site sources and potential sources:

On-Site Sources and Potential Sources of RECs

Site Listing on Environmental Databases: BPNAS - It is possible that historical military use has negatively impacted the soil and groundwater beneath the site.
"Barbers Point Central Office" (GTE Building) (Parcel 1) on the UST database. The underground storage tank (UST) and associated piping at the site poses a risk of future release of hazardous substances and/or petroleum products to the site.
Pipelines: "Black oil" and "white gas" pipelines are located within the subject property ROWs on FDR Avenue and the OR&L utility corridor. It is possible that soil and groundwater beneath the site have been or may be impacted by releases associated with the pipelines.
Releases: 272: Transformer Station A: Transformer 444, installed in the early 1940s, was retro-fitted in 1988 because PCBs were detected in the dielectric fluid and wipe samples collected from the concrete pad. No additional information was available. It is possible that historical releases from the transformer have negatively impacted surface materials in the vicinity of the transformer as well as the soil and groundwater beneath the site.

Solid Waste: Evidence of illegal dumping of miscellaneous debris and litter adjacent to the ROWs included but was not limited to general household trash, 1-gallon paint cans, several cans of brake fluid, wooden pallets, and electronics. It is possible that illegal dumping activities have negatively impacted soil and groundwater beneath the site.
Hazardous Substances and Petroleum Products: Hazardous and/or regulated substances (e.g., oils, gasoline, grease, petroleum-based products) may be used/stored within the GTE Building (Parcel 1) and 272: Transformer Station A (Parcel 2). The nature of the activities conducted in these two areas poses a material threat of a future release to the environment.

Off-Site Sources and Potential Sources of RECs

Leaking UST (LUST): Adjacent Structure 77 Wakea Garden Apartments (former BOQ) (interior of Parcel 3) previously had diesel and fuel oil USTs (BP19 and BP20) (installed in 1958). The tanks, boilers, and piping were removed in October 1991, at which time visual evidence of soil contamination was noted. No additional information was available. It is possible that contamination associated with the release(s) remains in the soil and groundwater beneath the site.
Releases: Contaminated surface soil (arsenic and selenium) and groundwater (TPH-DRO and TPH-ORO) were identified on an adjacent property to the northwest of Parcel 1 hydraulically upgradient (now occupied by Costco). It is possible that contamination from this site is migrating to the subject property.
Soil sampling conducted within Parcel 1 in 2016 indicated the presence of elevated pesticide concentrations in some areas, which will require management during redevelopment. It is possible that subject property is negatively impacted by historical pesticide use on Parcel 1.
Soil sampling conducted within drywells located within Parcel 1 and potentially within the proposed roadway expansion indicates the presence of elevated chromium concentrations in well L18-01. It is possible that contamination from this dry well is on or migrating to the subject property.

A summary of the identified CRECs indicated the following sources:

LUST Sites: The LUST associated with former Building 74 (exact location is unknown; approximated to be within the southwest interior portion of Parcel 3) (Facility ID 9-103191, Release ID 030039), located within the interior of Parcel 3, is listed as Site Cleanup Completed (NFA).

The ESA's literature and records research noted that during a site investigation in 2016, discrete soil samples were collected from soil borings taken adjacent to Parcels 1, 2, and 3. Contaminants of potential concern (COPCs) were identified in soil to a depth of 4 ft below ground surface (bgs) at concentrations that exceeded HDOH environmental action levels for unrestricted land use, including chromium, arsenic, chlordane (technical), heptachlor, and heptachlor epoxide (Element Environmental, LLC December 2017).

The data generated during the 2016 site investigation is not adequate to evaluate potential environmental hazards, associated risk, and construction/trench worker exposure. However, none of the five COPCs identified in soil at the site, with the possible exception of chromium, exceed their respective HDOH Direct Exposure Action Levels (DEALs) for Construction/Trench Worker exposure. The ESA notes that for chromium, the levels are within the background level range.

As the soil samples were collected in accordance with HDOH guidance, and were considered to be representative of the soil conditions, the sample results would indicate that construction/ trench worker exposure is not a concern in soils to a maximum depth of 5 ft bgs. Thus, to minimize construction worker exposure to potential soil hazards during construction, trenching to a maximum depth of 5 ft bgs should be maintained.

- It is possible that soil and groundwater beneath the site's rights-of-way on FDR Avenue and the OR&L utility corridor have been or may be impacted by releases associated with the pipelines, that historical releases from the transformer station site

have negatively impacted surface materials in the vicinity of the transformer as well as the soil and groundwater beneath the site.

- It is possible that illegal dumping activities have negatively impacted soil and groundwater beneath the site.
- It is possible that contamination from an adjacent Costco site north of the project site, is migrating to the project site.
- It is possible that Parcel 1 may be negatively impacted by historical pesticide use on it, or contamination from a dry well on the same parcel could be migrating to the project site.

Recommendations

1. Complete a Phase II ESA to characterize soil within the subject property to evaluate potential environmental hazards, associated risks, and potential construction/trench worker exposure. Soil sample results can also be used to characterize soil for on/off-site reuse and/or disposal.
2. If COPCs are detected in soil at concentrations exceeding HDOH EALs, complete an Environmental Hazard Evaluation (EHE) to evaluate potential environmental hazards, associated risks, and construction/trench worker exposure.
3. If potential environmental hazards, associated risks, and/or construction/trench worker exposure are identified by the EHE, prepare an Environmental Hazard Management Plan to manage contaminated soil and mitigate potential environmental hazards and exposure risks.

5.5.2 Potential Impacts and Proposed Mitigation

The proposed project will involve minor grading, excavation and backfill activities to prepare the site for development. Earthwork will consist of minor grading to prepare the paving of existing and new roads, construction of the new walkways, and installation of utilities (i.e., drainage and electrical). Prior to construction all known utilities and underground pipelines shall be identified by the contractor and shall be subsequently disconnected, removed, or avoided.

Based on preliminary engineering and environmental site assessment and planning, construction/trench worker exposure is not a concern in soils to a maximum depth of 5 ft bgs. Excavation at the site will be accomplished using conventional excavating equipment. It is expected that most of the excavated materials will be returned to trenches, safely covered on-site, or disposed of at an approved State or City and County of Honolulu facility.

During construction, the potential for release of sediments in storm water runoff from excavated areas and stockpile material sites will be addressed through a City and County of Honolulu-approved Erosion Control Plan (ECP) that will be secured for this project. A NPDES permit will be obtained for this project from the DOH, CWB. The ECP and NPDES permit applications will provide for the use of BMPs to prevent or mitigate the potential for impacts to State waters as a result of storm water runoff from the construction site.

There is a possibility that surface soils may be impacted due to hazardous substances or petroleum products that may have migrated from mauka upland properties to the project site.

If contaminated materials are detected, construction will cease immediately and standard protocols for soil contamination will be followed, including the implementation of mitigation measures to ensure no further adverse impact to the soil conditions on the project site or to worker health and safety.

The contractor shall be responsible for taking safety, contamination management, and documentation actions as required by HRS, Chapter 396, Occupational Safety and Health, and HAR, Chapter 12-8, Hawaiʻi Occupational Safety and Health. Compliance with the guidance provided in these regulations involves the protection of workers and public health and safety; and immediate notification of the DOH including monitoring requirements. Other controls may be implemented in accordance with a Soil Management Plan or a site-specific Health and Safety Plan, prepared if required by Hunt Kalaeloa for this project.

Any contaminated materials to be removed from the project site will be sampled, analyzed, and appropriately disposed of at a DOH-approved facility. The transport of the materials shall comply with State and Federal regulations regarding the transportation of hazardous or petroleum contaminated materials.

Engineered controls to mitigate against potential exposure pathways will include paving of the site with concrete and/or AC pavement, and the use of clean, uncontaminated soil cover. The implementation of these controls is expected to be sufficient to reduce the potential threat to human health and the environment by eliminating the exposure pathway.

Other impacts to soils include the potential for erosion and the generation of dust during grading and construction. Clearing and grubbing activities will temporarily disturb the soil retention values of existing vegetation and expose soils to erosional forces. Some wind erosion of soils could occur without a proper watering and regrassing program. Heavy rainfall could also cause erosion of soils within disturbed areas of land. BMPs to minimize impacts may include the following:

- Minimizing the time of construction;
- Retaining existing ground cover as long as possible;
- Constructing drainage control features early;
- Using temporary area sprinklers in non-active construction areas when ground cover is removed;
- Providing a water truck on-site during the construction period to provide immediate sprinkling, as needed;
- Using temporary berms and cut-off ditches, where needed, for erosion control;
- Watering graded areas when construction activity for each day has ceased;
- Grassing or planting all cut and fill slopes immediately after grading work has been completed; and
- Installing silt fences, sediment traps, and diversion swales, where appropriate.
- Employee training on proper use of BMPs

After construction, the new improvements will provide long-term erosion control. Construction activities will comply with all applicable Federal, State, and City and County regulations and rules for erosion control. A grading permit will be procured from the City and County of Honolulu. Compliance with the NPDES permit program will be required.

Adherence to the above mitigation measures and provisions of law are expected to maintain public and worker health and safety and mitigate against the potential for significant short or long term adverse environmental impacts. No secondary or cumulative impacts to soils are expected from the proposed action.

5.6 Wetlands

5.6.1 Description

Wetlands play an integral role in the environment. They prevent erosion in the surrounding area through the presence of wetland associated plants with root systems that hold soil in place. The plants also serve as a physical barrier and absorb energy from waves. Wetlands also provide a natural filtration system for runoff. Nutrients swept into the wetland from runoff are absorbed by plant roots and microorganisms that live in the soil, or stick to the soil particles themselves. Through this process, most of the nutrients and pollution in the water are absorbed and retained and are prevented from entering the ocean (EPA, 2016). Executive Order 11990, Protection of Wetlands, directs federal agencies to take action to minimize the destruction, loss, or degradation of wetlands on their properties and mandates the review of the impact of proposed actions on wetlands through NEPA.

There are no known wetlands in or adjacent to the project site.

5.6.2 Potential Impacts and Proposed Mitigation

There would be no impact to wetlands because none exist in the project area.

If water is encountered and removed while digging foundations for the proposed roadway, walkway, concrete slab, and drainage facilities, any such discharged water must comply with federal NPDES requirements. During operation of the proposed project, a BMPs plan and an ECP will be implemented to protect against inadvertent spills or releases of contaminants. **Section 5.4.1.2** addresses preventive measures to be taken by the construction contractor to avoid spills into Makakilo Gulch, which is the nearest groundwater resource northeast of the Fort Barrette Road intersection improvements work during construction.

No direct, secondary, or cumulative adverse impacts to the area wetlands are anticipated and no further mitigation is anticipated to be required. All work proposed would adhere to City and County of Honolulu regulatory requirements.

5.7 Natural Hazards

5.7.1 Description

Hawai'i is susceptible to potential natural hazards such as flooding, hurricanes, earthquakes, and tsunamis. This section provides an analysis of the Site's vulnerability to such hazards.

Floods

As indicated in **Section 5.4.1, Surface Waters**, the proposed project site is located in flood hazard Zone D, defined as areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted in Zone D as reflected in FEMA-FIRM Map No. 15003C0310G (HI-NFIP, 2011). See also **Figure 5-2, FEMA FIRM Map**.

Hurricanes

Hawaiʻi's hurricane season is between June and November, when the sun can heat the ocean enough to produce strong storms (University of Hawaiʻi at Hilo, 2013). Hurricanes are not very common in Hawaiʻi (as opposed to, for example, the Caribbean). This is because the ocean around the islands is relatively cool and wind patterns are more likely to create shear, which tears storms apart. However, since 1950, when reliable recordkeeping on hurricanes began, five hurricanes have caused major damage to Hawaiʻi. Causing an estimated $2.3 billion in damages, Hurricane ʻIniki (1992) is the worst storm to have hit Hawaiʻi (Williams, 2013). No hurricanes or tropical storms have caused substantial damage since ʻIniki.

Seismic Hazards

In Hawaiʻi, most earthquakes are linked to volcanic activity, unlike other areas where a shift in tectonic plates is the cause of an earthquake. Each year, thousands of earthquakes occur in Hawaiʻi, the vast majority of which are so small they are detectable only with highly sensitive instruments. However, moderate and disastrous earthquakes have occurred in the islands.

Tsunami Hazard

The project site is located well outside the tsunami evacuation zone designated by the Hawaiʻi State Civil Defense agency.

Climate Change

According to recent findings by researchers at the Hawaiʻi Climate Change Commission and University of Hawaiʻi (IPRC, 2013, var.), the effects of climate change are increasingly evident in Hawaiʻi: air temperature has risen; rain intensity has increased while total rainfall has decreased; stream flows have decreased; sea surface temperatures and sea levels have increased; and the ocean is becoming more acidic (Hawaiʻi Climate Change Commission, 2017 and SB No. 2745, 2012).

Research is also in agreement that GHG emissions, including carbon dioxide, methane, nitrous oxide, and fluorinated gases, are a key contributor to the unprecedented increases in global atmospheric warming over the past century (EPA, 2011 and IPRC, 2013). These trends are projected to continue to increase in the future posing unique and considerable challenges to Hawaiʻi. Research at the University of Hawaiʻi, School of Ocean and Earth Science and Technology (SOEST) indicates that sea level has risen in Hawaiʻi by approximately 0.6 inches per decade (1.5 mm per year) over the past century (SOEST, 2012). Research in the 2017 *Hawaiʻi Sea Level Rise Vulnerability and Adaptation Report* finds that 3.2 feet of SLR is expected by year 2100 (Hawaiʻi Climate Change Mitigation and Adaptation Commission, 2017).

According to the Intergovernmental Panel on Climate Change's Fifth Assessment Report, Climate Change 2013, Chapter 13, Sea Level Change, released in 2014, it is estimated that at most, a global sea-level rise of approximately 0.45 -0.82 m (1.48 – 2.70 ft) is likely to occur for

the period of 2081-2100. There will be deviations of local and regional sea level change from the global change – it is estimated that about 70% of coastlines are projected to experience a relative sea level change within 20% of the global mean sea level change.

The project site elevation is 52 ft above sea level and direct inundation due to sea level rise is not anticipated in the context of 21st century sea level rise projections. Furthermore, according to the Hawaiʻi SLR Viewer (accessed 2019), the project site is not within the 3.2-feet SLR Exposure Area. The Center for Island Climate Adaptation and Policy and the University of Hawaiʻi Sea Grant note that sea level is expected to rise one foot by 2050 and three ft by 2100, and recommends that state and local governments plan accordingly (Center for Island Climate Adaptation and Policy, 2011). While an accelerating rise in local sea level should be planned for, specific water levels should not be anticipated because sea level rise models are inherently uncertain. Sources of this uncertainty include sparse local data, intrinsic uncertainty in climate warming and ice melt models, and prospective shifts in human behavior to curb green-house gas emissions.

5.7.2 Potential Impacts and Proposed Mitigation

The proposed project will have beneficial impacts for the community when considering natural hazards. The Subdivision roadways will be a hardened public infrastructure system from which the developer and CCH can respond to water system service needs during natural hazard events. Further, the development of a water source through capture of brackish water will provide additional supply to an area that may experience increased drought in the future.

The occurrence of a natural disaster cannot be predicted, and should one occur, it could pose a risk of life and property at the Site. Because the Subdivision roadways will provide efficient access to services related to the water security of the Kalaeloa community, it is important that the roads be protected from natural disasters so that its resources are available to assist in impacted areas.

To protect against natural hazards (particularly hurricanes and earthquakes), the proposed new roadway system will be constructed in compliance with requirements of the Uniform Building Code and other county, state, and federal standards.

Climate Change

The proposed Hunt Kalaeloa subdivision roadway improvements project would not result nor constitute a source of impact to the climate of the project area or region, and does not propose activities that will lead to an increase in the generation of GHGs. Because the project would not increase the use of machinery in the project area, it is not anticipated to result in a persistent contribution to long term or secondary impacts.

Potential impacts associated with climate change are being addressed through long-range planning. No significant secondary or cumulative impacts at the project site are anticipated from climate change, as plans for adaptation are established, e.g., Act 286, Session Laws of Hawaiʻi 2012.

The development and operation of the Hunt Kalaeloa subdivision roadways project will not individually affect the climate. However, Global Warming theory postulates that human activities cumulatively affect the climate through the creation of GHGs. GHGs will be produced in the construction and operation of the Project. Strict adherence to State DOH policy guidance

regarding Contractor BMPs during construction will help to mitigate the Project's "carbon footprint" through careful selection and practice of recycling and the use of renewable, energy efficient materials and practices. During operation of the roadways, the greenhouse effect is expected to also be mitigated through efficient energy use strategies, including the use of natural as opposed to mechanical ventilation and renewable onsite energy generation.

Microclimates can be affected on a local scale. The urban heat island effect is when the built environment causes urban areas to be warmer than surrounding areas. The main cause of the urban heat island effect is from the modification of land surfaces with materials that effectively store short-wave radiation, such as pavement. Roadway improvements include increased access for bicycles, pedestrians, and the mauka extension of Wakea Road for the future Honolulu Authority for Rapid Transportation (HART) transit station. The long-range project impact of increasing access to public transit would contribute to the incremental reduction of the carbon footprint.

5.8 Flora and Fauna

The biological communities of potential concern in the project area are botanical, and terrestrial and avian faunal organisms. Biological surveys occurred in December 2017. Based on information contained in the floral and faunal biota assessment, there are no threatened or endangered floral or faunal species in the area of the Hunt Kalaeloa subdivision roads project. A description of the terrestrial flora and terrestrial and avian fauna that were observed as well as anticipated to be present in the vicinity of the proposed project is discussed in detail below. See **Appendix C, Biological surveys for proposed road improvements at Kalaeloa, Kapolei, Oʻahu** (AECOS 2017).

5.8.1 Terrestrial Flora

An area south of Boxer Road just outside the survey area is designated Critical Habitat for selected plants listed on Oʻahu (Lowland dry habitat Unit 10). The endangered *ʻakoko (Euphorbia skottsbergii var. skottsbergii)* is known to occur in this designated area (USFWS, 2011).

5.8.1.1 Potential Impacts and Proposed Mitigation

No adverse effects to rare, threatened or endangered flora are anticipated from construction of the proposed improvements as all work will be within an area that has been previously subjected to extensive disturbance associated with the development and maintenance of BPNAS. The proposed project would not result in significant adverse secondary or cumulative impacts to flora resources.

5.8.2 Fauna

5.8.2.1 Description

Terrestrial Mammals. Feral and domestic (pet) cats (*Felis catus*) were observed occasionally throughout the survey area, but were most frequently observed in the scrub- shrub outlying residential areas adjacent to the survey area. One domestic (pet) dog (*Cannis l. familiaris*) was being walked along Franklin Avenue. Other mammals likely to frequent the area include the

small Asian mongoose (*Herpestes javanicus*), a small Asian rodent species introduced to Hawaiʻi from South and Southeast Asia.

The findings of mammals during the survey are consistent with the location of the survey area and habitats present. Both dogs and cats are alien to the Hawaiian Islands. Other mammal species not observed during the survey but likely to occur in the area include the small Asian mongoose and various rodents, all of which are considered alien to the Hawaiian Islands, and deleterious to native ecosystems and native faunal species.

The Hawaiian hoary bat or ʻōpeʻapeʻa (*Lasiurus cinereus semotus*) is the only Endangered Species Act (ESA) listed terrestrial mammal in Hawaiʻi. Surveys for the bat were not included in the scope of this survey, as detection requires specialized acoustic equipment deployed over multiple nights. Given the scarcity of records of this species from the ʻEwa Plain, it is unlikely that bats use resources in the project vicinity. Numerous potential roosting trees (trees in excess of 4.6 m [15 ft]) are present on the property.

Avian Fauna. A total of 247 birds representing 22 species were observed during the avian survey. The fauna listing includes one endemic and two indigenous migratory species, as well as 19 species alien to the Hawaiian Islands.

Three individuals of the endemic Hawaiian Black-necked Stilt or ʻaeʻo (*Himantopus mexicanus knudseni*) were observed foraging on the lawn of Barbers Point Elementary School at Station 8, before being flushed by school children coming out to recess. A single Wandering Tattler or ʻūlili (*Tringa incana*), an indigenous migrant shorebird, was incidentally observed in flight, transitioning through the Project area in a west-bound direction near Boxer Road. A total of 17 Pacific Golden Plover or kōlea (*Pluvialis fulva*), another indigenous migratory species, were observed at five of nine point-count stations. Kōlea are commonly found on lawns and other open grassy areas throughout the project site. The presence of both the Wandering Tattler and Hawaiian Black-necked Stilt may be partly attributed to the drainage canal to the west of the project site, as the riparian and estuarine habitats in the canal are attractants for the two species.

The avian diversity and density at the project site are fairly typical of highly disturbed dry lowlands and urbanized developments on the ʻEwa Plain of Oʻahu. Of the total individual birds observed, approximately 92% are non-native alien species. The species most observed were Common Waxbill (*Estrilda astrild*), Common Mynah (*Acridotheres tristis*), Zebra Dove (*Geopelia striata*), and Spotted Dove (*Streptopelia chinensis*). Combined, these four species constituted 55% of the total birds observed during the survey, with each species counted at seven or more of the nine point-count stations.

Only the Hawaiian Black-necked Stilt is listed as an endangered species under both the federal ESA of 1973 and the State of Hawaiʻi endangered species statutes (USFWS, 2014; DLNR, 2015). Project activities are not anticipated to directly impact foraging habitat; the birds were observed on a playground field at Barbers Point Elementary School, a location unlikely to be disturbed. Construction-related noise may be an indirect impact influencing foraging behavior, an impact already occurring when students play on the field. Suitable alternative foraging habitat is abundant in nearby areas, and no long-term impacts to the species are anticipated. This species does not actively nest in the area due to a lack of suitable nesting habitat.

Seven of the 22 bird species observed are protected by the Migratory Bird Treaty Act of 1918 (MBTA): Black-necked Stilt; Wandering Tattler; Northern Mockingbird (*Mimus polyglottos*);

Cattle Egret (*Bubulcus ibis*); House Finch (*Carpodacus mexicanus*); Northern Cardinal (*Cardinalis cardinalis*); and Pacific Golden Plover (USFWS, 2013). It is unlawful to pursue, hunt, take, capture, kill, or sell birds species protected under the MBTA without a permit. The statute also protects bird parts, including feathers, eggs, and nests.

The Pueo or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) is a state-listed endemic sub-species (on Oʻahu only) and has been recorded on undeveloped lands mauka (inland) of Kapolei. While not observed during this survey (these birds are crepuscular, active mostly in the evening and early morning hours), it is possible that this owl may hunt over grassy fields in the Project area. With the exception of "new" roadways proposed for the far western end, Pueo feeding and ground-nest sites would be unlikely due to extensive development and regular disturbing activities associated with urban development.

No seabirds were observed during the survey, and no evidence of seabird nesting colonies were discovered, nor are any such colonies currently known in this area. However, seabirds may overfly the site on occasion.

5.8.2.2 Potential Impacts and Proposed Mitigation

Avian Resources. The potential impact to seabirds would be the installation of outdoor lights. Night lights can disorient nocturnally-flying seabirds, particularly fledglings, resulting in their potential downing and harm from collision with objects and/or predation by feral dogs and cats if downed. Mitigation measures are planned to include:

- During construction, the presence of any ESA-listed species within 50 m (164 ft) of the project work area would necessitate halting of work until the animal voluntarily leaves the work area.
- Immediately prior to the start of grading at the far western end of the site, a survey for Pueo ground-nesting activity would be undertaken. If a nest is discovered, The Department of Land and Natural Resources (DLNR) must be notified before proceeding with grading or grubbing that could disturb nesting activity.
- If night-time construction activity and/or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground.
- If streetlights or exterior facility lighting are installed in conjunction with the project, it is recommended that the lights be shielded to reduce the potential for interactions between nocturnally flying seabirds and external lights and/or man-made structures (Reed et al., 1985; Telfer et al., 1987).

Mammalian Resources. To avoid potential impacts to roosting Hawaiian hoary bats with pups, it is recommended that no woody vegetation taller than 4.6 m (15 ft) be removed during the pupping season, from June 1 to September 15.

5.9 Archeological and Historic Resources

5.9.1 Description

Introduction

An Archaeological Literature Review and Field Inspection (ALRFI) Report was prepared by Cultural Surveys Hawaiʻi, Inc., for the proposed project. The project area subject to archaeological field inspection comprised approximately 39 acres with field work conducted between October 17 and 18, 2017. See **Appendix D, Archaeological Literature Review and Field Inspection** (Cultural Surveys Hawaiʻi, 2017).

The investigation was designed based on detailed historical, cultural, and archaeological background research and field inspection of the project area. The purpose was to determine the likelihood that historic properties may be affected by the project and, based on findings, to provide cultural resource management recommendations. The ALRFI is intended to facilitate the project's planning and support compliance requirements for historic preservation and environmental review in HRS, Chapter 6E and HRS, Chapter 343.

Findings

Background research and review of previous archaeological studies has identified the area as not having been heavily used in the pre-Contact and post-Contact periods for habitation. In pre-Contact periods, the area is associated with various gods. The Puʻu o Kapolei Heiau is located to the northeast of the project area. In the post-Contact period, the area was used for domestic animal husbandry and was later heavily utilized for military purposes, including the Barbers Point military complex.

During the field inspection, several remnants of historic foundations were documented and designated as CSH 1. See **Figure 5-4, Aerial photograph showing the location of sites CSH 1, CSH 2, and CSH 3** and **Table 5-1, CSH 1 - Archaeological Features** for additional detail concerning site features (Cultural Surveys Hawaiʻi, 2017). These features correspond with the historic military buildings built in the 1940s to 1950s. A filled-in well (CSH 2) of indeterminate age was documented along FDR Avenue. A former road (CSH 3) was also documented along Saratoga Avenue near the area of CSH 1. CSH 3 corresponds with a road seen on historical maps. Consultation with SHPD is recommended regarding formal historic property designation for CSH 2 due to the historic nature of artesian well drilling in the area.

Figure 5-4, Aerial photograph showing the location of sites CSH 1, CSH 2, and CSH 3 (Cultural Surveys Hawaiʻi, 2017).

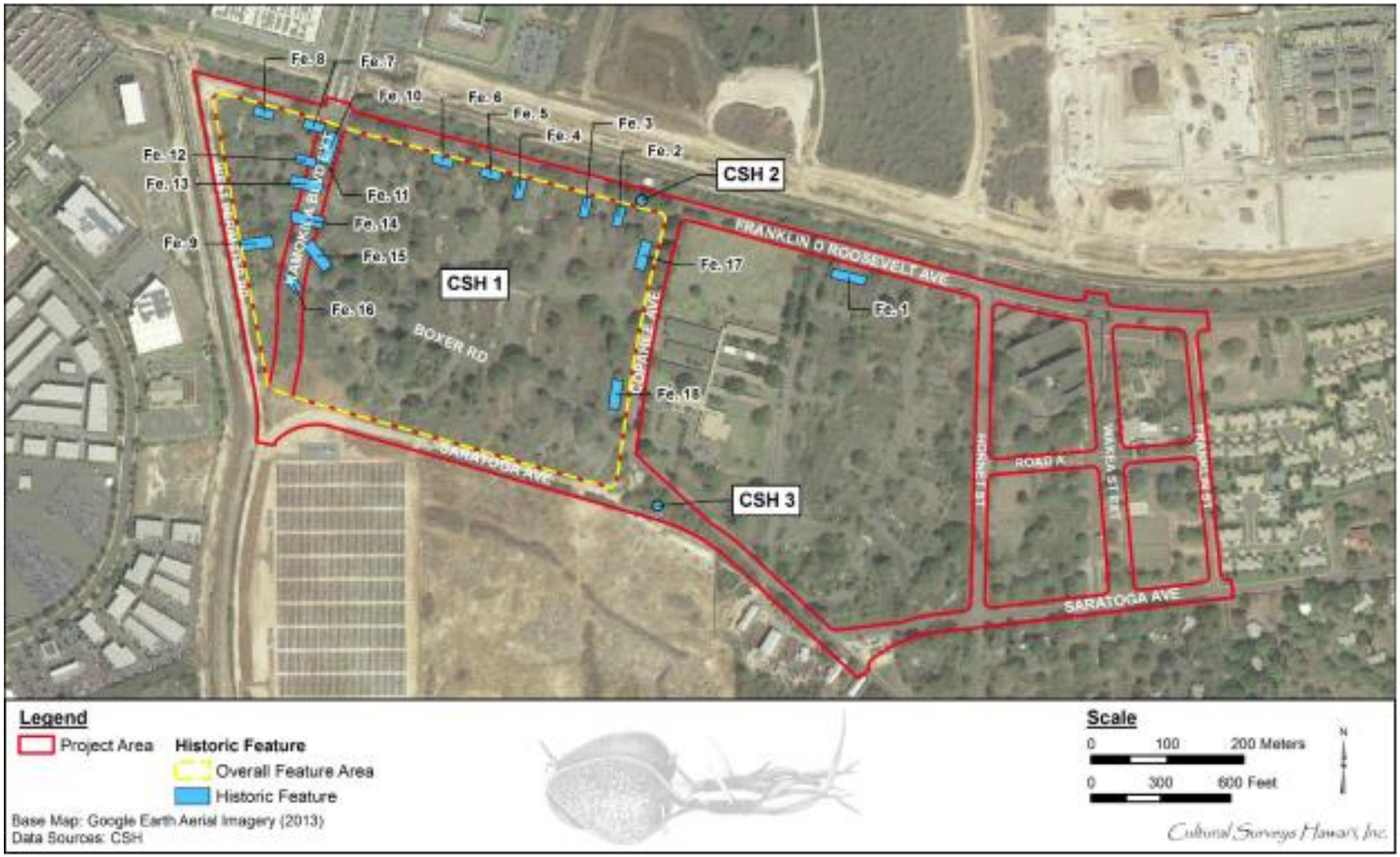


Table 5-1, CSH 1 – Archaeological Features

Feature	Location	Orientation	Measurement	Associated Features/Artifacts	Condition
1	Roosevelt Ave	East-west	23 m by 8 m	Rusted metal debris	Poor
2	Roosevelt Ave	North-south	16 m by 6 m	Rusted metal debris	Poor
3	Roosevelt Ave	North-south	18 m by 6 m	Rusted metal debris	Poor
4	Roosevelt Ave	North-south	16 m by 6 m	Rusted metal debris	Poor
5	Roosevelt Ave	North-south	12 m by 6 m	Rusted metal debris	Poor
6	Roosevelt Ave	East-west	17 m by 6 m	Rusted metal debris	Poor
7	Roosevelt Ave	East-west	20 m by 5 m	Rusted metal debris	Poor
8	Roosevelt Ave	East-west	23 m by 10 m		Poor
9	West Perimeter Rd	North-south	17 m by 6 m		Poor
10	Kamokila Blvd	North-south	30 m by 8 m		Poor
11	Kamokila Blvd	N/A	2.5 m by 2.3 m		Poor
12	Kamokila Blvd	East-west	21 m by 6 m	Rusted metal debris	Poor
13	Kamokila Blvd	East-west	30 m by 8 m	Circular concrete depression, four concrete and metal postholes, rusted metal debris	Poor
14	Kamokila Blvd	East-west	21 m by 6.5 m plus extension of 9 m by 6.5 m		Poor
15	Kamokila Blvd	East-west	23.5 m by 8 m	Rusted metal debris	Poor
16	Kamokila Blvd	East-west	20 m by 6.5 m	Rusted metal debris	Poor
17	Copahee Ave	North-south	8 m by 6 m	Rusted metal and ceramic utility debris	Poor
18	Copahee Ave	North-south	13 m by 6 m		Poor

No historic properties were identified or designated in the project site by this study.

Conclusions

Based on an assessment of the history, cultural background, and existing cultural and historical sites in the Hunt Kalaeloa project area, the following conclusions are made.

While the features of CSH 1 are older than 50 years of age, they appear to lack integrity due to the buildings and foundations having been removed and only remnants of base course and debris remaining. Consultation with SHPD is recommended regarding formal historic property designations for these remnant foundations and the former road (CSH 3). CSH's informed opinion is that the CSH 1 features do not fulfill the criteria pursuant to HAR §13-275-6. Consultation with SHPD is recommended regarding formal historic property designation for the filled-in well (CSH 2) due to the historic nature of artesian well drilling in the area.

Based on the results of the study, early consultation with SHPD is recommended to determine what (if any) further archaeological study is indicated. CSH recommends a combination of on-site and on-call monitoring with on-site monitoring limited to the southern extension of Kamokila Boulevard, the Wakea Street Extension, and "Road A" and on-call monitoring for all other areas of the project that are current roadways. The reasoning for this recommended plan for

monitoring is due to the potential for historic surface and subsurface sites to be encountered within areas previously utilized by the BPNAS. Due to the heavily disturbed nature at the intersections, it is unlikely that historic properties would be encountered.

In the unlikely event that cultural deposits and/or human skeletal remains are encountered during ground disturbing activities, work should be stopped immediately in that area and the SHPD notified of the nature of the discovery.

5.9.2 Potential Impacts and Proposed Mitigation

The potential for adverse effects to archaeological and historical resources are not anticipated as no historic properties were encountered or discovered during past surveys in the vicinity of the project site. An important factor for the lack of archaeological and historical resources present includes the past extensive use of the area by the BPNAS which would have otherwise removed or destroyed any resources that may have once been present.

No secondary or cumulative effects to archeological or cultural resources are anticipated from the proposed project. However, because there is always the potential for the discovery of ʻiwi or other cultural remains, any inadvertent finds will immediately result in the cessation of work and the immediate reporting of the find to the SHPD at (808) 692-8015 (Main Office, Oʻahu). SHPD will provide further instructions regarding the treatment of the find and the conditions when work may be resumed.

5.10 Noise Conditions

5.10.1 Description

The regulation of noise is governed by HAR, Chapter 11-46, Community Noise Control. Allowable day and nighttime noise standards for sensitive receptors have been established for conservation, residential, apartment, hotel, business, agricultural and industrial districts. Current noise sources in the project vicinity include the Barbers Point Elementary School, vehicular traffic, aircraft traffic, and equipment use associated with residential and business uses, and grounds and building maintenance.

The DOH Indoor and Radiological Health Branch and the U. S. Environmental Protection Agency (EPA) have established guidelines and standards for assessing environmental noise impacts and establish noise limits as a function of land use. The project site is located in a developing urban environment where certain levels of environmental noise are acceptable.

5.10.2 Potential Impacts and Proposed Mitigation

Existing sources of noise in the area include motor vehicle and aircraft traffic, and the periodic use of combustion and electric powered equipment associated with nearby area businesses and residences. The Barbers Point Elementary School is not considered a major source of noise.

Construction associated noise is anticipated to result from proposed clearing, grading, road paving, and installation of utilities and drainage. Construction equipment is expected to include, but not be limited to, the use of bulldozers, excavators, graders, pavers, dump trucks, concrete delivery trucks, jackhammers and related powered hand tools used in road construction.

Short-term noise impacts are expected during the construction period and may have an impact on nearby residents and businesses. Construction noise however will be short-term and limited to

daytime hours. Proper mitigation measures will be implemented to minimize noise impacts, and all work will comply with DOH noise limits. All construction activities will be monitored to ensure compliance with HAR, Chapter 11-46.

Nighttime work in residential areas is not anticipated for this project and the DOH will enforce the provisions its noise regulations. Compliance with DOH noise regulations is not expected to result in significant noise-related impacts.

Nearby areas which include residential, commercial and light industrial uses may be temporarily affected by construction generated noise. However, noise generated from construction activities will for the most part not radiate or extend beyond the immediate surrounding project site. Construction related noise is expected to be temporary, of limited duration, and restricted to daytime hours. The area affected would be limited to the area immediately adjacent to the project site, and noise impacts are not considered significant as it will be consistent with other exiting noise generating sources that include the Kalaeloa Airfield and the Kalaeloa Harbor.

The proposed project will facilitate the future development of residential units as a part of the Hunt Kalaeloa plan which will help to fulfill the HCDA Kalaeloa Master Plan for development of a new community adjacent to and makai of Kapolei. Within this land use context, the project is not expected to result in adverse indirect (secondary) effects to a larger area, as all work to support roadway construction would be part of a designated plan for land development (HCDA, March 1, 2006). The scope of the proposed project would facilitate this future development and will be limited in scale to support an existing land use plan for community development.

The potential for cumulative impacts could occur if construction of the proposed project results in significantly prolonged construction that may coincide with residential development in the area and surroundings. However, roadway construction and the generation of noise within the project site are expected to be short-term, lasting only long enough to complete the proposed project. This action would therefore make no persistent contribution to cumulative impacts, and upon completion, ambient noise levels in the area would return to pre-existing background levels.

Mitigation measures to address the generation of short-term construction related noise include:

- All equipment will be properly muffled in accordance with DOH noise regulations.
- All combustion and air-powered equipment will be maintained in proper working order.
- Work will be limited to weekdays during daylight hours between 7:00 am and 6:00 pm. No work will be scheduled on federal or state holidays.
- The contractor will secure a noise permit, as required, from the DOH prior to the initiation of construction.

No adverse noise impacts associated with this project are anticipated. Mitigation measures as described will be employed to minimize and reduce the potential for such impacts. No further mitigation measures are anticipated to be required.

5.11 Air Quality

5.11.1 Description

The DOH, Clean Air Branch (CAB) has identified the following four potential sources of air pollution in the vicinity of the proposed project: (1) industrial sources, such as power plants and refineries; (2) mobile sources, such as motor vehicles; (3) agricultural sources, such as cane burning (no longer practiced on Oʻahu); and (4) natural sources, such as wind-generated dust and volcanic activity (DOH, 2013, 2014b, 2015b). Air quality around the project site and Kalaeloa surroundings is generally excellent year-round. The prevailing northeasterly trade winds tend to push any human-made or natural pollutants out to sea. However, during certain periods winds can shift from a southeasterly direction causing the air flow to carry volcanic smog (more commonly referred to as vog) over and toward the ʻEwa region leading to an increase in pollution and a decrease in visibility.

According to the State of Hawaiʻi, Annual Summary 2015 Air Quality Data, air quality levels for the monitoring station closest to the project site is the Kapolei Station. Air quality data is recorded for levels of ozone, PM2.5, PM10, carbon monoxide, sulfur dioxide, ozone, NO2, and lead, and remain below the state and federal ambient air quality standards.

Air quality in the vicinity of the project site is primarily affected by construction activities (i.e. fugitive dust) and by vehicular emissions generated along surrounding streets. Among the various air pollutants for which State and National standards have been established, the level of carbon monoxide is the primary concern when it is near locations with heavy traffic flow. According to the DOH Clean Air Branch, air quality near the Kapolei Station, located at the Kapolei Business Park on Lauwiliwili Street, is within the range considered as good.

5.11.2 Potential Impacts and Proposed Mitigation

Construction activities are expected to have little to no impact based on the limited duration and scope of the project. Where engine exhausts may be a potential source of air pollution, all internal combustion equipment will be governed in accordance with applicable state regulations in HAR, Chapters 11-59 and 11-60, Air Pollution Control.

It is expected that no State or Federal air quality standards will be violated during or after construction. Construction activities such as site clearing and grading will be temporary, and all construction activities will comply with the provisions of HAR, Chapter 11-60.1-33, Fugitive Dust. An effective dust control plan will be implemented as necessary. Measures to control dust during various phases of construction include:

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

During construction, fugitive dust is expected to be generated. Fugitive dust will be controlled with regular wetting of the soil by the contractor and/or with the use of dust screens, as required. There will be no long-term or secondary effects to air quality once construction is completed.

In the long-term, increased vehicular traffic volumes on the Hunt Kalaeloa subdivision roads project may result in an increase in emissions; however, improved operational efficiencies, equipment, and technology, as well as the use of cleaner-burning fuels and adherence to air pollution controls and regulations would help to offset the increased emissions. Construction and operational impacts are not expected to be significant.

Contributing more substantially to air quality concerns would be other sources of air pollutants, such as those from transiting trucks and passenger vehicles, cargo and fuel facilities, and related commercial and business activities associated with the James Campbell Industrial Park and Kalaeloa Harbor.

Other past, present, and reasonably foreseeable actions have used and may use heavy machinery in the future. Eventually the project site is expected to be fully developed as the proposed roadway project would facilitate future planned residential development. This would limit opportunities for other future projects, and therefore the use of heavy machinery contributing to air quality impacts. Cumulatively, however, the impact on air quality from all future planned projects, including the proposed project, is not considered as significant due to the limited intensity and duration of construction.

5.12 Visual Resources

5.12.1 Description

Significant views and vistas within the area of the proposed project are identified in the CCH ʻEwa DP (2013) and include:

Significant Views and Vistas

1. *Distant vistas of the shoreline from the H-1 Freeway above the ʻEwa Plain;*
2. *Views of the ocean from Farrington Highway between Kahe Point and the boundary of the Waiʻanae Development Plan Area;*
3. *Views of the Waiʻanae Range from H-1 Freeway between Kunia Road and Kaloʻi Gulch, and from Kunia Road;*
4. *Views of Nā Puʻu at Kapolei, Pālailai, and Makakilo;*
5. *Mauka and makai views; and*
6. *Views of central Honolulu and Diamond Head, particularly from Puʻu O Kapolei, Puʻu Pālailai, and Puʻu Makakilo.*

5.12.2 Potential Impacts and Proposed Mitigation

No adverse impacts to scenic and visual resources are anticipated. Vistas of the shoreline from the Interstate Highway 1 (H-1) Freeway above the ʻEwa Plain and views toward Honolulu and Diamond Head would be mostly unaffected as the nature of the roadways project would

principally involve at-grade construction of roads and some below grade installation of utilities. Limited views of street lights and traffic signals for nighttime visibility and safety of roadways, however, may be observable but would not be considered to be an adverse negative impact to views. Views of the ocean and the Waiʻanae Range from Farrington Highway and other vantage points would similarly be unaffected and would not be considered an adverse negative impact.

The proposed project has been designed to be consistent with the master planned residential community for which the project roadways are being improved to Kalaeloa CDD and CCH standards to maintain safe and efficient mobility and access into, out of, and through the Kalaeloa neighborhood.

The project would not result in significant adverse secondary visual and aesthetic resource impacts. Upon the completion of construction, all equipment and personnel will be removed and the environmental conditions of the site will be permitted to return to existing conditions with no significant visual impact. No mitigation measures are anticipated to be required. Because other past, present, and reasonably foreseeable future actions are expected to be consistent visually with existing development no cumulative visual impacts are anticipated.

5.13 Socio-Economic Environment and Demographics

5.13.1 Description

Kalaeloa is situated within the ʻEwa region of the City and bounded by residential development to the north and east, and by the James Campbell Industrial Park to the west. Communities in the region, consisting of predominantly single-family residences, include Kapolei, Makakilo, Honokai Hale, ʻEwa Beach, ʻEwa by Gentry, ʻEwa Villages, Ocean Pointe, and other single and multifamily developments. Commercial areas, schools, and parks support the residential neighborhoods. The northeastern corner of Kalaeloa is adjacent to the Honouliuli Wastewater Treatment Plant. The State's Kalaeloa Harbor and the Ko Olina Resort are located west of the James Campbell Industrial Park. The recently constructed University of Hawaiʻi, West Oʻahu campus is located north of Kalaeloa in the eastern portion of Kapolei.

The Hunt Kalaeloa property slated for residential development is located along the northern perimeter of Kalaeloa between FDR Avenue and Saratoga Avenue, and the Kalaeloa Airport. The eastern portion of the property includes portions of the former Marine Corps Air Station ʻEwa. A linear east-west drainage basin and remnants of the former OR&L railroad forms a barrier between Kapolei and Kalaeloa along much of the north side of FDR Avenue.

There is an established residential community in Kalaeloa that rents apartments and homes that were once a part of the Marine Corps Air Station ʻEwa. The Kalaeloa Professional Center is home to various businesses and services, including a U. S. Army Medical Clinic. Additionally, the Federal Bureau of Investigation (FBI), Army National Guard, U. S. Coast Guard, and the Kalaeloa Airport, are all government agencies located in Kalaeloa that provide jobs for the community.

Kalaeloa is also home to businesses that include K-1 Speed Hawaiʻi and the Coral Crater Adventure Park catering to active families. White Plains Beach is a family friendly beach and is used for surfing and military Morale, Welfare and Recreation (MWR) program facilities are located near the coastline.

Much of the ʻEwa region was once dedicated to the cultivation of sugar cane up until the closure of the Oʻahu Sugar Company in the early 1990s. During the 1990s, the cane fields yielded to newly constructed homes with much of the new development east of Kalaeloa along Fort Weaver Road. The region is now home to approximately 70,000 people, while the larger Leeward Oʻahu area (ʻEwa, Central Oʻahu, North Shore and Waiʻanae) has nearly 300,000 residents.

The ʻEwa region is growing into a new urban center and is the location on Oʻahu most likely to accommodate population growth. While the Oʻahu-wide population increase is forecast at 1.6 percent annually, ʻEwa could experience a 3.6 percent average annual growth rate. Of the 200,000 additional residents expected on Oʻahu (between 2000 and 2025), about 30 percent are expected to live in the ʻEwa region. The City's ʻEwa DP contemplates a resident population in the year 2020 of almost 125,000.

Tourism is the primary economic engine of Oʻahu, but the public sector also plays a major role in the island's economy. According to the Hawaiʻi Tourism Authority, in 2012, the number of visitors to Oʻahu was 5,065,645, an 11.9 percent increase from 2011. This is 62.3 percent of all the visitors to the state in 2012. Visitors that year expended $7.7 billion on Oʻahu.

According to the U.S. Census American Community Survey, median household income in the Site census tract was estimated at $86,085 (in 2014) and per capita income was $22,235 (in 2014). Median household income in Honolulu County was $91,139 and per capita income was $30,735.

5.13.2 Potential Impacts and Proposed Mitigation

The economic viability and potential for growth of the Hunt Kalaeloa Community and ʻEwa neighborhoods are closely tied to the capacity of essential infrastructure. This includes the proposed Kalaeloa subdivision roadways project. The economic impact is expected to be favorable based on the benefit of promoting more efficient use of the roadway system, and the improvement of connectivity with the surrounding transportation network.

In the short term, construction expenditures will have a beneficial impact on the local construction industry, and construction activities will benefit the community indirectly through the creation of jobs.

In the long term, improving the condition of the Kalaeloa transportation network will provide for more efficient access to and from employment centers as well as to schools, services, and community and recreational activities including shopping. In turn, this is expected to stimulate direct service-related expenditures.

Implementation of the proposed project will result in potential secondary beneficial impacts by stimulating local business enterprises and increasing local employment. Combined increased business activities will result in increased state revenues in the form of excise, individual, and corporate taxes.

Combined with other past, present, and reasonably foreseeable future actions the proposed project would support the local economy and anticipated increased area population. Because population growth on Oʻahu is anticipated to occur with or without implementation of the proposed project no significant adverse cumulative impacts to the socio-economic environment are anticipated.

5.14 Public Facilities and Services

5.14.1 Roads and Transportation

5.14.1.1 Description

The following section summarizes the Hunt Kalaeloa roadway, public transit, bicycle, and pedestrian system as described in a Traffic Impact Analysis Report (TIAR) conducted by Fehr and Peers in December 2017. Per a comment letter received by DTS on January 31, 2019 (File No. TP12/18-755262R), the report is provided in its entirety in **Appendix E**.

Roadway Network:

The TIAR prepared in 2017 analyzed the impacts of two residential development scenarios on Parcels 1, 2, and 3 on the surrounding transportation system. The report analyzed level of service[2] (LOS) at 12 intersections within and around the project site, and evaluated weekday morning (AM) peak (6:30 AM to 8:30 AM) and weekday evening (PM) peak (3:30 PM to 5:30 PM) hours for the existing conditions, Near Term (2020) Baseline Conditions, and Near Term (2020) plus Project Conditions. Traffic counts were collected during the weekday peak periods at the study intersections in December 2017, when local schools were in session. The following discussion summarizes the analysis of existing roadways within the project area provided in the TIAR.

<u>Mauka/Makai Roadways</u>

Kalaeloa Boulevard begins at Olai Street at the makai end and extends mauka of the H-1 Freeway to Farrington Highway. Kalaeloa Boulevard is located west of the project site and generally contains four lanes (two in each direction) with a raised landscaped median. The speed limit on this facility is 25 miles per hour (mph). Regional access is provided via the Kalaeloa Boulevard and H-1 interchange.

Fort Barrette Road extends from Farrington Highway in the makai direction to FDR Avenue and is generally bounded by residential units on the Diamond Head side of the road. Within the study area, it generally includes two travel lanes with a posted speed limit of 35 mph. The roadway widens at intersections to provide separate turn lanes. Fort Barrette is proposed to be widened to four-lanes from Farrington Highway to the Barbers Point Gate.

Wakea Street connects H-1 and Farrington Highway to Kapolei Parkway. This roadway has four lanes, two lanes in each direction, and is separated by a landscaped median with a posted speed limit of 25 mph. Additionally, the Wakea Street and H-1 interchange will be expanded to include new ramp connections, an off-ramp from ewa-bound H-1, a frontage road from Makakilo Drive to Wakea Street, and a new connection to ewa-bound Farrington Highway. A discontinuous segment of Wakea Street is located makai of Kapolei Parkway which would eventually connect Kapolei Parkway to FDR Avenue.

[2] Level of service (LOS) is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, with the least congested operating conditions, to LOS F, with the most congested operating conditions. LOS E represents “at-capacity” operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions.

The segment of Fort Barrette Road between Farrington Highway and the main gate serves the growing Villages of Kapolei residential area. Geiger Road west of Fort Weaver Road also serves portions of the ʻEwa by Gentry residential development, and the clubhouse for the Coral Creek Golf Course.

ʻEwa/Diamond Head Roadways

Farrington Highway is an ewa-Diamond Head major arterial that provides connection from Waipahu to Kapolei. It begins at H-2 in Waipahu and extends ewa-bound to Kapolei where it turns at Kamokila Boulevard Diamond Head of Manawai Street. Within the study area, Farrington Highway is generally a four-lane divided roadway and has a posted speed limit of 35 mph.

Kamokila Boulevard is generally an ewa-Diamond Head roadway that is located mauka of the project site and extends between Kapolei Parkway and Farrington Highway (approximately 350 ft Diamond Head of Manawai Street). The roadway has four lanes, two in each direction, and a raised landscaped median for most of its length. The roadway becomes Farrington Highway further Diamond Head. Within the study area, Kamokila Boulevard is generally fronted by retail on the mauka side of the roadway.

FDR Avenue starts at Kamokila Boulevard at the west end and extends Diamond Head where it transitions to Geiger Road at Essex Road. It has a posted speed limit of 25 miles per hour (mph) with unsignalized intersections at all cross streets. FDR Avenue is the mauka boundary of the project site.

Saratoga Avenue is a two-lane local road that starts at Boxer Road on the west side and extends Diamond Head bound to its current terminus at Independence Avenue. It has a posted speed limit of 25 mph and is immediately makai of the project site.

Existing intersection LOS during weekday AM and PM peak traffic at the study intersections are provided in Table 3 of **Appendix E**. The results of the LOS calculations indicate that all study intersections operate at an overall desirable service level (LOS D or better) with the exception of the following three analyzed intersections: Kapolei Parkway and Kalaeloa Boulevard, Fort Barrette Road and Kapolei Parkway, and Fort Barrette Road-Enterprise Street and FDR Avenue. The remaining 9 study intersections operate at a desirable LOS D or better at an overall intersection-level during both peak hours. However, it should be noted that it is possible for individual turning movements/approaches to operate below LOS D (the HDOT desired minimum operating level) even when the overall intersection is operating at a desirable LOS.

Ownership and maintenance of each roadway within the project site is illustrated in **Table 3-2**. In its comment letter on the project dated February 7, 2019, the CCH Department of Design and Construction (DDC) informed HCDA that Kapolei Parkway from Kalaeloa Boulevard to Kamokila Boulevard, Boxer Road, Hornet Street, and Saratoga Avenue were recently paved by the CCH.

Existing Transit Services

"The Bus" is Oʻahu's primary form of public transit provided by the CCH. This system provides access within the greater urban area of Honolulu, as well as in communities on the ʻEwa plain, North Shore, Leeward Coast, and Windward Coast. There are currently no bus stops or transit services directly serving the project site. The closest bus stop is located approximately 0.4 miles

from the project site in the mauka-ewa direction, near the intersection of Kapolei Parkway and Kalaeloa Boulevard. Additional transit services are provided on Haumea Street, Kamokila Boulevard, Fort Barrette Road, Kalaeloa Boulevard, FDR Avenue east of Fort Barrette Road, and Kapolei Parkway east of Fort Barrette Road. Transit service is expected to be expanded with increased adjacent development, especially with the future expansion of the HART rail project. The planned East Kapolei rail station will be located approximately 2.7 miles northeast of the project site.

There are eight (8) fixed-route bus lines that serve the study area:

- Route C
- Route 40
- Route 41
- Route 411
- Route 412
- Route 413 (peak periods only)
- Route 414
- Route 415 (peak periods only)

Existing Bicycle Facilities

Bicycle facilities generally consist of three types of facilities, which are outlined below:

- Bike or Shared Use Paths provide a completely separate ROW and is designated for the exclusive use of bicycles and pedestrians with vehicle and pedestrian cross-flow minimized. Generally, the recommended pavement width for a two-directional shared use path is ten (10) ft.
- Bike Lanes provide a restricted ROW and are designated for the use of bicycles with a striped lane on a street or highway. Bicycle lanes are generally five (5) ft wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted.
- Bike Route or Signed Shared Roadways provide for a ROW designated by signs or shared lane pavement markings, or “sharrows,” for shared use with pedestrians or motor vehicles.

Currently, no bicycle infrastructure is provided on or within the direct proximity of the project site, though existing bicycle facilities do serve adjacent community areas. Class II bicycle lanes, which provide for a striped lane for one-way bike travel on a street or highway, are present along both sides of Kapolei Parkway, Kamaʻaha Avenue, Kamokila Boulevard, and Wakea Street.

Existing Pedestrian Facilities:

Pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals at signalized intersections. Pedestrian facilities do not currently exist within the project site since Parcels 1, 2, and 3 consist of vacant and/or underutilized land. However, all study intersections have pedestrian facilities and connect to the sidewalk network on one or more of the approaches. The one exception is the intersection of FDR Avenue and Copahee Avenue. There are no sidewalks or crosswalks present at this intersection.

The following streets have sidewalks along both sides:

- Kamokila Boulevard

- Wakea Street
- Manawai Street
- Nau Place
- Alohikea (north of Haumea)
- Haumea Street
- Ala Kahawai Street (east of Wakea)

5.14.1.2 Potential Impacts and Proposed Mitigation

The major source of disturbance to traffic is anticipated from construction activities during deliveries and transit of vehicles to and from the job site. Occasional increases in construction traffic may also result from the periodic movement of vehicles to and from the job site to dispose of demolition debris. Safe driveway access into and out of existing operations including those of Barbers Point Elementary School and Wakea Gardens apartments, would be temporarily impacted during regular school morning rush hours as drivers may experience minor delays during peak construction, especially along FDR Avenue, Copahee Avenue, and Hornet Street.

These impacts however will be short term in duration and will cease with the completion of the road improvements. Mitigative measures will include the planning of construction activities during the daytime hours with no night work anticipated to be required, and the use of flagmen and/or traffic controls to maintain accessibility for businesses and residents who may use the surrounding area roads. As recommended by DTS, construction materials and equipment will be transferred to and from the project site during off peak traffic hours (8:30 AM to 3:30 PM) to minimize any possible disruption to traffic on the local streets, and after the morning school rush to minimize impacts to schools in the area. A Traffic Management Plan (TMP) including BMP controls and ADA compliance requirements would be prepared for review and approval by appropriate State and CCH agencies, including DTS and DPP. The TMP would be implemented by the contractor to ensure unimpeded traffic flow through the Kalaeloa neighborhood to minimize traffic circulation problems. Any damage to State and CCH-owned roadways caused by the project would be repaired to current CCH standards as well as meet ADA requirements. Project plans (interior and exterior layouts, vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, reduced-width traffic lanes, etc.) would be reviewed and approved by the Disability and Communication Access Board to ensure full compliance with the ADA. The contractor would obtain street usage permits from DTS for any construction-related work that may require temporary closure of any traffic lane on a CCH street. Hunt and its contractor would continue to apprise the Kapolei/Makakilo/Honokai Hale Neighborhood Board No. 34, area businesses and schools, emergency services, and OTS of its construction plans, schedule, and any changes throughout the project planning and implementation process.

In the long-term, eight of the 12 study intersections analyzed as a part of the TIAR are forecasted to operate at LOS D or better under the Near Term (2020) Baseline Conditions. Projected LOS reported in the TIAR is provided in Table 6 of **Appendix E**. Intersections projected to operate at LOS E or F include the following: Kapolei Parkway and Kalaeloa Boulevard, Kapolei Parkway and Wakea Street, Fort Barrette Road and Kapolei Parkway, and Fort Barrette Road and FDR Avenue. The majority of the poorly operating movements are left-turn movements. The project includes improvements to these intersections, including the construction of left turn lanes two intersections, installation of traffic signals, and lane restriping. These improvements would serve

as mitigation for projected lower LOS operation at these intersections, especially improving operation on Kamokila Boulevard, FDR Avenue, and Fort Barrette Road. Additionally, the realignment of Boxer Road may eliminate one of two driveways into Barbers Point Elementary School. During further design of the project, Hunt will work with the DOE to ensure that an alternative access is provided and that adverse impacts will be avoided. The proposed project's long-term contribution to cumulative impacts is anticipated to be minimal, when taken in concert with other past, present, and reasonably foreseeable future actions. The proposed project would result in short-term cumulative effects to the regional transportation of the area, however, cumulative impacts to transportation would not be considered significant.

The proposed project is not expected to substantially increase the walking, biking, or transit demand to a level where it could not be accommodated by existing or planned facilities, nor is it expected to conflict with any existing facilities and planned improvements. In the long term, the proposed project would confer a beneficial impact in terms of transportation as better pedestrian, bicycle and traffic flow would be facilitated. The project would support Hunt's planned residential development on Parcels 1, 2, and 3, and would be utilized by the growing Kalaeloa community. The development is expected to enhance and promote multi-modal facilities and services, especially the use of passive and active spaces and non-motorized modes. The improvements to and along roadways, along with utility systems and drainage improvements provided by the proposed project would offset a cumulative projected decline in safe access within the project extents. The proposed project would not result in significant adverse cumulative transportation impacts.

5.14.2 Utilities

A portion of the utilities within the Kalaeloa CDD that were once part of the BPNAS is described as follows:

5.14.2.1 Description

Electrical Supply

Existing Electrical System – The existing electrical distribution system on the former BPNAS is owned and operated by the Navy. Electrical power is received through a Hawaiian Electric Company (HECO) substation located near the main gate along the northern property line. Power distribution is through a combination overhead and underground power lines (Department of the Navy, 2011). Hawaiian Telcom and Oceanic Time Warner Cable (now Spectrum) and Sandwich Isles provide telephone and broadband internet cable service.

Proposed Electrical System – The proposed electrical power for Parcels 1, 2, and 3 will be from a HECO source located at Kamokila Extension on the makai side of the OR&L railroad tracks. Cable will be provided by the existing Hawaiian Telcom system.

Water Supply

Existing Water System – The former BPNAS potable water system consists of a deep well pumping facility, treatment facilities, two underground storage tanks, a transmission main line and associated distribution lines. The source well is located approximately 3 miles north of the former BPNAS.

The Kalaeloa Water Company recently acquired the Navy water system which had been operating in "caretaker mode." The Kalaeloa Water Company has invested resources to repair leaks and bring the water system to an acceptable level. Potable water is currently in use throughout Kalaeloa.

Proposed Water System – While the Honolulu Board of Water Supply (BWS) does not have a water system within the project site, the existing Kalaeloa water system will require improvements to meet BWS Standards to accommodate the anticipated water demand from the future development of Parcels 1, 2 and 3.

The new Kalaeloa water system will be constructed to BWS Standards. The proposed water lines will be designed to meet fire and domestic flow demands, and will be designed in a loop system around each of the parcels slated for development.

The proposed Kalaeloa water system will split potable and non-potable water uses. Potable water will be provided by the Kalaeloa Water Company and non-potable water will be provided by the BWS. The proposed project will connect to the BWS non-potable water system along the west Kalaeloa project boundary, approximately 1,000 lf makai of FDR Avenue. Water supply approved CCH, capable of supplying the required fire flow for fire protection, shall be provided.

Wastewater

Existing Wastewater (Sewer) System – The majority of Kalaeloa's sewer collection system is assumed to have been built in the early 1940s at about the time that BPNAS was being established. The collection system was constructed according to Navy design standards and may not comply with City standards. The wastewater collection system is currently owned, operated, and maintained by the Kalaeloa Water Company.

The existing sewer system consists of:

- Over 15 miles of gravity sewer lines ranging in size from 6-inches to 30-inches in diameter;
- Approximately 475 sewer manholes (SMHs);
- 12 sewage pump/lift stations; and
- Approximately 7 miles of 4-inch to 18-inch diameter gravity and force mains.

Most of the existing wastewater flows are generated in the northern housing areas and downtown industrial area, located north of Midway Road. Sewage from this area is collected into one of two main sewer lines located along Midway Road before converging north of Kalaeloa Airport into a 30-inch gravity pipe which then conveys flows beneath the airport runways into the main wastewater pump station (WWPS BP-071) near the southern shore line. WWPS BP-071 conveys sewer flows through an existing force main (FM) located along Coral Sea Road and subsequently discharges into the City's sewer system at SMH #653822 on FDR Avenue across from the Honouliuli Waste Water Treatment Plant (HWWTP). Wastewater is treated at this facility and is either disposed of through the Barbers Point Ocean Outfall or conveyed to the BWS Water Reclamation Facility, located adjacent to the HWWTP, for further treatment and reuse.

Proposed Sewer System – The Kalaeloa sewer system will require minimal modifications and upgrades to the existing sewer system to accommodate the anticipated sewage generated from future development of Parcels 1, 2, and 3. A proposed gravity sewer system consisting of

manholes and pipes will be provided within the proposed road right of ways to enable connection to the existing sewer system. The sewer system will be designed to meet City and County of Honolulu Sewer Standards.

Drainage System

Existing Drainage System – Kalaeloa is affected by the three major watersheds: the Kaloi Gulch watershed, Kapolei Village watershed, and the City of Kapolei watershed. Land development from the early 1990s to the present has impacted these watersheds due to changes to the area landscape, changed runoff flow patterns, and the generation of increased storm water quantities from urban development.

Offsite runoff from the City of Kapolei located above Parcels 1, 2 and 3 flows into the recently completed James Campbell Industrial Park (JCIP) drainage channel. Offsite runoff from the JCIP is not expected to impact Parcels 1, 2, and 3 since the offsite drainage system can carry runoff beyond the design flow.

Runoff within Kalaeloa (Barbers Point) is drained by drywells and excess storm water runoff sheet flows to coral pits located throughout Kalaeloa where it percolates into porous coral subsurface soils. The dry wells, which are classified as injection wells and are permitted through the DOH Drinking Water Branch Underground Injection Control program, do not currently conform to CCH standards (Department of the Navy, 2011).

Proposed Drainage System – The proposed Kalaeloa drainage system will meet CCH stormwater flow capacity requirements. However, it will not follow the CCH standards for storm drainage details but will be addressed with the planned development of a unique storm drainage system for Parcels 1, 2, and 3. This system will provide for roadway runoff to percolate into a high capacity paver where the stormwater will be filtered using filter fabric and choker rock, and stored in drainage runoff storage chambers. The stormwater held in the storage chambers would eventually percolate into the ground. The system would be maintained by a future association of the property and/or business owners.

Runoff from Parcels 1, 2, and 3, and excess runoff beyond the design storm will overflow into a stormwater drainage system where the flows will be directed to discharge into retention basins.

5.14.2.2 Potential Impacts and Proposed Mitigation

Above and below ground utilities and pipelines will be identified during the design of the proposed improvements project. The presence of utilities will be field verified prior to the start of the project and if required, will be removed and/or relocated. Any utility relocations and/or modifications will be coordinated with the affected utility company to minimize disruption of water, power, wastewater, telecommunications and other services.

Residents and area businesses will be notified prior to construction should any temporary disruption of utility service be required, i.e., if the proposed project requires disconnection of a water main, a standby tanker truck will be provided for the provision of water to residents and businesses. Prior to construction, HCDA will require all drawing submittals for the project include detailed BMPs for review and approval by State and CCH agencies as part of the project grading and construction permit process. Erosion control measures may consist of, but are not limited to, hydromulching grass seedling, erecting silt fencing/curtains, berms, and/or other applicable erosion control devices to prevent construction-related soils and silt from mixing with

storm water runoff. The project's compliance with CCH Storm Drainage Standards and Rules Relating to Water Quality will be verified during the review of construction plans. Once construction is complete, utility services will be restored. The proposed project would not result in secondary or cumulative impacts to water or wastewater resources.

5.14.3 Solid Waste

5.14.3.1 Description

Most residential and general commercial trash from Honolulu is hauled to the Campbell Industrial Park H-POWER (Honolulu Program of Waste Energy Recovery) Plant. This waste-to-energy plant processes over 600,000 tons of waste per year and produces up to 10 percent of Oʻahu's electricity. Residual ash and non-combustible construction and demolition debris, as well as industry waste is disposed of in a landfill. The two landfills on Oʻahu are the Waimanalo Gulch Sanitary Landfill, administered by the Department of Environmental Services, and the PVT landfill in Nānākuli, administered by the PVT Land Company (CCH Department of Environmental Services, 2005).

5.14.3.2 Potential Impacts and Proposed Mitigation

The construction of the proposed project is not expected to have long term impacts to solid waste facilities based on the limited scope and scale of work. Short-term impacts are anticipated in the form of construction debris that will be generated requiring disposal. The construction contractor shall be responsible for the disposal of construction debris at a CCH-approved disposal site.

The proposed project is not anticipated to generate a significant quantity of solid waste during planned construction activities. Solid waste that is generated will be disposed of in accordance with HAR, Chapter 11-58.1, Solid Waste Management Control. No secondary or cumulative impacts to solid waste facilities would occur from the implementation of the proposed project.

5.14.4 Police Protection

5.14.4.1 Description

The Honolulu Police Department (HPD)'s Kapolei police station is located at 1100 Kamokila Boulevard. The project site is in Patrol District 8, Sector 2. As of May 2012, HPD had 1,933 sworn officers (HPD, n.d.).

5.14.4.2 Potential Impacts and Proposed Mitigation

The proposed construction of the Hunt Kalaeloa subdivision roadways project would not result in an increase in demand for police protection services. No direct, secondary or cumulative impacts to police protection are anticipated or expected, and no mitigation measures are necessary or recommended.

5.14.5 Fire Protection

5.14.5.1 Description

Fire prevention, suppression, and protection services for all of Oʻahu is provided by the HFD. The Project Site is located adjacent to the Kapolei Fire Station. In 2013, the HFD employed over 1,100 firefighters (Honolulu Fire Department, n.d.).

5.14.5.2 Potential Impacts and Proposed Mitigation

The proposed Hunt Kalaeloa subdivision roadways project would not result in an increase in demand for fire protection services. The proposed project roadway improvements will comply with Kalaeloa Community Development Plan and all applicable CCH design standards to meet health and fire safety requirements, including the provision of fire apparatus access roads that meet county requirements and an accessible and reliable water source. The water supply and routing systems for the proposed project are being designed in accordance with all applicable Kalaeloa Community Development Plan and CCH standards. No direct, secondary or cumulative impacts on fire protection are anticipated or expected, and no mitigation measures are necessary or recommended.

5.14.6 Health Care and Emergency Services

5.14.6.1 Description

The nearest major medical facility is the Queen's Medical Center West Oʻahu, a 7.2-mile drive from the Site. Emergency medical service is provided by the City and County of Honolulu Emergency Services Department, Emergency Medical Services Division. This facility provides emergency care as well as clinic specialty services, generally excluding General Medicine and Family Practice. The largest hospital on the island is The Queen's Medical Center on Punchbowl Street, with 505 small care beds and 28 sub-acute beds. Queen's at Punchbowl is the only Level II trauma center in the Pacific Region and provides emergency, primary, and specialized care. Any trauma patients are transferred to Queen's, approximately six miles from the project site (The Queen's Medical Center, 2013). In addition, numerous privately operated medical/dental clinics and offices are located in the area to serve the local population.

5.14.6.2 Potential Impacts and Proposed Mitigation

The proposed roadway improvements to the Hunt Kalaeloa subdivision would not result in an increase in demand for health and emergency services. Post construction and upon completion of the proposed roadways, there would be an increased capacity to more efficiently access the existing medical facilities in the region. No direct, secondary or cumulative impacts on emergency services are anticipated or expected, and no mitigation measures are necessary or recommended.

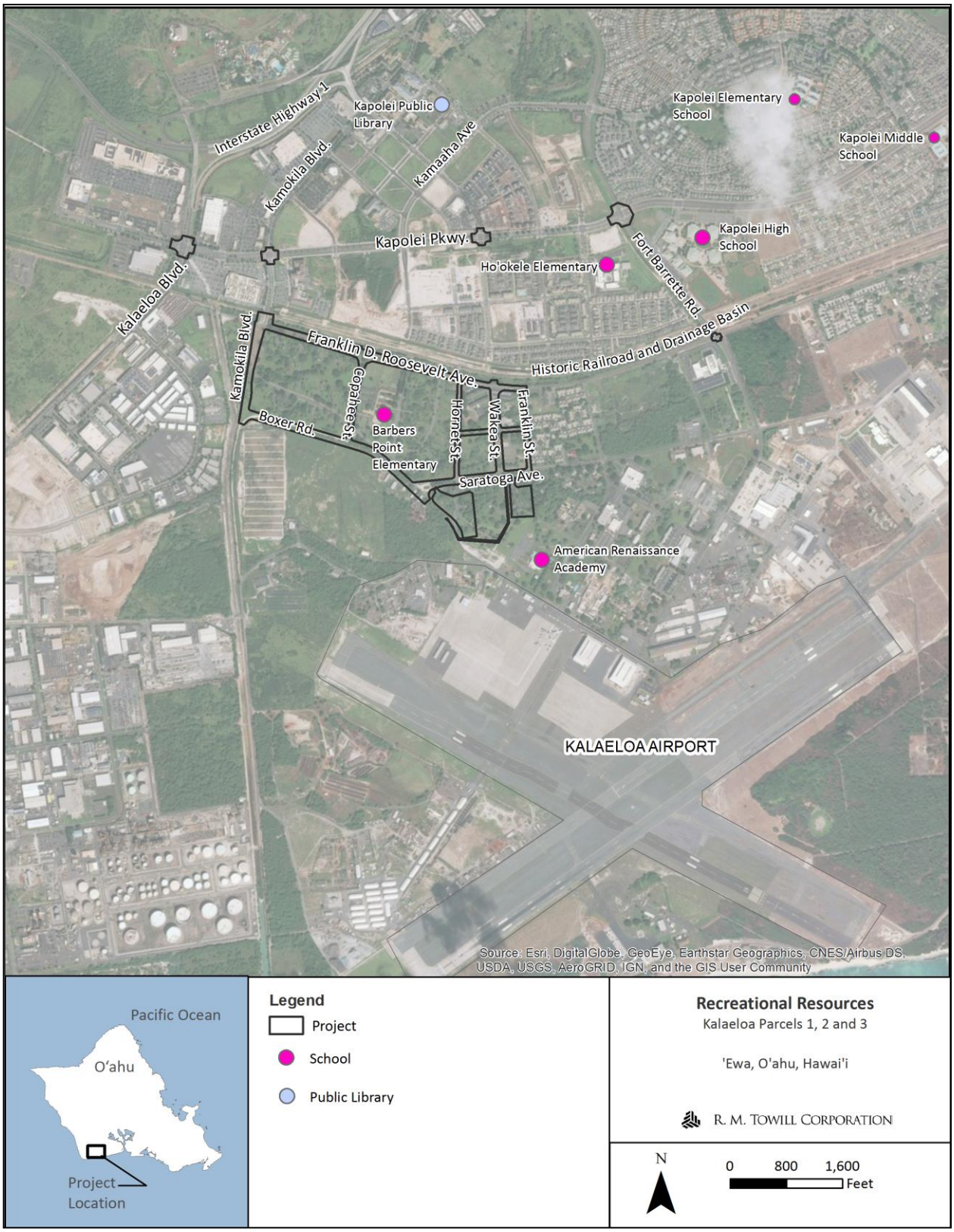
5.14.7 Schools and Libraries

5.14.7.1 Description

The project site is within the Leeward Oʻahu school district, in the Campbell-Kapolei Complex area. In addition to two high schools, the complex includes 12 elementary schools and three intermediate schools. The Barbers Point Elementary School is located within the project site with 496 students enrolled in the 2012-2013 school year. See **Figure 5-5, Schools and Libraries** for schools and libraries within 2 miles of the project site.

There are two private schools in Kapolei, the American Renaissance Academy and Island Pacific Academy, which enrolled 87 and 483 students, respectively, in 2014-2015 (Hawaiʻi Association of Independent Schools, 2016). Kapolei Charter School by Goodwill Hawaiʻi serves 49 students throughout grades 9 through 12, and is located 0.3 mile west of the western portion of the project site (Strive HI, 2018).

Figure 5-5, Schools and Libraries



In addition, higher education institutions in proximity to the project site include the University of Hawaiʻi, West Oʻahu, which enrolled 3,128 undergraduate students in 2018 (University of Hawaiʻi , West Oʻahu, 2018), and the Hawaiʻi Tokai International College, which enrolled 158 undergraduate students in 2016 (Hawaiʻi Tokai International College, 2016). Both are located approximately 2.8 miles northeast of the project site.

There are two public libraries in the vicinity, Kapolei north of the project site, and ʻEwa Beach to the east near the James Campbell High School.

5.14.7.2 Potential Impacts and Proposed Mitigation

Because the proposed project is to develop the subdivision roadways, the project is not anticipated to impact any schools or libraries.

During construction, the project may result in short-term disruption of vehicle traffic along roadways within the near vicinity or periphery of the project site. However, the project is not anticipated to obstruct or hinder access to nearby educational facilities, including the Barbers Point Elementary School. In the long-term, the realignment of Boxer Road may eliminate one of two driveways into Barbers Point Elementary School. During future planning and design of the project, Hunt will work with the DOE to ensure that an alternative access is provided and that adverse impacts will be avoided.

The proposed project would not increase nor decrease the provision of educational services to the community, and would not directly, secondarily, or cumulatively result in an increase in the area population, which would otherwise generate the need for school services.

5.15 Recreational Resources

5.15.1 Description

Diverse recreational opportunities are available in the surrounding region. The following recreational facilities are within two miles of the project site:

- Barbers Point Beach Park
- Barbers Point Golf Course
- Kapolei Community Park People's Open Market
- Kapolei High School Farmer's Market
- Kapolei Community Park
- Kapolei Regional Park
- Kamokila Community Park
- Koʻolina Beach Park
- Makakilo Neighborhood Park
- Mehana Neighborhood Park
- Nimitz Beach Park/Kalaeloa Beach Park
- Pearl Harbor National Wildlife Refuge
- Pointer Fields
- Pride Fields

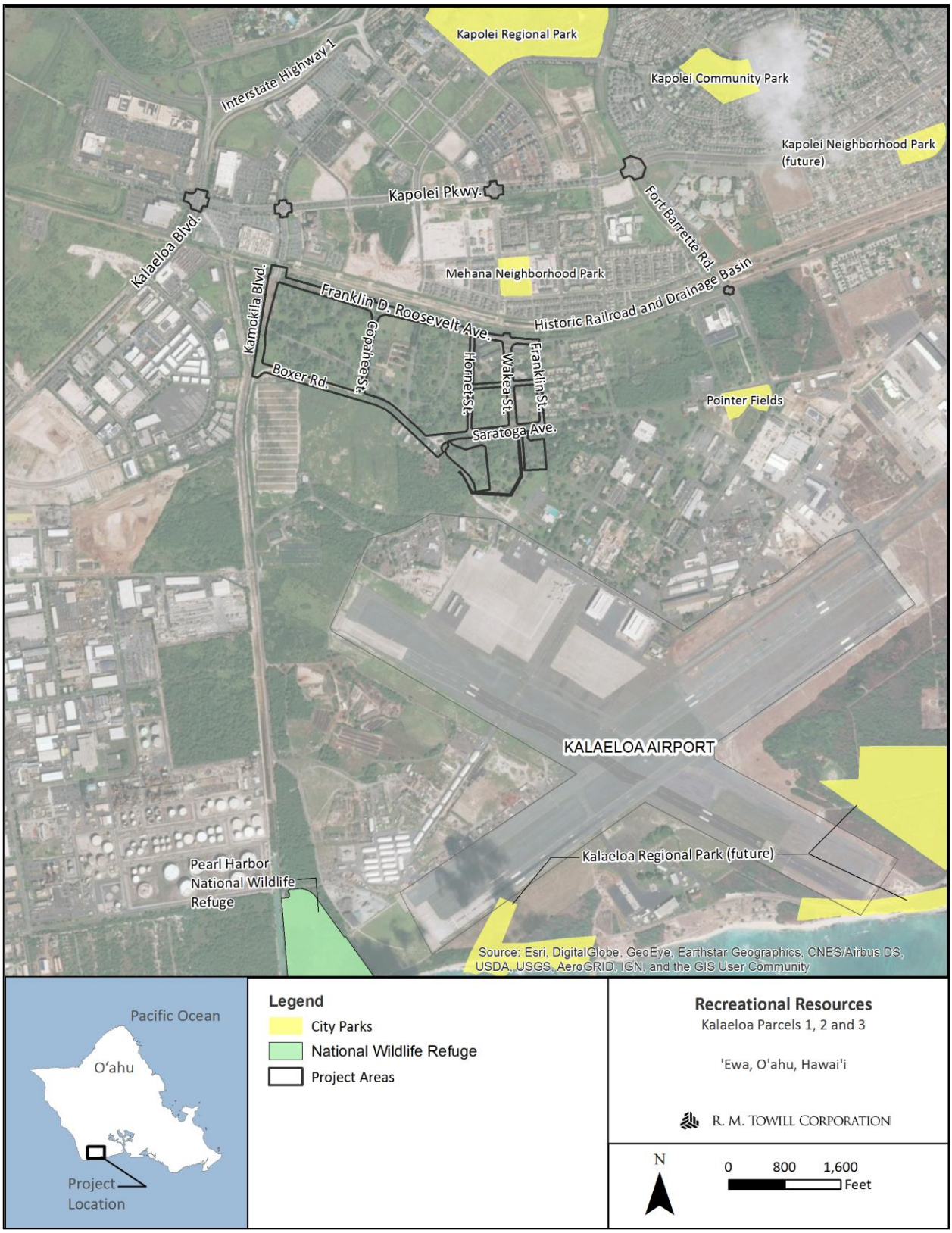
Most recreational resources are available for use by the general public. The parks and baseball fields are owned and managed by the CCH Department of Parks and Recreation (DPR). DPR is currently under a licensing agreement with the U.S. Navy for the Pointer and Pride Fields and the Nimitz Beach Park/Kalaeloa Beach Park, while the CCH owns the other parks listed above. The Pearl Harbor National Wildlife Refuge is owned by the U.S. and allows restricted, escorted public access.

The 2013 ʻEwa DP envisions a future Kapolei Neighborhood Park approximately 1.1 miles north east and Kalaeloa Regional Park approximately 1.5 miles south and southeast of the project site. The park would anchor the ʻEwa Open Space and Greenways Network proposed in the ʻEwa DP. See **Figure 5-6, Recreational Resources**.

5.15.2 Potential Impacts and Proposed Mitigation

During construction, the project may result in short-term disruption of vehicle traffic along roadways within the near vicinity or periphery of the project. However, the project is not anticipated to obstruct or hinder access to nearby recreational facilities.

Figure 5-6, Recreational Resources



Section 6
Cultural Impact Assessment

The use of the site for traditional or cultural practices is not expected based on the location of the planned project within a former military installation (BPNAS) that has been transferred to the State of Hawaiʻi and proposed for multiple uses including the subject proposed project for the construction of roads. The project area has been previously heavily modified with grading, paving, road and building construction activities. Plants found at the site are primarily introduced, exotic species not normally associated with cultural gathering or use activities. The edges of the paved areas at the site areas are heavily overgrown with weedy species such as lantana, *koa haole*, and various grasses.

The previously paved and otherwise developed condition of the site is also not conducive to the presence of *wahi pana* (storied places) or other sites or activities associated with the gathering of important native species that may include *tī*, flowering Hawaiian plants, or other species bearing fruit.

Based on the above, the potential for adverse direct, secondary, or cumulative effects to traditional or contemporary cultural practices is not anticipated. However, as noted in **Section 5.9.2**, because there is always the potential for the discovery of *ʻiwi* or other cultural remains, any inadvertent finds will immediately result in the cessation of work and the immediate reporting of the find to the SHPD at (808) 692-8015 (Main Office, Oʻahu). SHPD will provide further instructions regarding the treatment of the find and the conditions when work may be resumed.

Section 7
Relationship to Land Use Policies, Plans, and Controls

Federal Government, State of Hawaiʻi and City and County of Honolulu policies, plans, and land use controls are established to guide development in a manner that enhances the environment and quality of life. The establishment of policies, plans, and land use controls at all levels of government are further promulgated to help ensure that the long-term social, economic, environmental, and land use needs of the community and region can be met. The proposed project's relationship to land use policies, plans, and controls for the region and proposed activity are as follows.

7.1 State of Hawaiʻi

7.1.1 Federal Aviation Administration (FAA) Order 5190.6B

FAA Order 5190.6B sets forth policies and procedures for the FAA Airport Compliance Program. It provides basic guidance for FAA personnel in interpreting and administering the various continuing commitments airport owners make to the United States as a condition for the grant of federal funds or the conveyance of federal property for airport purposes. The Order discusses the obligations set forth in the standard airport sponsor assurances, addresses the application of the assurances in the operation of public-use airports, and facilitates interpretation of the assurances by FAA personnel. The order's intent is to ensure compatible land uses near federally obligated airports.

In the state of Hawaiʻi, the HDOT-Airports discourages such land uses that may attract hazardous wildlife within five statute miles of airport boundaries, pursuant to FAA Advisory Circular 150/5200-33B. As recommended by HDOT-Airports in their Draft EA comment letter dated January 23, 2019 (File No. DIR 1423 STOP 8.2580), projects within the five-mile airport boundary are advised to read the Technical Assistance Memorandum (TAM) File No. TAM-2016-1 published by the Department of Business, Economic Development and Tourism (DBEDT), Office of Planning (OP) and HDOT-Airports on August 1, 2016 for guidance with development and activities that may require further review and permits.

> <u>Discussion:</u> The project site is approximately 0.6 mile north of the Kalaeloa Airport, and is therefore located within the FAA-designated five-mile radius. The applicant will develop the project following the guidance set forth in TAM File No. TAM-2016-1 and as recommended by HDOT-Airports. The design and landscaping for the drainage improvements would not create conditions to attract wildlife. If wildlife is attracted to the project site, the applicant shall take appropriate measures to ensure proper mitigation of the potential wildlife hazard. Furthermore, the subdivision roadways project does not include the installation of photovoltaic panels or tall equipment; therefore, a glint and glare analysis is not required at this time. Hunt will continue to consult with HDOT-Airports regarding appropriate mitigation measures to ensure that the proposed project and future subdivision may not attract hazardous wildlife, glint/glare hazard, or aerial obstructions.

7.1.2 Hawaiʻi State Plan

The Hawaiʻi State Plan, adopted in 1978, and promulgated in HRS, Chapter 226, consists of three major parts:

> Part I, describes the overall theme including Hawaiʻi's desired future and quality of life as expressed in goals, objectives, and policies.
>
> Part II, Planning Coordination and Implementation, describing a statewide planning system designed to coordinate and guide all major state and county activities and to implement the goals, objectives, policies, and priority guidelines of the Hawaiʻi State Plan.
>
> Part III, Priority Guidelines, which express the pursuit of desirable courses of action in major areas of statewide concern.

The proposed project is consistent with the objectives and policies of the Hawaiʻi State Plan. Specifically, the proposed action will increase and diversify the State's economic base through building and upgrading roadway and drainage facilities necessary to support future residential development of Hunt Kalaeloa. An analysis of the project's ability to meet the objectives, policies, and priority guidelines of the Hawai'i State Plan are provided in **Table 7-1** below.

Table 7-1, Hawaiʻi State Plan Applicability to the Proposed Project

Hawaiʻi State Plan Objectives, Policies, and Priority Guidelines	Applicability to the Proposed Project
Objectives and Policies	
§226-5 Objective and policies for population	Not Applicable
§226-6 Objectives and policies for the economy--in general	Not Applicable
§226-7 Objectives and policies for the economy—agriculture	Not Applicable
§226-8 Objective and policies for the economy--visitor industry	**Applicable**
§226-9 Objective and policies for the economy--federal expenditures.	Not Applicable
§226-10 Objective and policies for the economy--potential growth activities	Not Applicable
§226-10.5 Objectives and policies for the economy--information industry	Not Applicable
§226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.	Not Applicable
§226-12 Objective and policies for the physical environment--scenic, natural beauty, and historic resources.	Not Applicable
§226-13 Objectives and policies for the physical environment--land, air, and water quality	Not Applicable
§226-14 Objective and policies for facility systems--in general	**Applicable**
§226-15 Objectives and policies for facility systems--solid and liquid wastes	Not Applicable
§226-16 Objective and policies for facility systems--water	Not Applicable
§226-17 Objectives and policies for facility systems--transportation	**Applicable**
§226-18 Objectives and policies for facility systems--energy	Not Applicable
§226-18.5 Objectives and policies for facility systems--telecommunications	Not Applicable
§226-19 Objectives and policies for socio-cultural advancement--housing	Not Applicable
§226-20 Objectives and policies for socio-cultural advancement--health	Not Applicable
§226-21 Objective and policies for socio-cultural advancement--education	Not Applicable
§226-22 Objective and policies for socio-cultural advancement--social services	Not Applicable
§226-23 Objective and policies for socio-cultural advancement--leisure	Not Applicable
§226-24 Objective and policies for socio-cultural advancement--individual rights and personal well-being	Not Applicable
§226-25 Objective and policies for socio-cultural advancement--culture	Not Applicable
§226-26 Objectives and policies for socio-cultural advancement--public safety	Not Applicable
§226-27 Objectives and policies for socio-cultural advancement--government	Not Applicable
Priority Guidelines	
§226-102 Overall Direction	**Applicable**

Hawaiʻi State Plan Objectives, Policies, and Priority Guidelines	Applicability to the Proposed Project
§226-103 Economic priority guidelines	Not Applicable
§226-104 Population growth and land resources priority guidelines	Not Applicable
§226-105 Crime and criminal justice	Not Applicable
§226-106 Affordable housing	Not Applicable
§226-107 Quality education	Not Applicable

The objectives, policies, and priority guidelines of the Hawai'i State Plan directly applicable to the proposed project are discussed in further detail below (emphasis added).

Section 226-8 Objective and policies for the economy-visitor industry.

(b) To achieve the visitor industry objective, it shall be the policy of this State to:
(1) Support and assist in the promotion of Hawaiʻi's visitor attractions and facilities; [and,]
(2) Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawaiʻi's people.

Discussion: The proposed project involves the improvement of roadways and drainage associated with the future proposed Hunt Kalaeloa residential development which would be consistent with the State HCDA Kalaeloa CDD plans and guidelines. The improvements will upgrade the existing roadways and provide connectivity for the planned residential development to the H-1 Freeway and provide for direct and safe connection to the future public transit station in Kapolei via Wakea Street.

Section 226-17 Objectives and policies for facility systems-transportation.

(a) Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:
(1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.
(2) A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State.

(b) To achieve the transportation objectives, it shall be the policy of this State to:
(1) Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in this chapter;
(2) Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives;
(3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties;
(6) Encourage transportation systems that serve to accommodate present and future development needs of communities;
(9) Encourage the development of transportation systems and programs which would assist statewide economic growth and diversification;
(10) Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaiʻi's natural environment;

(12) Coordinate intergovernmental land use and transportation planning activities to ensure the timely delivery of supporting transportation infrastructure in order to accommodate planned growth objectives.

Discussion: The proposed project will provide needed improvements to the Hunt Kalaeloa subdivision road system for access by vehicles and pedestrians within the Kalaeloa and Kapolei area to encourage the overall objective of statewide economic growth and diversification by providing a facility that will support planned expansion of housing opportunities and services for the growing communities in the ʻEwa district.

The design and development of this project will address the needs of the community and region through the selection of a site that is consistent with surrounding new and future urban land uses associated with the growing Kalaeloa community as envisioned by the State and Hunt. The project will be developed in accordance with all laws and regulations necessary to ensure against the potential for adverse environmental effects.

§226-102 Overall Direction

The State shall strive to improve the quality of life for Hawaiʻi's present and future population through the pursuit of desirable courses of action in seven major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, quality education, principles of sustainability, and climate change adaptation.

Discussion: The proposed project will maintain and enhance economic productivity by supporting the effective use of State lands to accommodate future growth in the real estate and public services industries. The project will further benefit the State of Hawaiʻi, and resident and visitor populations on Oʻahu by facilitating the efficient transportation of people and goods to, from, and among communities throughout Oʻahu, as a desirable place to live and visit.

7.1.3 State Land Use Law

The State Land Use Commission classifies all lands in the State of Hawaiʻi into one of four land use designations: Urban, Rural, Agricultural and Conservation. According to HRS, Chapter 205, State Land Use Law:

"Chapter 205, HRS, Districting and classification of lands:"

"(a) There shall be four major land use districts in which all lands in the State shall be placed: urban, rural, agricultural and conservation. The land use commission shall group contiguous land areas suitable for inclusion in one of these four major districts. The commission shall set standards for determining the boundaries of each district provided that:"

"(1) In the establishment of boundaries of urban districts those lands that are now in urban use and a sufficient reserve area for foreseeable urban growth shall be included;"

"In establishing the boundaries of the districts in each county, the commission shall give consideration to the master plan or general plan of the county."

> *(b) Urban districts shall include activities or uses as provided by ordinances or regulations of the county within which the urban district is situated.*

Discussion: The proposed action involves the use of land within the Urban and Agriculture State Land Use Districts. The proposed project involving the construction of roadway and drainage improvements, and appurtenances is consistent with these designations. See **Figure 7-1, State Land Use District**.

7.1.4 State Functional Plans

The State Functional Plans provide detail to the Hawaiʻi State Plan and guide State and County actions under specific functional areas. The proposed project is considered applicable to the Transportation Functional Plan.

The applicable objectives and policies of the Transportation Functional Plan are discussed below.

> ***Transportation***
> *Objective I.A: Widening of the transportation system; Policy I.A.1: Increase transportation capacity and modernize transportation infrastructure in accordance with existing master plans.*

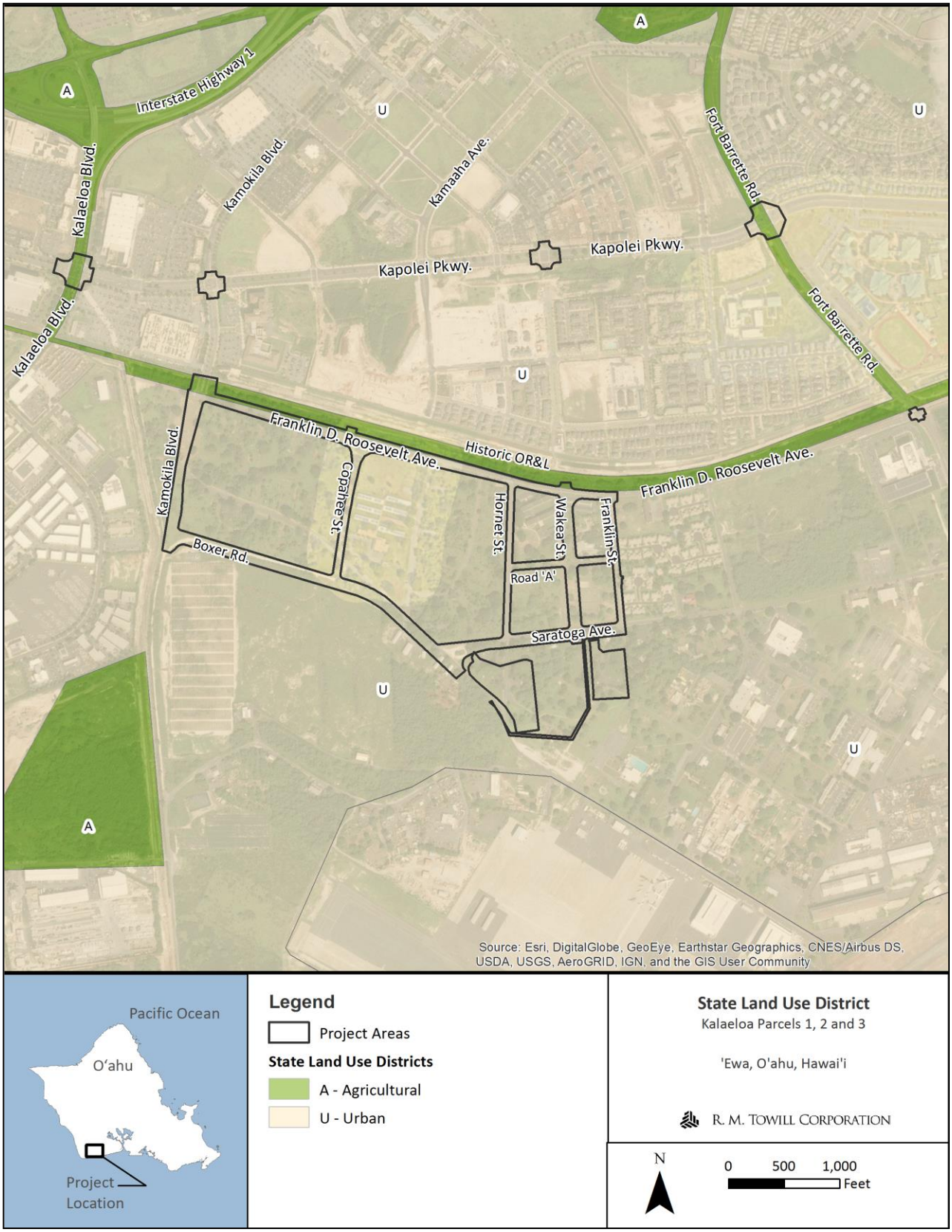
Discussion: The proposed project is designed to provide facility improvements to the existing Hunt Kalaeloa subdivision consisting of road, access, drainage, pedestrian access and related infrastructure systems. This improvement of existing roadway infrastructure will allow for continued long term uses that will support plans for Hunt to develop approximately 39 acres to support the HCDA Master Plan, which envisions a new sustainable community featuring residential development, educational, commercial and recreational activities.

7.1.5 Hawaiʻi Statewide Transportation Plan

The Hawaiʻi Statewide Transportation Plan (HSTP) provides the framework for the planning of Hawaiʻi's transportation system and includes: an extensive public involvement and outreach effort with a broad and diverse range of participants; collaboration with the modal divisions of the DOT and its County partners; and, a detailed research effort to ensure that all technical issues associated with the plan are fully analyzed and considered, and that applicable federal and state regulations are satisfied. The stated purposes of the HSTP are:

- To establish a framework for the development, integrated management, and operation of Hawaiʻi's multi-modal transportation systems, programs, and facilities; and
- To provide a foundation and identify the parameters within which the search for solutions can begin.

Figure 7-1, State Land Use District



The proposed project is consistent with the stated mission and the following goals of the HSTP:

> *Mission: To provide for the safe, economic, efficient, and convenient movement of people and goods.*
>
> *Goal I: Achieve an integrated multi-modal transportation system that provides mobility and accessibility for people and goods.*
> *Goal II: Ensure the safety and security of the air, land, and water transportation systems.*
> *Goal III: Protect and enhance Hawaiʻi's unique environment & improve the quality of life.*
> *Goal IV: Support Hawaiʻi's economic vitality.*
> *Goal V: Implement a statewide planning process that is comprehensive, cooperative, and continuing.*
>
> Discussion: The Hunt Kalaeloa roadway improvements will both promote the safe and efficient movement of vehicles, bicycles, pedestrians and the HART transit system through the Kalaeloa area and support economic vitality by making more efficient the movement of goods and products requiring transportation to and from the Kalaeloa community. The mauka bound extension of Wakea Street will support the safe movement of vehicles and bicycles to the future transit station in the Kapolei neighborhood adjacent to the Kalaeloa community.

7.1.6 Act 54, Session Laws of Hawaiʻi (SLH), Complete Streets

SLH, Act 54, Complete Streets was signed into law in 2009. The bill calls for context-sensitive solutions to enhance the accessibility and safety for users of multi-modal means of transportation. It calls for use of national industry best practices, including those delineated within reports by the American Planning Association and the National Complete Streets Coalition, when planning, designing, constructing, reconstructing, maintaining or improving public highways, roadways, streets, sidewalks, or anything related to accommodating walking, bicycling, mobility devices, transit and driving. If compliance with SLH, Act 54, becomes unreasonably burdensome to the developer, exceptions to compliance are provided under the Act. These exceptions to compliance include the use of a highway by non-motorized users, a use that is excessively disproportionate to the need or probable future use over the long term, the absence of current or future needs, and/or uses that place any group of multi-modal users at unacceptable risk.

> Discussion: The proposed project is compatible with and advances the priorities set forth in SLH, Act 54, Complete Streets. Existing roadways on the project site are dilapidated and have not been repaired since closure of the BPNAS in 1999. The proposed improvements to roadways would be designed to CCH standards, and therefore provide for bike lanes and incorporate Complete Streets design principles per Honolulu City Council Ordinance 12-15 (2012), fostering greater safety of pedestrians and bicyclists. Complete Streets principles incorporated into the typical roadway sections, as illustrated in **Figures 3-1, 3-2, and 3-3**, include bike lanes, planter strips, and sidewalks to create a pedestrian-friendly environment. The proposed roadways would be ultimately dedicated to the CCH per the 2001 and 2016 MOUs. The proposed action is a context-sensitive incorporation of Complete Streets because it would serve to address the long-term, safe, and accessible alternative transportation needs of Kalaeloa residents, and would not significantly alter the character of the landscape.

7.1.7 HCDA Kalaeloa Master Plan

The Kalaeloa Master Plan was prepared under the direction and guidance of the HCDA. The HCDA was established under the State Legislature in 1976 to supplement traditional community renewal methods by promoting and coordinating public and private sector community development. HCDA plans for and revitalizes urban areas in the State that have been identified by the Legislature to be in need of timely redevelopment. Its legislative mandate empowers HCDA with comprehensive planning, regulation, and development responsibilities.

Act 184 of the 2002 Hawaiʻi State Legislature transferred redevelopment responsibility for Kalaeloa CDD from the BPNAS Redevelopment Commission to the HCDA. HCDA published the Kalaeloa Master Plan in March 2006. The plan serves as an amendment to the Kalaeloa Community Redevelopment Plan, prepared as part of the U.S. Navy BRAC process. Act 184 of the 2002 Hawaiʻi State Legislature also redefined the boundaries of the Kalaeloa CDD to include the entirety of the former BPNAS so that the Kalaeloa CDD now includes the lands retained by the U.S. Navy, excess lands conveyed to other federal agencies, and the surplus lands designated for disposal. The Kalaeloa Master Plan now serves as the principal policy and planning document for HCDA's use in coordinating planning within the Kalaeloa CDD with federal, state, and county government agencies, developers, private landowners, and the community.

HCDA conducted a concentrated planning effort involving review of various planning reference documents, preparation of various environmental analysis reports, and extensive stakeholder and community outreach in preparation of its final plan. Chapter 3 of the plan describes the conceptual framework for developing the land use plan through an overview of the opportunities at Kalaeloa, including addressing regional traffic congestion. Chapter 4 describes the preferred land uses, while Chapter 5 summarizes the issues surrounding the successful implementation of the master plan.

> Discussion: The master plan recommends improvements to the road network within and adjacent to Kalaeloa as an opportunity to enhance regional connectivity. The plan supports ongoing roadway improvements in the Kalaeloa CDD and regional transportation plans, and in addition proposes the following improvements that would be undertaken as a part of the proposed project: 1) enhance vehicular circulation and connectivity with Fort Barrette Road and connections from Kalaeloa to the H-1 Freeway, and 2) extension of Kamokila Boulevard from the City of Kapolei into Kalaeloa. Vehicular circulation and connectivity would be improved through the installation of traffic signals and lane restriping where Fort Barrette Road intersects with FDR Avenue and Kapolei Parkway. Additionally, the plan involves the extension of Kamokila Boulevard from FDR Avenue to Boxer Road.
>
> The master plan also proposes that bicycle trails and mass transit be integrated in roadway projects, and that a pedestrian-friendly environment be fostered. The proposed project would include bike lanes and sidewalks in accordance with HCDA rules set forth in HAR, Chapter 15-215-24, and with Complete Streets principles. See **Sections 7.1.6 and 7.1.9** for further discussion. Additionally, all roads would be designed to CCH standards, and will be ultimately conveyed to the CCH upon completion, as is outlined in the plan and in accordance with the MOUs signed in 2001 and 2016.

The proposed project is intended to support development of Hunt's Parcels 1, 2, and 3, which are identified as areas for moderate and high intensity mixed uses in Figure 4-1 of the Kalaeloa Master Plan. The proposed project would allow Hunt to lay the foundation of its residential mixed use development, which is also envisioned in the HCDA's plan for the Kalaeloa CDD.

7.1.8 HCDA Kalaeloa Master Plan – Draft Infrastructure Master Plan Updates (2010)

The 2006 Kalaeloa Master Plan noted that infrastructure master plan updates (IMPU) would need to be prepared and submitted to the CCH or local utility service provider for approval. The 2010 Draft IMPU, prepared by Fehr & Peers, is intended for submittal to the CCH for approval. HCDA is currently updating the 2010 Draft IMPU. Once approved, the draft IMPU would replace the Kalaeloa Master Plan Chapter 5.2, Infrastructure and Appendix B, Engineering and Infrastructure.

The Draft IMPU notes that existing roadways within the Kalaeloa CDD generally do not conform to CCH standards; therefore, all roadways to be dedicated to the CCH would need to be constructed to a CCH-approved road standard because ownership of all roads is intended to be transferred to the CCH. Fehr & Peers conducted traffic counts, recommended roadway sections, and determined road type, as shown in **Figure 7-2, Draft – Kalaeloa Roadway Concept**. The 2010 Draft IMPU designates special features for each road, including bicycle lanes for Kamokila Boulevard, Wakea Street, Boxer Road, Saratoga Avenue and parking lanes for Copahee Avenue. According to the draft roadway concept, Kamokila Boulevard is extending from FDR Avenue to West Perimeter Road, and Hornet Street is proposed to be exchanged for the Wakea Street Extension.

Discussion: The proposed improvements on FDR Avenue, Kamokila Boulevard, Copahee Street, Boxer Road, and Saratoga Avenue are consistent with the vision set forth in the 2010 Draft IMPU. However, the proposed project will not eliminate Hornet Street or extend Wakea Street, as proposed in the Draft IMPU. As previously stated, HCDA is currently updating the 2010 Draft IMPU. The update would reflect the proposed improvements by Hunt.

7.1.9 HCDA Kalaeloa CDD Rules (HAR, Chapter 15-215)

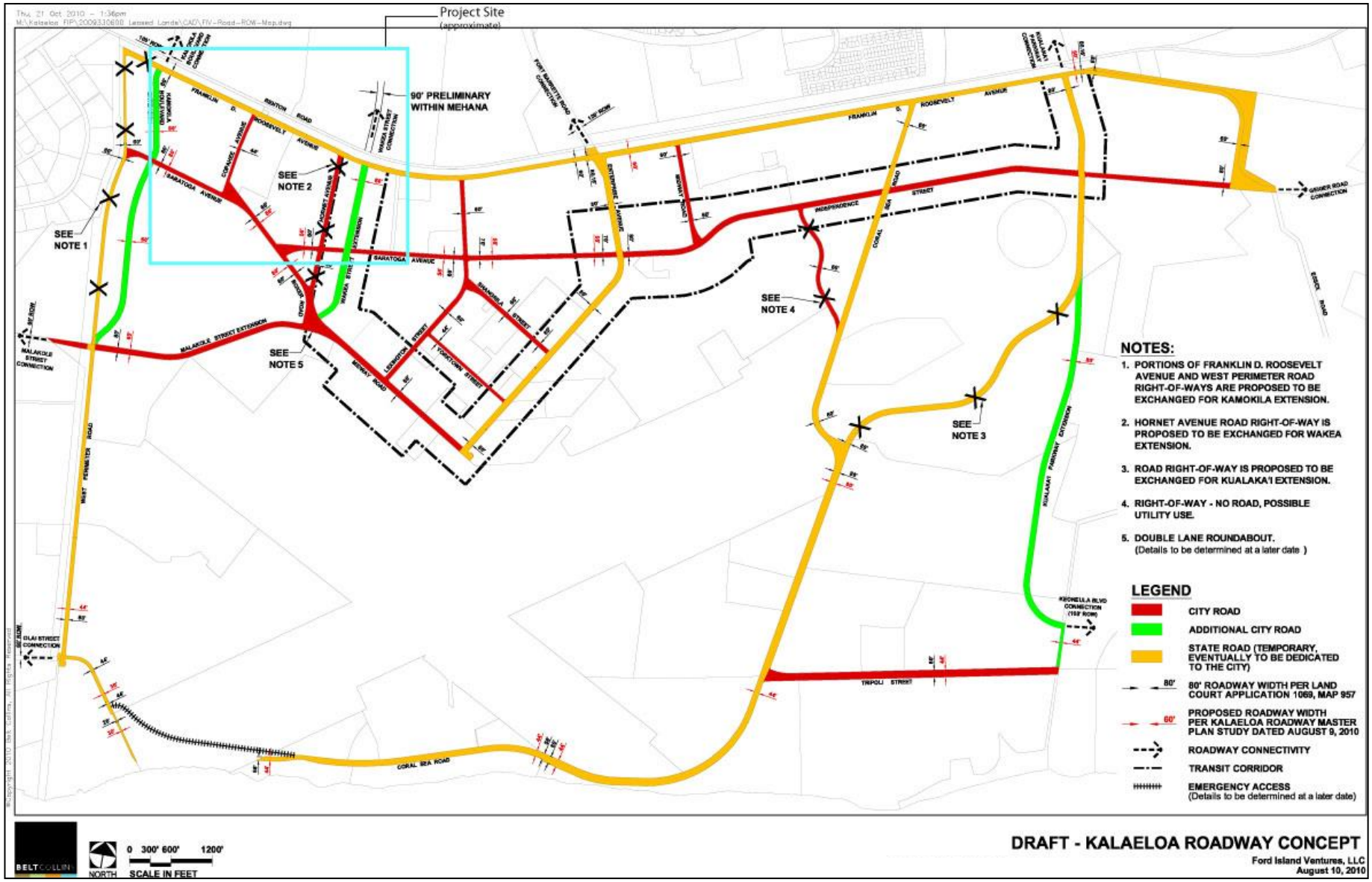
The rules in HAR, Chapter 15-215 are designed to promote and regulate the planned development of the Kalaeloa CDD, consistent with the policies and objectives of the Kalaeloa Master Plan and HRS, Chapter 206E, Hawaiʻi Community Development Authority. The rules are intended to protect and promote public health, safety, and general community welfare and protect and preserve places and areas of historical, cultural, architectural, and environmental importance and significance.

According to the rules, §15-215-3, "Applicability":

(a) This chapter, together with the KMP shall govern all real property within the Kalaeloa CDD.

(b) No building permit shall be approved by the authority for any project within the Kalaeloa CDD unless the project conforms to the provisions of the Kalaeloa Master Plan and this chapter.

Figure 7-2, Draft – Kalaeloa Roadway Concept



(c) If any provision of the (1) City and County of Honolulu land use ordinance, (2) 'Ewa Development Plan (Ordinance no. 97-49, as amended by ordinance no. 00-16), or (3) Naval Air Station Barbers Point Community Redevelopment Plan are inconsistent with these rules, then such provisions are hereby declared to be inapplicable to lots within the Kalaeloa CDD and these rules shall govern.

(d) Except as otherwise provided herein, all other rules, laws, and ordinances shall continue to remain applicable to the lots within the Kalaeloa CDD.

(e) The Kalaeloa sustainability guidelines should be utilized to promote sustainability and energy efficiency.

Lands within the Kalaeloa CDD are organized into six "Transect Zones" that "reflect the physical form and character of an area, according to the density and intensity of its land use and urbanism" (§15-215-8, Definition of Terms). The project site is designated within the T3 General Urban Zone and T4 Urban Center Zone transect zones. According to §15-215- 23, Transect zones, T3 zones are characterized by mixed use projects, and streets are intended to have curbs, sidewalks, and landscaping that define medium-sized, pedestrian-friendly blocks. The T4 zone is characterized by a mix of retail, office, residential, and civic buildings, and its streets are characterized by pedestrian-friendly streets which are tree-lined with sidewalks.

The Kalaeloa CDD Rules also stipulate that thoroughfares conform to the standards set forth in §15-215-24, Thoroughfare plan. The rules read as follows:

(b) Thoroughfare plan standards:

(1) Thoroughfares shall have street trees planted along their lengths within the public frontage area as provided in Figure 1.5 (street tree chart), dated September 2012, made a part of this chapter, and attached at the end of this chapter; and,

(2) Design conflicts between vehicular and pedestrian movement for new thoroughfares in the T3 general urban, T4 urban center and T5 urban center high intensity zones, shall generally be decided in favor of the pedestrian, unless there is overriding public interest which dictates that the conflict be resolved in favor of vehicular movement.

The Kalaeloa CDD Rules provide design guidance for thoroughfares, as illustrated in **Figure 7-3, Kalaeloa CDD Rules Thoroughfare Plan (Figure 1.4), Figure 7-4, Kalaeloa CDD Rules Thoroughfare Plan (Figure 1.4A),** and **Figure 7-5, Kalaeloa CDD Rules Thoroughfare Plan (Figure 1.4B)**.

Discussion: The proposed project involving the provision of drainage, access roadway, and pedestrian improvements to support the future Hunt residential community within the HCDA Kalaeloa CDD will be developed in compliance with these rules. Specifically, FDR Avenue, Kamokila Boulevard, and Wakea Street will include a median and bike lanes in each direction. The ultimate condition of Saratoga Avenue and Boxer Road will also include a median and bike lanes in each direction. Additionally, Copahee Avenue will include parking lanes in both directions, and thus conform to the Kalaeloa CDD Rules. All roadways would have minimum 5-foot wide sidewalks on each side to conform to the rules. See **Figures 3-1, 3-2,** and **3-3** of this reissued Draft EA for proposed typical roadway sections.

Figure 7-3, Kalaeloa CDD Rules Thoroughfare Plan

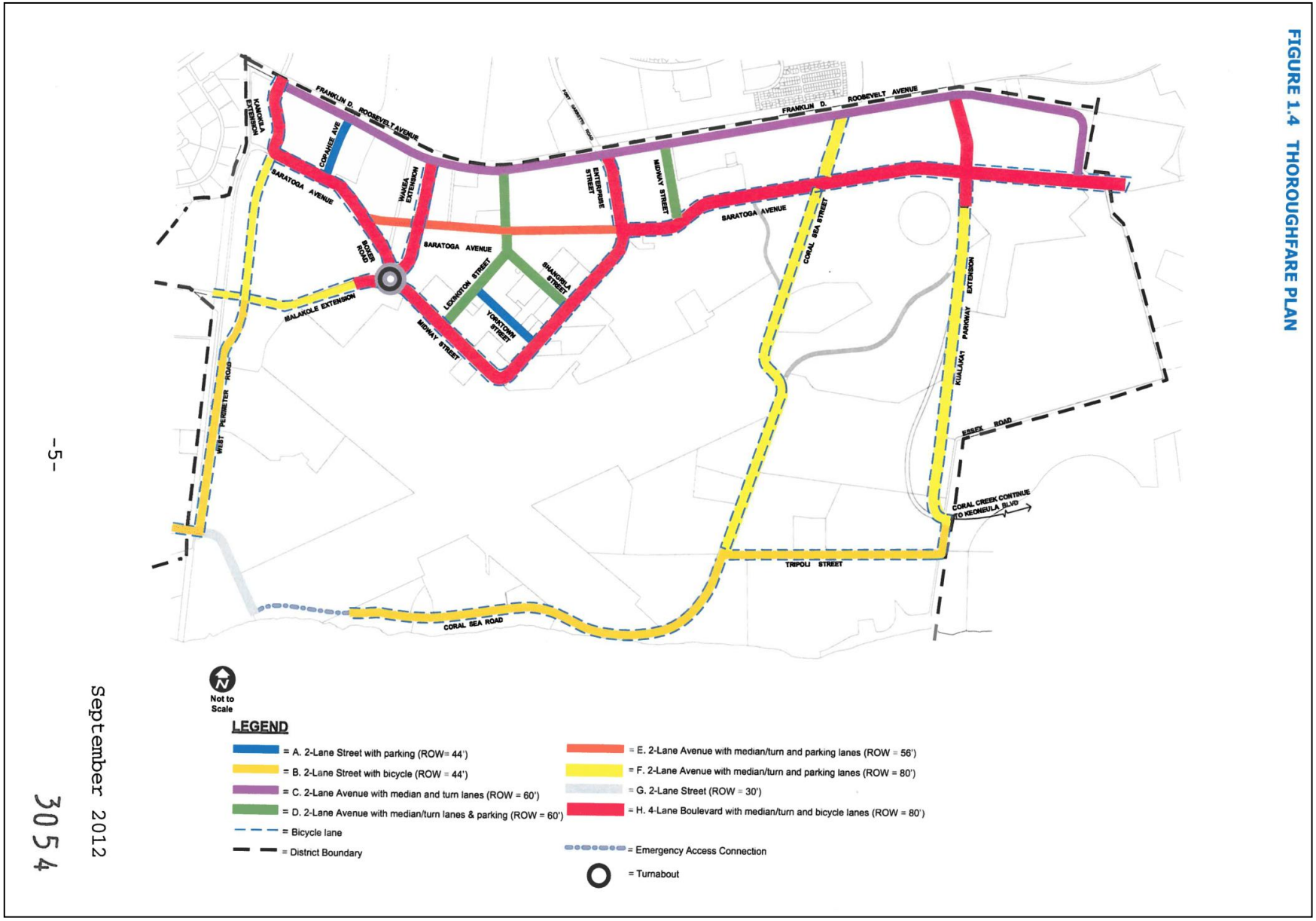
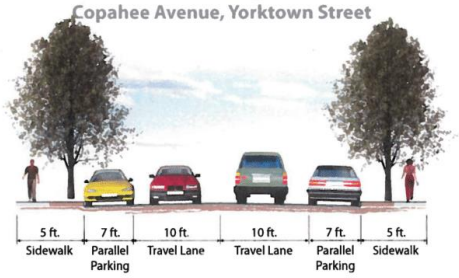


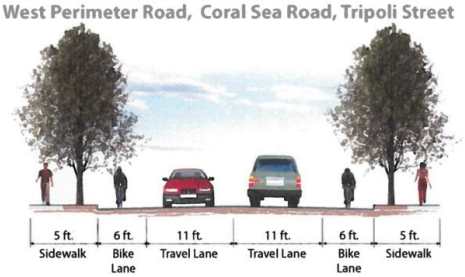
Figure 7-4, Kalaeloa CDD Rules Thoroughfare Plan (Figure 1.4A)

FIGURE 1.4A THOROUGHFARE SECTIONS

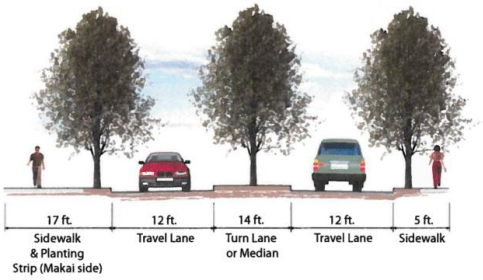
A. 2-Lane Street and Parking Lanes (ROW = 44')
Copahee Avenue, Yorktown Street



B. 2-Lane Street and Bicycle Lanes (ROW = 44')
West Perimeter Road, Coral Sea Road, Tripoli Street



C. 2-Lane Avenue with Median/Turn Lane (ROW = 60')
Franklin D. Roosevelt Avenue



D. 2-Lane Boulevard with Median/Turn Lane and Parking Lanes (ROW = 60')
Lexington Street, Shangrila Street, Midway Street

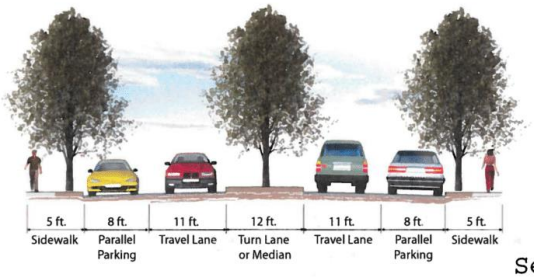


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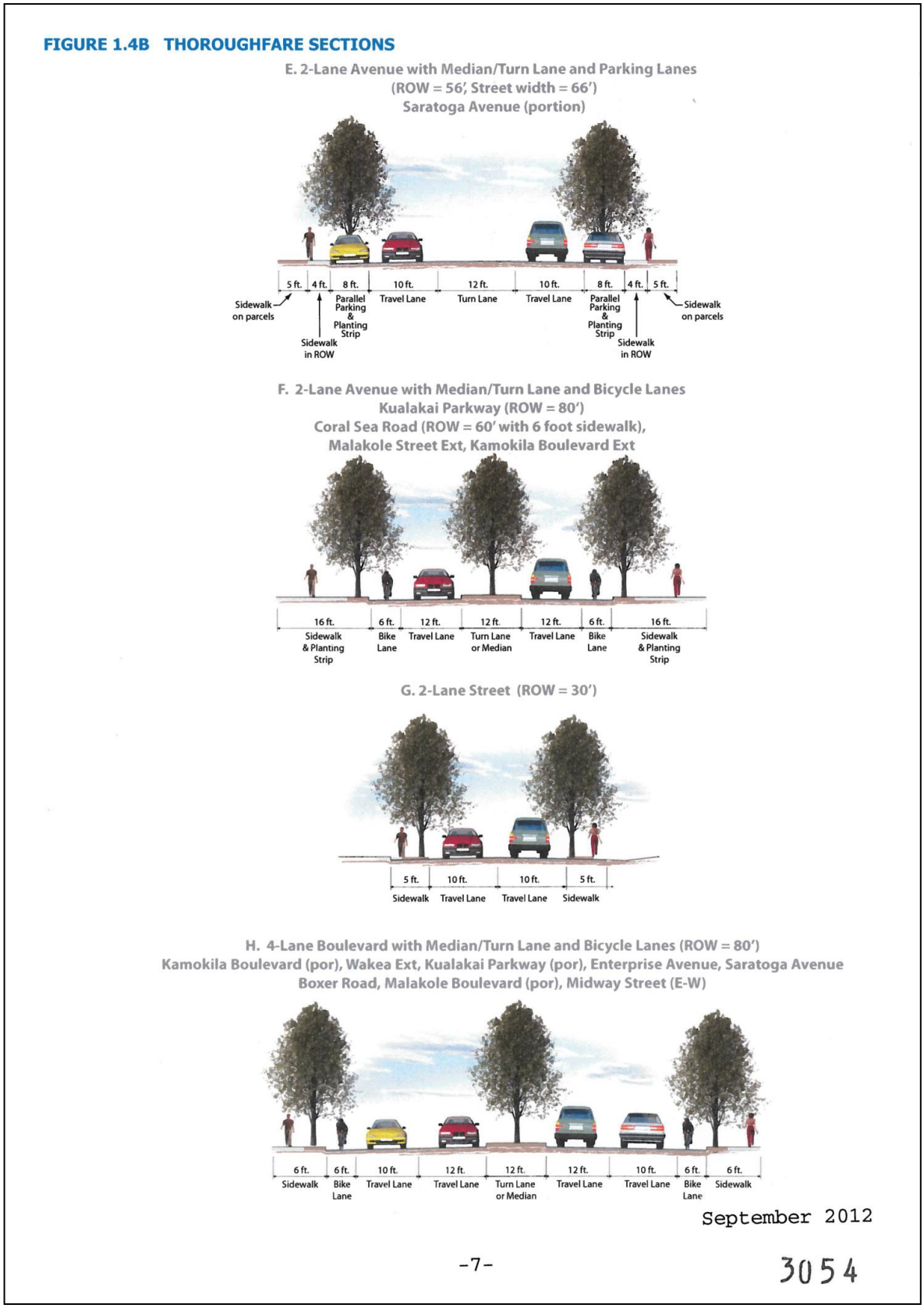
Figure 7-5, Kalaeloa CDD Rules Thoroughfare Plan (Figure 1.4B)



7.1.10 Kalaeloa Reserved Housing Rules (Hawaiʻi Administrative Rules, Chapter 15-216)

The Kalaeloa Reserved Housing Rules provides for the establishment of an increased supply of housing for low or moderate-income residents within the Kalaeloa CDD as a condition of new residential construction or redevelopment.

> Discussion: The rules governing the reservation of housing, although not strictly applicable to the proposed project involving the development of surface transportation infrastructure, would be applicable to the subsequent construction of housing envisioned in the Hunt Kalaeloa development (see **Section 7.1.7**).

7.1.11 Hunt Kalaeloa Strategic Implementation Plan

The Hunt Kalaeloa Strategic Implementation Plan, prepared by AECOM in June 2013, summarizes key development strategies over a 20-year period for the 538 acres of landholdings in Kalaeloa controlled by Hunt. By 2035, Hunt's plan for its holdings in Kalaeloa is projected to contribute toward the overall region's job and housing balance by creating more than 7,000 direct and indirect jobs, and more than 1,000 construction jobs and 4,000 homes. The 4,000 residences will be a mix of multifamily and single-family homes that will range from affordable to moderately price, for sale and as rentals. The plan outlines the approach Hunt intends to take in fostering community development and intended outcomes.

In addition to adopting the concepts set forth in the ʻEwa DP (DPP, 2013), Kalaeloa Master Plan (HCDA, 2006), and the Kalaeloa CDD District Rules/HAR, Chapter 15-215 (HCDA, 2012), the plan adopts the following six planning principles to guide the design and physical form of projects at Hunt's Kalaeloa properties:

- Principle 1: Create a Walkable Community
- Principle 2: Build a Strong Community Identity
- Principle 3: Celebrate and Connect to Cultural and Environmental Assets
- Principle 4: Strengthen Gateways and Edges
- Principle 5: Create and Economic Engine for the Area and its Residents
- Principle 6: Restore and Upgrade Infrastructure

> Discussion: The proposed project to construct and improve roadways and install associated utilities within the project site would fulfill the planning principles set forth in the Hunt Kalaeloa Strategic Implementation Plan, particularly Principle 6.Hunt will continue to work closely with HCDA, HDOT, and CCH, and will dedicate the roads to CCH upon completion of the project. All roads will be designed to conform to HCDA and DPP subdivision design standards, and would incorporate complete streets principles in order to support the walkable, sustainable community envisioned by Hunt. Proposed work on FDR and Saratoga Avenues will fulfill Principle 4 of the plan, which identifies the two roadways as the gateways into the community. The project represents a significant private investment that would benefit the wider community. When constructed, the project would allow Hunt to proceed with development of Parcels 1, 2, and 3.

7.1.12 Hunt Kalaeloa Plan

Hunt controls 538 acres of land in Kalaeloa. The *Hunt Kalaeloa Plan* draft prepared in January 2017 provides a vision for Kalaeloa for the westernmost holdings; Parcels l, 2 and 3 (G70, 2017). These lands which are makai of Kapolei's retail core and adjacent to Barbers Point Elementary School, are the ideal setting for a new residential community. Kalaeloa is a viable option for residences in West Oʻahu with a growing job creation center, and has the potential.to be both a gathering place and a destination. Kalaeloa's history as the former BPNAS will be integrated into the conversion of the former military base to a more vibrant, mixed-use community.

The future development of Hunt Kalaeloa will comprise a mosaic of several different neighborhoods and provide a diverse range of lifestyle choices and character. Characteristics of the community will feature connectivity to the future Leeward Bikeway that links the resorts and public beaches to the neighborhoods, organized sports for children and adults at community sports fields, neighborhood recreation centers, and schools that are part of the community programming that focuses on health and wellness opportunities for Kalaeloa residents.

> Discussion: A strong connection to the ʻEwa shoreline (makai), and to the unique landscape and open spaces of the area geology and environment will be made. The community character will be enhanced with connectivity to a future planned regional bikeway that will link the resorts and public beaches to the neighborhoods.

7.1.13 Special Management Area (SMA)

The CCH has designated the shoreline and certain inland areas of the island of Oʻahu as being within the SMA. SMA areas are designated sensitive environments and protected in accordance with the State's Coastal Zone Management policies, as set forth in HRS, Chapter 205A, Coastal Zone Management. See **Figure 7-6, Special Management Area**.

> Discussion: The project site is located approximately 1.3 miles north of the coastline fronting the former BPNAS which places it outside of the SMA. Therefore, no impacts to the SMA are expected.

7.1.14 Coastal Zone Management Act (CZMA)

All land and water use activities in the state must comply with HRS, Chapter 205A, Hawaiʻi Coastal Zone Law. The State of Hawaiʻi designates the Coastal Zone Management Program (CZMP) to manage the intent, purpose and provisions of HRS, Chapter 205(A)-2, as amended, for the areas from the shoreline to the seaward limit of the State's jurisdiction, and any other area which a lead agency may designate for the purpose of administering the CZMP.

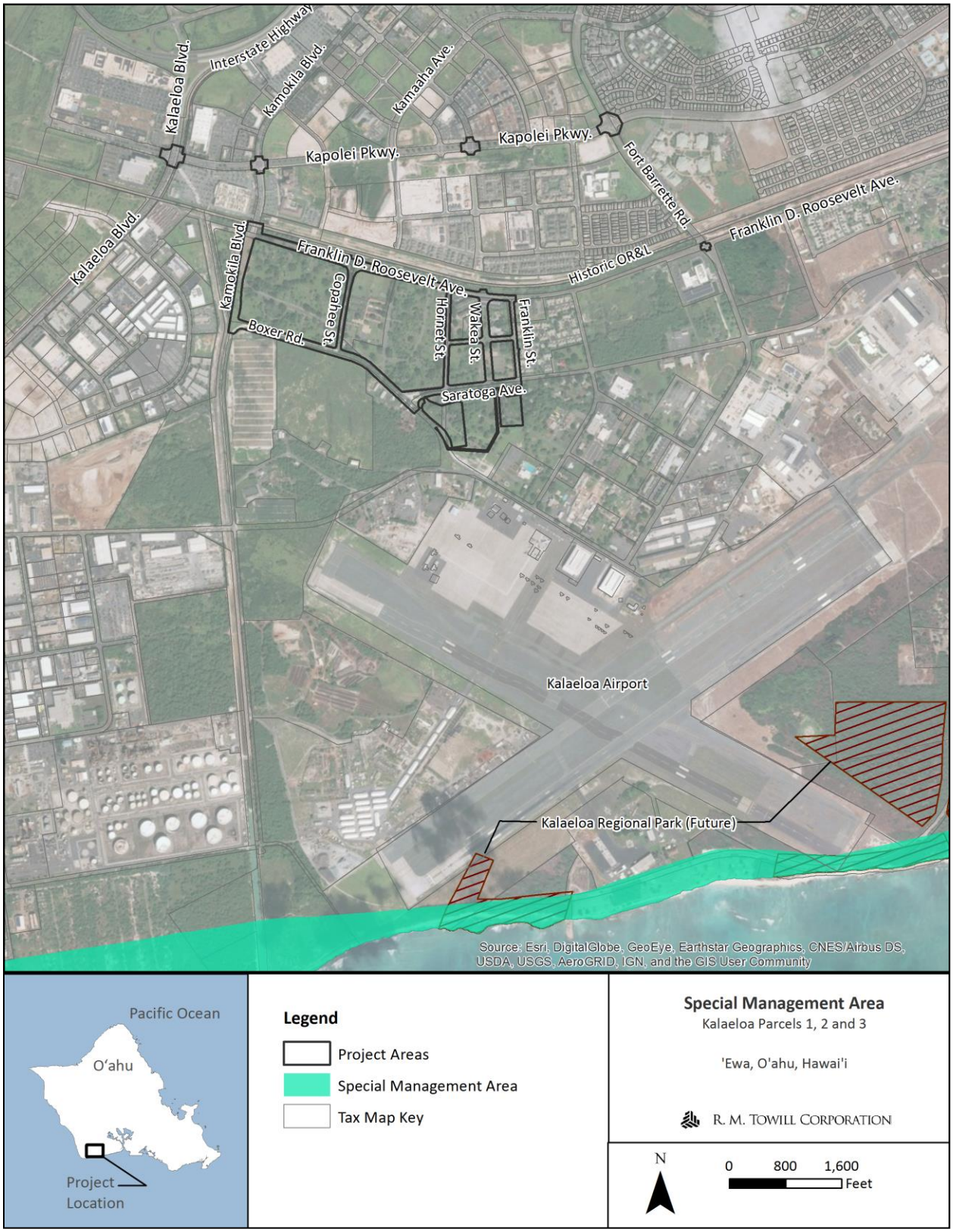
The following is an assessment of the project with respect to the CZMP objectives and policies set forth in Section 205(A)-2.

1. Recreational resources

Objective: Provide coastal recreational opportunities accessible to the public.

Policies: A) Improve coordination and funding of coastal recreational planning and management; and
B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

Figure 7-6, Special Management Area



(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;

(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

(vi) Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of section 46-6.

Discussion: As indicated in **Section 7.1.13** the proposed project is located approximately 1.3 miles mauka of the coastline fronting the former BPNAS. The proposed safety and access improvements proposed by the Hunt Kalaeloa subdivision roads would have no effect on existing access to and from public recreational areas including Kalaeloa Regional Park.

Existing recreational uses currently occur within the immediate area surrounding Kalaeloa and ʻEwa Beach, and the proposed project is not expected to adversely affect the continuation of these uses.

2. Historic resources

Objective: Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies: (A) Identify and analyze significant archaeological resources;

(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and

(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Discussion: There are no archaeological or cultural resources known to be present within the immediate project site. However, in accordance with HRS, Chapter 6E, and the requirements of the SHPD, should any historic resources, including human skeletal and significant cultural remains be identified during the construction of the proposed project, the following shall be implemented:

1. Work will cease in the immediate vicinity of the find;
2. The find will be protected from any additional disturbance by the contractor; and,
3. SHPD will be contacted immediately at (808) 692-8015 (Main Office, Oʻahu) for further instructions including the conditions under which work activities may resume.

3. Scenic and open space resources

Objective: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies: (A) Identify valued scenic resources in the coastal zone management area;

(B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural land forms and existing public views to and along the shoreline;

(C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

(D) Encourage those developments that are not coastal dependent to locate in inland areas.

Discussion: The potential for adverse visual impacts is anticipated to be minimal. The proposed project will involve the improvement of road facilities associated with use of the Hunt Kalaeloa subdivision and the existing neighboring Kapolei, ʻEwa Villages and Kalaeloa Airport. There will be the use of construction equipment and personnel, which are not expected to constitute an adverse effect to the surrounding viewplane. Public access will continue along Kamokila Boulevard, FDR Avenue, and Wakea Street; access to limited areas may be temporarily restricted from public access to maintain safety during the construction period. These activities will be only for a short period of time and will not result in any adverse permanent changes.

4. Coastal ecosystems

Objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies: (A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;

(B) Improve the technical basis for natural resource management;

(C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

(D) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

(E) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Discussion: Coastal ecosystems will not be affected by the project. No use of the coastal ecosystem will be required. During construction, BMPs will be employed to prevent potential pollutant (sediment) discharges into storm water runoff. These measures will be in place and functional before project activities begin and will be maintained throughout the construction period. When completed, the use of permanent storm water and erosion controls is expected to help improve upon current conditions.

5. Economic uses

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies: (A) Concentrate coastal dependent development in appropriate areas;

(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

(i) Use of presently designated locations is not feasible;

(ii) Adverse environmental effects are minimized; and

(iii) The development is important to the State's economy.

Discussion: The proposed project will provide needed improvement of existing roads and infrastructure systems within roadways that serve as the primary thoroughfares for a future Hunt subdivision. The proposed project is considered an investment in Hunt Kalaeloa that will provide environmental benefits in the form of reduced discharges of storm water associated sediments in runoff and the improvement of roadway conditions from reduced ponding and sheetflows of storm water across the site.

In the short term, construction expenditures will have an overall beneficial impact on the local construction industry, and construction activities will benefit the community indirectly through the creation of jobs. In the long term, there will be safe and efficient roadway conditions in the Hunt Kalaeloa subdivision and the surrounding community, which is consistent with policies regarding economic uses.

6. Coastal hazards

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

Policies: (A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;

(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

(D) Prevent coastal flooding from inland projects.

Discussion: The proposed project has been evaluated for potential impacts associated with natural hazards including flooding, erosion, and nonpoint source pollution hazards. Natural hazards such as hurricanes, flooding, and tsunami are unavoidable for all coastal areas. Accordingly, all structures proposed for this project will be built, at a minimum, according to equivalent standards for the area's flood zone. To mitigate from hurricanes, the project will ensure that improvements are designed to present building codes which offer some protection from damage.

Hunt will continue to coordinate with the CCH Civil Defense agency to implement and maintain established procedures in the event of a flood or tsunami. It is noted that no habitable structures are proposed that would constitute an unreasonable risk to life or property. Given the requirement for the proposed project to be located within proximity of the shoreline, the proposed use is considered reasonable and is not anticipated to have a significant impact on flood conditions.

7. Managing development

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies: (A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

(B) Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and

(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Discussion: The proposed project conforms to all State of Hawaiʻi regulations. A comprehensive list of permits that may be required is provided in **Section 8** of this reissued Draft EA. While the proposed project site is within the coastal zone, no coastal resources will be adversely affected.

8. Public participation;

Objective: Stimulate public awareness, education, and participation in coastal management.

Policies: (A) Promote public involvement in coastal zone management processes;

(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and

(C) Organize workshops, policy dialogues, and site-specific mitigation to respond to coastal issues and conflicts.

Discussion: The provision for public participation will be provided through the environmental review process as required in HRS, Chapter 343. Public comments will be received during the public comment period associated with the filing of the Draft EA. In addition, should any environmental permit applications be filed for the project, all permits will be subject to governmental agency and public review as required under law.

9. Beach protection;

Objective: Protect beaches for public use and recreation.

Policies: (A) Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;

(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Discussion: The proposed project does not involve nor require the direct use of beaches. Shoreline resources are not present in the subject area as the project site is about 1.3 miles mauka of the shoreline.

10. Marine resources

Objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies: (A) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

(B) Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

(C) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

(D) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

(E) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Discussion: The proposed project does not involve the use or development of marine and coastal resources.

7.2 City and County of Honolulu

7.2.1 General Plan

The Oʻahu General Plan is the policy document for the long-range development of the island of Oʻahu. Adopted in 1977 and amended in 2002, the plan sets forth the long-range objectives and policies for the general welfare of the island over a 20-year time horizon. Combined with the regional development plans, the General Plan provides direction and framework to guide the programs and activities of the CCH.

The relevant goals, objectives, policies and implementing actions, along with a discussion of project conformance, are discussed below.

The proposed project is considered consistent with the following provisions of the GP:

Section V. Transportation and Utilities.

Objective A: To create a multimodal transportation system which moves people and goods safely, efficiently, and at a reasonable cost and minimizes fossil fuel consumption and greenhouse gas emissions; serves all users, including limited income, elderly and disabled populations; and is integrated with existing and planned development.

Policy 1: Develop a comprehensive, well-connected and integrated ground-transportation system that enables safe, comfortable and convenient travel for all users, including motorists, pedestrians, bicyclists, and public transportation users of all ages and abilities.

Policy 2: Provide multimodal transportation services to people living within the ʻEwa, Central Oʻahu, and Pearl City-Hawaiʻi Kai corridors primarily through a mass transit system including exclusive right-of-way rail transit and feeder-bus components as well as through the existing highway system.

Policy 4: Work with the State to ensure adequate and safe access for communities served by Oʻahu's coastal highway system.

Policy 6: Support the development of transportation plans, programs, and facilities that are based on Complete Streets features. Maintain and improve roads, bicycle and pedestrian facilities in existing communities to eliminate unsafe conditions.

Policy 7: Design street networks to incorporate greater roadway and pathway connectivity.

Policy 8: Make transportation services safe and accessible to people with limited mobility: the young, elderly, disabled and those with limited incomes.

Policy 9: Consider environmental, social, cultural, and climate change and natural hazard impacts, as well as construction and operating costs, as important factors in planning transportation system improvements.

Policy 10: Reduce traffic congestion and maximize the efficient use of transportation resources by pursuing transportation demand management strategies such as carpooling, telecommuting, flexible work schedules, and incentives to use alternative travel modes.

Discussion: The proposed project represents Hunt's capital investment in the long term improvement of a critical part of Oʻahu's transportation infrastructure, facilitating the safe and efficient movement of vehicle and pedestrian traffic in and through Kalaeloa to support the needs of existing and future residents in a new and growing community. The proposed pedestrian and bicycle accessways will improve circulation and safety for pedestrians, bicyclists and drivers transiting along the improved access roads.

7.2.2 ʻEwa Development Plan

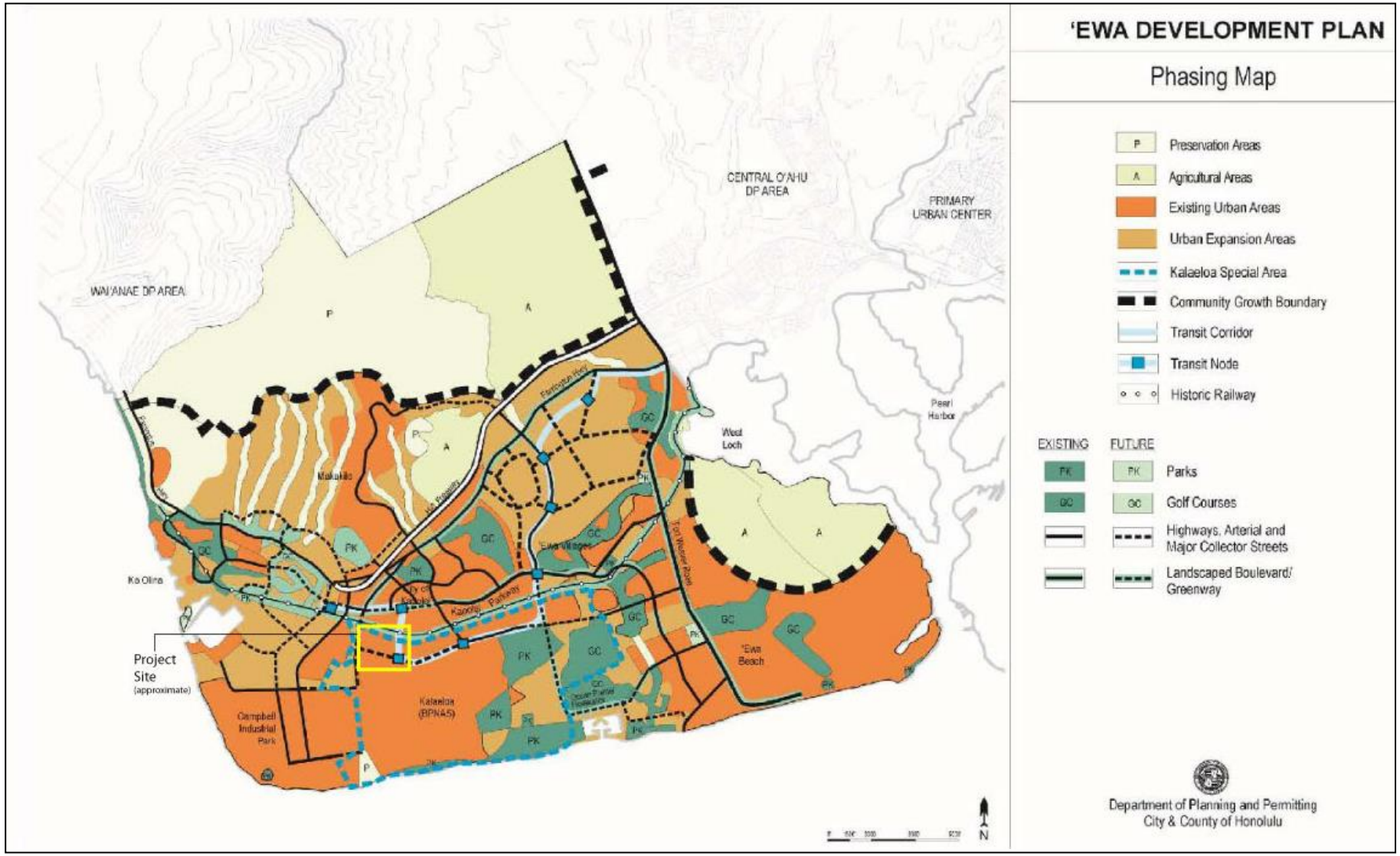
Supporting the General Plan are eight sustainable communities plans (SCPs) and development plans (DPs) for various regions of Oʻahu intended to help guide public policy, investment and decision-making on a 25- year planning horizon. Each plan explains the role of the particular region in Oʻahu's overall development pattern; the vision statement for the area; land use policies, principles and guidelines; public facilities and infrastructure policies and principles; implementation strategies; and maps of Open Space, Land Use and Public Utilities.

The proposed project is located within the ʻEwa DP area. The ʻEwa DP, revised and adopted by the Honolulu City Council in 2013, sets forth a vision and implementation plan for a Secondary Urban Center in ʻEwa, with Kapolei at its heart. The DP vision statement notes that development of adequate infrastructure is essential to meet the needs of new and existing development. Future population and economic growth on Oʻahu are to be directed to the ʻEwa planning region and the Primary Urban Center. DPP estimates that the population in the ʻEwa region is projected to grow from 101,397 in 2010 to 164,500 by 2035. As such, the DP serves as a policy guide for the actions and decisions that will support that growth.

The DP designates the project site as within a Special Area within the ʻEwa for which planning is under the State of Hawaiʻi's HCDA, and planning and development must be consistent with the planning principles and guidelines in the DP. See **Figure 7-7, ʻEwa DP Phasing Plan**. The DP suggests that the Kalaeloa Master Plan (HCDA, 2006) be submitted for acceptance by the Honolulu City Council as the Special Area Plan for Kalaeloa. The DP envisions master planned communities in Kalaeloa as redeveloped to support pedestrian and bike use within the community and transit use for trips both within and outside the community. An extension of the Rail system is also envisioned to extend through Kalaeloa ending near the intersection of Kapolei Parkway and the planned extension of Hānuʻa Street.

The DP further envisions open space anchored by the future Kalaeloa Regional Park located approximately 1.3 miles south of the project limits at Saratoga Avenue. In the vicinity of the project area, the historic OR&L railroad corridor alignment runs parallel to FDR Avenue, and is identified as a significant historic resource in the ʻEwa DP, which includes guidelines for its protection and preservation, including a minimum 50-foot setback on either side of the OR&L ROW.

Figure 7-7, ʻEwa DP Phasing Plan



The following general policies and guidelines envisioned for Kalaeloa as outlined in the ʻEwa DP are applicable to the project:

3.13.1 General Policies

- *Use Kalaeloa's redevelopment as an opportunity to integrate the circulation system and land use pattern of the ʻEwa Plain.*
- *Integrate the road network within Kalaeloa with the regional circulation system for all of ʻEwa to provide additional ways for residents and workers to cross ʻEwa from east to west and north to south.*

3.13.2 Guidelines

Circulation System and Transportation System Facilities

- *Design the circulation system to include major roadways connecting the City of Kapolei to the shoreline recreation center and Ocean Pointe/Hoakalei*
- *Upgrade the road system to allow bus stop facilities to be provided at the airport, military housing area, and shoreline recreation area.*

  Discussion: The proposed roadway improvements and extension of Kamokila Boulevard meets the DP's expressed goal of integrating the road network within Kalaeloa CDD with the regional circulation system. The proposed roadways would support Hunt's future subdivision, which would be designed to foster a pedestrian- and bike-friendly environment where use of the future East Kapolei rail station would be encouraged. The project incorporates Complete Streets design features, included bike lanes. Furthermore, the project would facilitate future regional connection to the shoreline recreation center and the [area of the proposed] ʻEwa Marina future Kalaeloa Regional Park. Preliminary plans for the proposed improvements to FDR Avenue would be outside of the designated 50-foot setback on either side of the OR&L ROW.

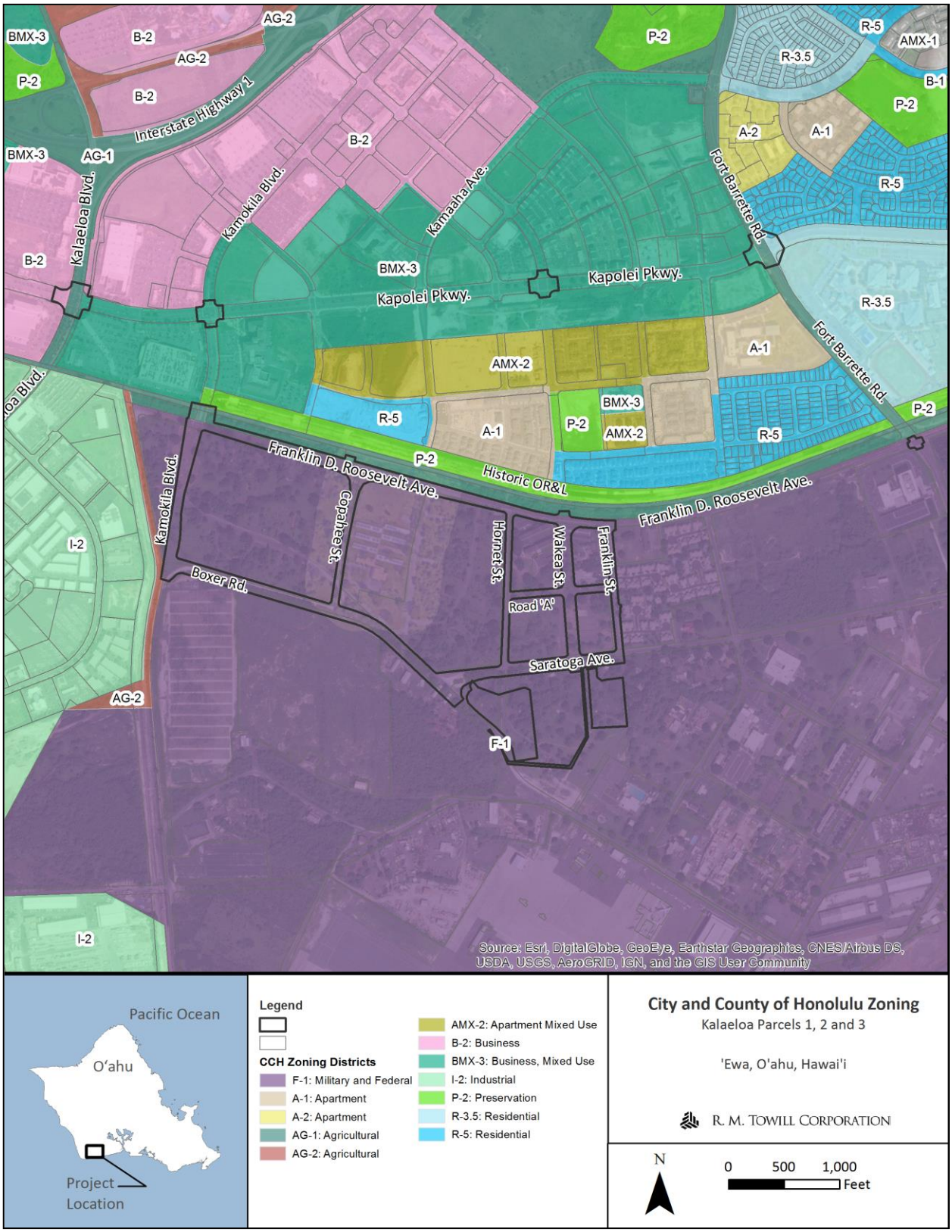
7.2.3 City and County of Honolulu Land Use Ordinance

The Land Use Ordinance (LUO) (Revised Ordinances of Hawaiʻi (ROH, Chapter 21-3) implements the goals and objectives of the Oʻahu General Plan and the ʻEwa DP All lands within the CCH are zoned into specified districts. According to DPP, the project site is located within the F-1 military and federal preservation district where all military and federal uses and structures shall be permitted (ROH, Chapter 21-3.40-1 (b)). See **Figure 7-8, City and County of Honolulu Zoning**.

The purpose for creating the F-1 military and federal preservation district is to identify areas in military or federal government use and to permit the full range of military or federal government activities.

Discussion: This project is consistent with the LUO as having been designated (former) military land. As discussed in **Section 7.1.7, the Kalaeloa Community Master Plan,** adopted by the HCDA in 2005, serves as the vision and provides standards for the adaptive reuse of the former BPNAS following the U. S. Navy's reassignment of the BPNAS to the State of Hawaiʻi pursuant to the Defense Base Closure and Realignment Act of 1990, as amended.

Figure 7-8, City and County of Honolulu Zoning



In addition, HCDA Kalaeloa CDD Rules set forth in HAR, Chapter 15-215 and Kalaeloa Reserved Housing Rules set forth in HAR, Chapter 15-216 would provide regulatory guidance for the review and development of drainage, access roadway, pedestrian improvements and appropriate housing to support the future Hunt residential community, as discussed in **Sections 7.1.9** and **7.1.10** of this reissued Draft EA.

7.2.4 Oʻahu Regional Transportation Plan (ORTP) 2040 (2016)

The Oʻahu Regional Transportation Plan (ORTP) is a policy document that is designed to guide the development of transportation on the island of Oʻahu through the year 2040 (OMPO, 2016). The plan was approved by the Oʻahu Metropolitan Planning Organization (OMPO). OMPO is responsible for coordinating transportation planning on the island of Oʻahu. The organization was designated by the Governor of the State of Hawaiʻi in 2015 per the Federal Surface Transportation Assistance Act of 1973, CFR, Chapter 23 Part 450, Planning Assistance and Standards.

The vision statement of the ORTP proposes that Oʻahu "should be a place where we will have efficient, well-maintained, safe, secure, convenient, appropriate, and economical choices in getting from place to place." The ORTP includes a vision and goals, identifies projects, and provides an implementation program for mid- and long-range investment of the available transportation funds across Oʻahu in a fair and equitable manner (ORTP, 2011). Any proposed federal funded project must be included in the ORTP.

Any future transportation improvement for Oʻahu that receives federal transportation funds must be consistent with the ORTP in order to be eligible for these funds. These requirements are mandated by the U.S. Department of Transportation as a means of verifying the eligibility of metropolitan areas for federal funds earmarked for surface transportation systems.

The ORTP is updated every five years to ensure that transportation decisions are based on current information and community priorities. As part of each update, future population and employment are projected and corresponding changes in travel patterns, revenue, and construction costs are forecast to test and validate new directions for transportation development on Oʻahu.

The island-wide transportation plan for Oʻahu is defined by five overarching goals addressing the following themes: Transportation Facilities, Transportation Operations and Services, Freight Movement and Economic Vitality, Natural Environment, Human Environment and Quality of Life, Land Use and Transportation Integration, Infrastructure Condition, and Reduce Project Delivery Delay (ORTP, 2016).

The Kamokila Boulevard extension from FDR Avenue to Saratoga Avenue as a four-lane roadway is listed in the ORTP 2040 as a long-range (2030 to 2040), developer-funded modernization project.

Discussion: The proposed project includes the construction of roadway projects that would be consistent with ORTP 2040, specifically the extension of Kamokila Boulevard from FDR Avenue to Saratoga Ave. The project would further fulfill the ORTP 2040 goal of constructing well-maintained, safe transportation facilities where existing roads are dilapidated. The roads would serve the residents of Hunt's future subdivision development.

7.2.5 Oʻahu Bike Plan

In 1994, the City Council and Mayor adopted Ordinance 94-39 (ROH, Section 2 The Mayor and Executive Agencies, Article 12 Department of Transportation Services, 2-12.1 Power, Duties, and Functions) which directed that a bikeway system master plan for urban Honolulu be prepared and updated every five years. This resulted in the publication of the Honolulu Bicycle Master Plan (1999), which was the first significant effort by the CCH in making Honolulu more bike-friendly.

The plan was then broadened in scope to include the entire island, and thus renamed the Oʻahu Bike Plan (2012). The Plan guides the CCH Department of Transportation Service's island-wide bikeway planning. There are currently 132 miles of existing on- and off-road Oʻahu bikeway facilities, and the Plan calls for an additional 559 miles of bikeway to be built over the next 20 to 30 years.

The Vision Statement of the Oʻahu Bike Plan, which first articulated in the 1999 Honolulu Bicycle Master Plan, is as follows:

> *"Oʻahu is a bicycle-friendly community where bicycling is a safe, viable, and popular travel choice for residents and visitors of all ages."*

The goals of the Oʻahu Bike Plan are articulated as the following:

1. *To increase the mode share of bicycle trips.*
2. *To enhance cooperation between roadway users.*
3. *To encourage and promote bicycling as a safe, convenient, and pleasurable means of travel.*
4. *To be recognized by the League of American Bicyclists as a Bicycle-Friendly Community (CCH, 2012a).*

As noted by DTS in its comment letter dated January 30, 2019 regarding the proposed project, bike paths or lanes are designated on FDR Avenue, Saratoga Avenue, and Wakea Street and are considered Priority 2 projects in the 2012 Oʻahu Bike Plan (Table 6). See **Figure 7-9, Oʻahu Bikeway Network ʻEwa and Waiʻanae**.

> Discussion: The proposed project is consistent with the proposed bike paths identified within the Oʻahu Bike Plan. The proposed roadway sections would include bike lanes traveling in each direction on Saratoga Avenue and Wakea Street. The ultimate condition of FDR Avenue would also be designed to incorporate bike lanes. The project would overall provide safe bike paths for the future residents of the subdivision to utilize, thus fulfilling the Plan's goal to encourage more people to utilize bicycles for recreation or commuting and increasing the overall mode share of bicycle trips.

Figure 7-9, Oʻahu Bikeway Network ʻEwa and Waiʻanae

Figure 1
Oʻahu Bikeway Network
ʻEwa and Waiʻanae
LEGEND
PROPOSED BIKEWAYS
Lane
Path
Route
EXISTING BIKEWAYS
Existing Lane
Existing Path
Existing Route
TheBus - Transit Center/ Park & Ride
Rail Station
Fixed Guideway
Planned Extension
College
School
Park
Facility Number (* Indicates Short Range Project)
0 0.25 0.5 1 Mile
Oʻahu
Not to Scale
Waiʻanae
2 1 0 2 Miles
See Figure 2: Pearl Harbor & Central Oʻahu
Waipahu
West Loch
Hoʻopili
East Kapolei II
UH West Oʻahu
ʻEwa Villages
ʻEwa Gentry
Ocean Pointe
ʻEwa Beach
Makakilo
Kapolei
Ko Olina Resort
Kalaeloa Boat Harbor
Campbell Industrial Park
Kalaeloa
Project Site (approximate)
Barbers Point Beach Park
Nimitz Beach
White Plains Beach
Onelua Beach Park
Farrington Highway
Fort Weaver Road
Kapolei Parkway
Makakilo Drive (extension)
Makakilo Drive
Kamokila Blvd.
Kalaeloa Boulevard
Saratoga Avenue
Roosevelt Avenue
Geiger Road
Kualakai Parkway
Keahumoa Parkway
Arizona Road
Iroquois Road
Bravo Road
Iroquois Ave.
West Loch Drive
North Road
Kapolei Parkway
Essex Road
Keoneʻula Boulevard
Coral Sea Road
Malakole Street
Olani Street
Papipi Road
Kalaeloa Drive
Depot Road
Waipahu St.
Farrington Hwy
H-1 Freeway
H-1
Makaha
Waiʻanae
NRTF Lualualei
NAVMAG PH Lualualei
Mayili
Nānākuli
Lualualei Naval Road
Farrington Hwy
Kaʻoʻo Dr.
Orbal ROW
Kapolei Parkway
Fort Weaver Road
Kualakai Parkway
Keahumoa Parkway
Kapolei Parkway
Kamokila Blvd.
Kalaeloa Boulevard
Saratoga Avenue
Roosevelt Avenue
Geiger Road
Essex Road
Keoneʻula Boulevard
Coral Sea Road
Malakole Street
Olani Street
Papipi Road
Kalaeloa Drive
Fort Weaver Road
Depot Road
Waipahu St.
Farrington Hwy
H-1 Freeway
H-1
Makakilo Drive
Makakilo Drive (extension)
Kapolei Parkway
Kualakai Parkway
Keahumoa Parkway
Arizona Road
Iroquois Road
Bravo Road
Iroquois Ave.
West Loch Drive
North Road
Fort Weaver Road
Kapolei Parkway
Geiger Road
Roosevelt Avenue
Saratoga Avenue
Kamokila Blvd.
Kalaeloa Boulevard

Section 8
Permits and Approvals That May Be Required

8.1 Federal

FAA Order 5190.6B

8.2 State of Hawaiʻi

Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) under Hawaiʻi Revised Statutes (HRS), Chapter 343

Section 402, CWA, NPDES Notice of Intent Form C, Permit Application for Discharges of Storm Water Associated with Construction Activity (CWB, DOH)

Construction plan review by HCDA

8.2 City and County of Honolulu

Construction Plan Review, DPP

Traffic Management Plan, DPP

Grading Permit, DPP

Street Usage Permit, DTS

ADA review by DCAB

Section 9
Agencies, Organizations, and Individuals to be Consulted for the Environmental Assessment

The following agencies, organizations, and individuals will be contacted during the HRS, Chapter 343, environmental review process to disclose the environmental conditions of the site, the proposed undertaking, and the potential impacts and mitigation measures that will be applied to ensure against adverse impacts.

9.1 Federal Government

USACE, Honolulu District
USFWS

9.2 State of Hawaiʻi

DLNR:
- Land Division
- SHPD

Department of Education (DOE):
- Barbers Point Elementary
- Facilities Development Branch, Planning Section
- Hawaiʻi State Library, Hawaiʻi Document Center
- Hawaiʻi State Library, Ewa Beach Public Library and Kapolei Public Library

DOH:
- CWB

DBEDT:
- OP, CZMP

HDOT:
- Director, HDOT
- Statewide Transportation Planning Office, HDOT

Office of Hawaiian Affairs

9.3 City and County of Honolulu

BWS
DDC
Department of Environmental Services
DFM

DPP
DTS
HFD
HPD
HART
Makakilo/Kapolei/Honokai Hale Neighborhood Board No. 34

9.4 Elected Officials, Organizations and Individuals

State Senator Mike Gabbard, 19th Senatorial District
State Representative Stacelynn Eli, 43rd Representative District
Honolulu County Councilmember Kymberly Marcos Pine, District 1
Eagle River Investors – Hawaiʻi LLC
Hawaiian Electric Company
Hawaiian Telcom
Honolulu Star-Advertiser
Hawaiʻi Gas
Kalaeloa Ventures LLC
Kapolei Infrastructure LLC
Spectrum (Formerly Oceanic Time Warner)
Wakea Garden Apartments

9.5 Consultation

9.5.1 Community Consultation

The project was coordinated with HCDA early in the planning process, and included meetings, phone calls, and overall coordination of the project. The proposed improvements to the roadway system also involved discussion with CCH and HDOT commencing in 2014. At the request of Councilmember Kymberly Marcos Pine, quarterly meetings were held with the HCDA, HDOT, the CCH DPP, DTS, and DFM to discuss the status of the roadways in Kalaeloa and a potential MOU between HCDA, HDOT, and the CCH agencies. State Senator Mike Gabbard and former State Representative Andria Tupola were also present at some meetings, as was a representative of Hunt. Stakeholder meetings were held on the following dates:

- August 20, 2014
- December 5, 2014
- March 6, 2015
- June 4, 2015
- September 3, 2015

Presentations regarding the MOU and Kalaeloa Roadways were given to the community and questions, input, and feedback were solicited at the following meetings:

- Joint HCDA Kalaeloa Stakeholders Meeting – June 18, 2015

- Makakilo/Kapolei/Honokai Hale Neighborhood Board No. 34 Transportation Committee – June 30, 2015
- HCDA Regular Meeting – July 8, 2015

On July 25, 2016, a second MOU was executed between HCDA, HDOT, and CCH reaffirming the intent of the 2001 MOU between the former BPNAS Redevelopment Commission, HDOT, and CCH which transferred ownership of various roadways in Kalaeloa CDD to HDOT and CCH. The 2001 MOU also stipulated that once roadways transferred to HDOT were improved to CCH standards, the roadways would be dedicated to CCH. The 2016 MOU further called for the transfer of ownership of a portion of FDR Avenue and West Perimeter Road from HDOT to HCDA in order to initiate a demonstration project to improve those roads. The roads have not yet been conveyed from HDOT to HCDA as of March 2019. Coordination between HCDA, HDOT, CCH, and Hunt regarding the road conveyances and overall roadway design is ongoing.

Hunt continues to meet regularly with HCDA and the community regarding the subject reissued Draft EA, Subdivision process, and the HCDA Development Permit for the residential and commercial project components. Additionally, Hunt has re-initiated consultation with the public to discuss the project at the following meetings:

- Kalaeloa Advisory Teams' Combined Meeting (Kalaeloa Community Network, Kalaeloa Public Safety, Kalaeloa Heritage and Legacy Foundation, and the Kalaeloa Advisory Team), Thursday, February 14, 2019
- Makakilo/Kapolei/Honokai Hale Neighborhood Board No. 34, February 27, 2019

Hunt will continue to keep all stakeholders, as well as the area businesses, emergency personnel (fire, ambulance and police), OTS (TheBus and TheHandi-Van), etc., apprised of the details of the proposed project and the impacts that the project may have on the adjoining local street area network.

9.5.2 Comments Received During the first Draft EA

A Draft EA for the subject project was published in the December 23, 2018 edition of *The Environmental Notice* published by OEQC. A copy of the Draft EA was sent to the public and private agencies, organizations, and individuals identified above for review and input. A list of comment letters received during the 30-day public review and comment period ending on January 22, 2019 is provided in **Table 9-1**, below. All comment letters received were provided with a written response for inclusion and use in the preparation of this reissued Draft EA. It should be noted that a copy of the Draft EA was also sent to DPR, who requested to be removed from further consultation lists. For a full record of the Draft EA comment and response letters prepared, see **Appendix F**.

Table 9-1, Comment Letters Received During the First Draft EA Public Comment Period

No.	Agency/Organization	Date of Letter	Reissued Draft EA Section
1	DFM	1/9/2019	2.1, 5.14.1, 5.14.2
2	DBEDT, OP	1/14/2019	5.2, 5.3, 5.5, 5.7, 5.8.2.2, 5.9, 7.1.13, 8.0, 10.3
3	DOE	1/15/2019	5.10, 5.14.1, 5.14.7, 9.5.1, 10.1
4	HFD	1/16/2019	3.1, 5.14.2, 5.14.5
5	HDOT	1/23/2019	2.3, 5.14.1, 7.1.1, 7.1.8, 9.5.1
6	DAGS	1/24/2019	--
7	DLNR	1/29/2019	5.4.1
8	DPP	1/30/2019	5.14.1, 5.14.2, 7.2.2, 8.0
9	DPR	2/4/2019	--
10	DDC	2/7/2019	5.14.1
11	BWS	2/19/2019	5.14.2
12	DTS	1/31/2019	3.1, 5.2, 5.3, 5.7, 5.14.1, 7.1.6, 7.2.5

Section 10
Summary of Effects

In accordance with the content requirements of HRS, Chapter 343, and the significance criteria in HAR, Chapter 11-200.1-13, an applicant or agency must determine whether an action may have significant impacts on the environment, including all phases of the project, its expected consequences both primary and secondary, its cumulative impact with other projects, and its short- and long-term effects.

HAR, Section 11-200.1-24 requires discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Short-term and long-term do not necessarily refer to fixed time periods but are viewed relative to environmentally significant consequences of the proposed action. **Sections 10.1 and 10.2** below discuss the extent to which the proposed action involves trade-offs among short-term and long-term gains and losses, as well as the extent to which the proposed action forecloses future options and/or narrows the range of beneficial uses of the environment.

In making the determination of whether an action may have significant impacts on the environment, HAR, Chapter 11-200.1-13 establishes "Significance Criteria" to be applied as a basis for identifying whether significant environmental impacts will occur. An action shall be determined to have a significant impact on the environment if it meets any one of the criteria. The relationship of the proposed action to the criteria are discussed below in **Section 10.3**.

10.1 Short Term Effects

Short-term effects associated with the proposed project will be principally during the construction phase. Noise will be temporarily generated from construction activities and the related mobilization of equipment. Construction equipment is expected to include, but not be limited to, backhoe(s), loader(s), or excavator(s), work trucks, and powered hand tools. All internal combustion powered equipment will be muffled in accordance with standard engine operating practices. Upon the completion of work, noise levels will return to preexisting ambient levels.

Fugitive dust may be generated during construction. The contractor will be required to control fugitive dust through the regular wetting of soils and ground areas susceptible to the generation of dust during work activities. Only enough water to wet the surface of the ground will be used to prevent the generation of runoff.

Protection of water quality will be through the use of mitigative measures including silt fencing/curtains, berms, and other applicable erosion controls to prevent construction storm water related soils and silt from leaving active areas of work. Specifications for the use of these measures will be through the construction plan approval process and National Pollutant Discharge Elimination System (NPDES) permit application that will be filed by the design consultant during the design phase.

Upon completion of work all construction equipment, machinery, and personnel will be demobilized from the job site with no further disturbance to the area. All debris and waste

materials will be disposed of at an approved refuse facility. Active work areas will be replanted with vegetation, similar to that found at the existing site.

10.2 Long Term, Secondary, and Cumulative Effects

Potential long-term direct, secondary, and cumulative impacts have been evaluated and are documented for the following resources or issues: land use; land ownership; public health and safety; roadways and traffic; utilities; public facilities and services; topography, geology, and soils; hydrology; natural hazards; climate and air quality; noise; visual resources; marine environment; terrestrial flora and fauna; cultural resources; and socioeconomics. Of the resources and issues evaluated, the following long-term direct, secondary and cumulative impacts are potentially significant.

Surface Water, Drainage, and Water Quality

The proposed project would provide needed improvement of existing roads formerly serving military uses of the BPNAS. The area and region are in the process of transformation into a new residential community by Hunt, as envisioned in the HCDA Kalaeloa Community Development Plan. The proposed roadway improvements would also comply with Kalaeloa CDD and CCH design standards to meet safety requirements. The increase in impermeable surface area is expected to be negligible based on the existing urban use surfaces of the surrounding area. An adverse increase in surface runoff is not expected to result in significant adverse impacts. Upon the completion of work, all equipment used on-site will be demobilized and all debris and waste materials disposed of at an approved state or CCH refuse facility.

The proposed project would result in positive long-term and secondary impacts by providing environmental benefits in the form of reduced discharges of storm water associated sediments in runoff, and the improvement of working conditions from the reduced incidence of storm water sheet flow across the site. The project would therefore reduce untreated storm water discharges into nearshore coastal waters. Long-term impacts from the proposed improvements are expected to protect nearshore State marine waters, and provide the conditions necessary to improve public health and safety, and visual aesthetics.

Socio-Economics

There would be positive long-term and secondary impacts involving social benefits for residents and visitors from use of an improved roadway system for the growing Kalaeloa community. With or without the proposed action, the urbanization of Kalaeloa and neighboring Kapolei would evolve with anticipated future growth of the State. Long-term gains from development of the proposed project include the more efficient land use of former BPNAS lands that will support continued growth in the ʻEwa region.

The proposed project will maintain and enhance economic productivity by supporting the effective use of public and private land to accommodate future growth in real estate, service sectors, and the retail industry. The project will further benefit the State of Hawaiʻi, and residents and visitors to Oʻahu, by facilitating the efficient transportation of people and goods to, from, and among southern areas of Oʻahu, to enable the island to continue to be a desirable place to live and visit.

The potential for significant adverse cumulative impacts is not anticipated:

- The proposed project is consistent with the long-range goals, policies and objectives articulated in policy documents for the redevelopment of Kalaeloa. It is also compatible with existing land uses in the area and would comply with applicable land use regulations. As a result, project implementation would not contribute to potentially significant land use compatibility or policy conflicts.
- The proposed project is designed to provide facility improvements to the existing transportation system and allow for the continued long-term use of existing public infrastructure. The project would encourage development of the Hunt Kalaeloa residential component to accommodate future growth in the ʻEwa region. This would benefit accomplishing related aspects of the Kalaeloa Master Plan by encouraging economic growth and continued vitality and sustainability of ʻEwa as the secondary urban center.
- The proposed project would result in positive long-term impacts by providing increased transportation efficiency of vehicles and goods to, from, and among ʻEwa region communities. It would enhance services now provided by improving upon the use of area roadways serving private and public lands. The proposed project would also meet current and future demand for the use of Oʻahu transportation facilities.
- The proposed project is located in an area adequately served by public services including police and fire protection. The project would not significantly affect the existing level of service of either police or fire protection service. The potential (less than significant) construction related impacts associated with the future use of the site would not alter the ability of fire or police protection from providing adequate levels of service and would not place an undue burden on public facilities that would support the project.

10.3 Significance Criteria

In accordance with the provisions set forth in HRS, Chapter 343, and the significance criteria in HAR, Chapter 11-200.1-13, anticipated to be signed into law on July 30, 2019, this Draft EA has preliminarily determined that the project will have no significant adverse impact to air and water quality, existing utilities, noise, archaeological or cultural sites, or wildlife habitat. All anticipated impacts will be temporary and will not adversely impact the environmental quality of the area.

According to the Significance Criteria:

1. *Irrevocably commit a natural, cultural, or historic resource;*

The proposed project is not anticipated to adversely impact any natural or cultural resources. The project site is located within a former military area with vestiges of former structures and roads associated with previous military use and development. These include foundations of military buildings, roads in various states of repair, and a few unpaved trails made by off-road vehicles. No significant archaeological or cultural sites are therefore anticipated to be discovered. However, the SHPD will be consulted for further assessment through the review of the ALRFI prepared for the project, and in the unlikely event that any remains or artifacts are encountered, practices as identified in **Section 5.9** of this document would be applicable. Any inadvertent

finds will immediately result in the cessation of work and the immediate reporting of the find to the SHPD who will furnish further instructions regarding the treatment of the find and the conditions when work may be resumed.

2. *Curtail the range of beneficial uses of the environment;*

The proposed use of the site will facilitate the long-term restoration and reuse of roads that service the Kalaeloa area and will not curtail existing or planned surrounding land uses.

3. *Conflict with the state's long-term environmental policies or long-term environmental goals established by law;*

The proposed project is consistent with the environmental policies, goals and guidelines as delineated in HRS, Chapter 344, and as documented in this EA. See also **Sections 7.1, State of Hawaiʻi**; and **7.2, City and County of Honolulu**.

4. *Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State;*

The proposed project is expected to have little to no effect on the social and economic environment. The planned roadway and related infrastructure improvements will generally serve to meet the level of service needed based on the use of standards and guidelines for future development of transportation infrastructure serving the Kalaeloa community.

The proposed project will not, by itself, stimulate economic growth and welfare, but would accommodate current and future uses associated with the Hunt Kalaeloa subdivision development.

See also **Sections 5.9, Archaeological and Historic Resources**; **5.13, Socio-economic Environment**; and **6, Cultural Impact Assessment**.

5. *Have substantial adverse effect on public health;*

The proposed project will be developed in accordance with Federal, State, and CCH rules and regulations governing public safety and health. Potential sources of adverse impacts have been identified and appropriate mitigative measures developed. The primary public health concerns are anticipated to involve air, water, noise, and traffic impacts. However, these impacts will be either minimized or brought to negligible levels by the appropriate use of the mitigation measures as described in this document.

6. *Involve adverse secondary impacts, such as population changes or effects on public facilities;*

The proposed project will not, by itself, stimulate unexpected changes in population. It will, however, accommodate current and future vehicular, bicycle, and pedestrian traffic associated with the Kalaeloa area. Inasmuch as the project will facilitate improved access and drainage, such improvements have been earlier considered as part of the HCDA Kalaeloa Master Plan and are expected to result in no adverse effects to population changes or effects to public facilities. See also **Section 5.13, Socioeconomic Environment**.

7. *Involve a substantial degradation of environmental quality;*

The proposed project will be developed in accordance with the environmental policies of HRS, Chapter 343. The analysis provided in this EA indicates that no substantial environmental degradation is anticipated or expected.

8. *Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions;*

The proposed project addresses the need for roadway and related improvements, and represents a commitment by Hunt toward maintaining transportation infrastructure. It is being developed as an ongoing effort to maintain and where required, upgrade the transportation system to meet existing and projected future service demands. The project will not by itself, involve a commitment to larger actions. However, as part of the Kalaeloa Community Development Master Plan, areas surrounding the project site can be expected to be used in the future.

9. *Have a substantial adverse effect on rare, threatened, or endangered species, or its habitat;*

There are no threatened or endangered flora or fauna species within or immediately surrounding the project site. No adverse environmental effects to rare, threatened, or endangered species, or habitat are anticipated. See also **Section 5.8, Flora and Fauna**.

10. *Have a substantial adverse effect on air or water quality or ambient noise levels;*

Any potential for adverse impacts to air, water quality, or noise levels will be addressed by use of appropriate mitigative measures as described in this EA. See also **Sections 5.4, Water Resources and Hydrology**; **5.10, Noise Conditions**; and **5.11, Air Quality**.

11. *Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;*

The proposed project is located in an area that is already in use as an access roadway system within existing Kalaeloa. The project itself does not possess any sensitive characteristics that would detract from or adversely impact the surrounding environment. See also **Sections 5.3, Geology and Topography**; **5.4, Water Resources and Hydrology**; **5.6, Wetlands**; and **5.7, Natural Hazards**.

12. *Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies; or,*

The proposed site is not located within any scenic vista or view plane identified in CCH or State Plans. The proposed project is not expected to result in long-term visual impacts in the form of an improved access roadway system, utility and drainage infrastructure, and appurtenances including the addition of traffic signals at specific intersections as described in this EA. The improvements will be noticeable, but will not intrude on existing view planes. In general, the appearance of the project will be similar to the visual impact created by its adjacent urbanized Kapolei and ʻEwa neighbor communities, and will not detract from existing views. Visual impacts associated with construction activities will be temporary and cease with the removal of construction equipment and personnel. See also **Section 5.12, Visual Resources**.

13. Require substantial energy consumption or emit substantial greenhouse gases.

Energy that is used will be in the form of fossil fueled internal combustion equipment, machinery, and vehicles, and electricity supplied to the site by either an existing Hawaiian Electric Company power connection or by the use of portable generator(s). The use of these forms of energy is not expected to be greater or significantly greater that that used for the development of similar projects.

Table 10-1, Hunt Kalaeloa Subdivision Roads Project Impacts Summary

Resource Area	Direct Short-term Impacts	Direct Long-term Impacts	Secondary Impacts	Cumulative Impacts	Mitigation and BMPs	EA Section
Climate	Construction activities that require the use of heavy machinery would present a short-term increase in GHGs.	No Adverse Impact.	No Secondary Impact.	Minimal Cumulative Impact – because the direct impact to climate would be only short-term, and would not increase the use of machinery, the project would make no persistent contribution to cumulative impacts (e.g., Act 286, Session Laws of Hawaiʻi 2012).	No Mitigation required.	5.2 Climate
Geology, Topography, and Soil Resources	Ground disturbing activities	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	• Erosion control measures will be employed during construction. • Site restoration to original condition at conclusion of project. • Disposal will be at an approved facility or location in accordance with Federal, State, and City and County of Honolulu regulations. No Mitigation required.	5.3 Geology and Topography 5.5 Soils and Potential for Hazardous Materials
Groundwater, Surface Water, Drainage, and Water Quality	Localized and potential temporary increase in turbidity.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	• Construction will be regulated through adherence to NPDES permit conditions. • During construction, work activities will be in compliance with HAR 11-55 Water Pollution Control. • Discharge pollution prevention measures will be employed in all phases of the project. • Following construction all areas of ground disturbance will be stabilized with appropriate materials.	5.4 Water Resources and Hydrology
Natural Hazards	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.7 Natural Hazards
Wetlands	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.6 Wetlands
Terrestrial Flora	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.8.1 Terrestrial Flora
Terrestrial Fauna	Increased lighting during construction of the proposed project.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	• Light fixtures utilized for this project will be designed and installed to reduce glare and fully shield light from migrating and/or nocturnally flying seabirds. • A survey for Pueo ground nesting activity will be undertaken and if discovered, DLNR would be notified prior to construction activity. • Recommendation that no woody vegetation taller than 4.6 m (15 ft) to be removed during June 1 through September 15 to observe the Hawaiian hoary bat nesting season.	5.8.2 Terrestrial Fauna

Resource Area	Direct Short-term Impacts	Direct Long-term Impacts	Secondary Impacts	Cumulative Impacts	Mitigation and BMPs	EA Section
Archaeological Cultural Resources	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	• In the unlikely event cultural deposits and/or human skeletal remains are encountered during ground disturbance, work stopped immediately and SHPD notified of the nature of the discovery. No further mitigation required.	5.9 Archaeological and Cultural Resources
Noise	Temporary source of noise above ambient levels from construction noise.	No Adverse Impact.	No Secondary Impact.	Minimal Cumulative Impact – because other past, present, and reasonably foreseeable future actions are expected to be consistent with existing development and the direct impact to noise would be only short-term, the project would make no persistent contribution to cumulative impacts.	• Mufflers used on all combustion powered construction vehicles and machinery, and all noise attenuation equipment maintained • Work limited to weekdays during daylight hours between 7:00 am and 6:00 pm. No work scheduled on federal or state holidays. • The contractor to secure a noise permit from the DOH prior to the initiation of construction.	5.10 Noise Conditions
Air Quality	Temporary and localized emissions from increased fugitive dust and exhaust emissions from construction related equipment, and vehicles.	No Adverse Impact.	No Secondary Impact.	Minimal Cumulative Impact – because the direct impact to air quality would be only short-term, the project would make no persistent contribution to cumulative impacts.	• Construction equipment and vehicles shall be maintained in proper working order to reduce air emissions. • During construction, work activities will be in compliance with HAR, Chapter 11-59 and 11-60. • Dust control plan to include water source, use of soils wetting, use of silt screening. No further mitigation required.	5.11 Air Quality
Visual Resources	Temporary visual impacts from the presence construction equipment	No Adverse Impact.	No Secondary Impact.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent visually with existing development.	• Equipment will be confined to work areas. • All construction related equipment will be removed following the completion of work. No further mitigation required.	5.12 Visual Resources
Socio-Economic Environment and Demographics	No Adverse Impact.	No Adverse Impact.	Minimal Secondary Impact –reasonably foreseeable future actions are expected to be consistent with existing development.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent with the socio-economic environment of the existing development.	No Mitigation required.	5.13 Socio-Economic Environment and Demographics
Transportation Facilities	Potential for limited, non-substantial short-term effects on transportation due to construction related activities and transit of vehicles to and from the job site.	No Adverse Impact.	Minimal Secondary Impact –reasonably foreseeable future actions are expected to be consistent with existing development.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent with the transportation use of the existing development.	No Mitigation required.	5.14.1 Roads and Transportation
Electrical, Water, and Wastewater	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.14.2 Utilities

Resource Area	Direct Short-term Impacts	Direct Long-term Impacts	Secondary Impacts	Cumulative Impacts	Mitigation and BMPs	EA Section
Solid Waste	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	• Disposal of solid waste will be handled in accordance with applicable Federal, State, and City and County of Honolulu rules and regulations.	5.14.3 Solid Waste
Police, Fire, Health Care and Emergency Services	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.14.4 Police Protection 5.14.5 Fire Protection 5.14.6 Health Care and Emergency Services
Schools and Libraries	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.14.7 Schools
Recreational Facilities	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.15 Recreational Resources

Section 11
Summary of Findings and Significance Determination

In accordance with the provisions set forth in HRS, Chapter 343, and the significance criteria in HAR, Chapter 11-200.1-13, this Draft EA has evaluated and assessed the potential for environmental impacts associated with the proposed project and it is preliminarily determined that a HRS, Chapter 343, EIS will not be required.

The proposed Hunt Kalaeloa Subdivision Roads project is not anticipated to result in significant adverse impacts to geology, soils, hydrology, stream flow, biological resources, air quality, natural hazards, cultural resources, socioeconomics, or land uses. Minimal impacts may consist of minor traffic, noise and air quality disturbances to residents in the immediate surrounding location of the project site, but will completely cease once construction is completed.

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Draft Environmental Assessment
Prepared in Accordance with Hawaii Revised Statutes,
Chapter 343, and Hawaii Administrative Rules, Title 11, Chapter 200

Hunt Kalaeloa Subdivision Roads

District of ʻEwa, Island of Oʻahu, Hawaiʻi

Appendices

Appendix A	*Preliminary Construction Drawings* *R. M. Towill Corporation, 2018*
Appendix B	*Phase I Environmental Site Assessment* *Element Environmental LLC,* *December 2017*
Appendix C	*Biological surveys for proposed road improvements at* *Kalaeloa, Kapolei, Oʻahu* *AECOS, Inc., January 2018*
Appendix D	*Archaeological Literature Review and Field Inspection,* *Cultural Surveys Hawaiʻi, Inc., December 2017*
Appendix E	*Draft Report: Traffic Impact Analysis Report for the* *Development of Parcels 1, 2, and 3 in Kalaeloa. Fehr & Peers,* *December 29, 2017*
Appendix F	*Early Consultation: Comments Received during the First Draft* *Environmental Assessment Comment Period from December* *28, 2018 to February 19, 2019 and Responses*

Appendix A

Preliminary Construction Drawings,
R. M. Towill Corporation, 2018

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3

BACKBONE ROADWAY IMPROVEMENTS

HONOULIULI , EWA , OAHU , HAWAII

TAX MAP KEY : 9–1–013: 002, 003, 004, 010, 026, 128 & 129

CONSTRUCTION PLAN FILE NO. 2018/CP–147

PREPARED FOR:

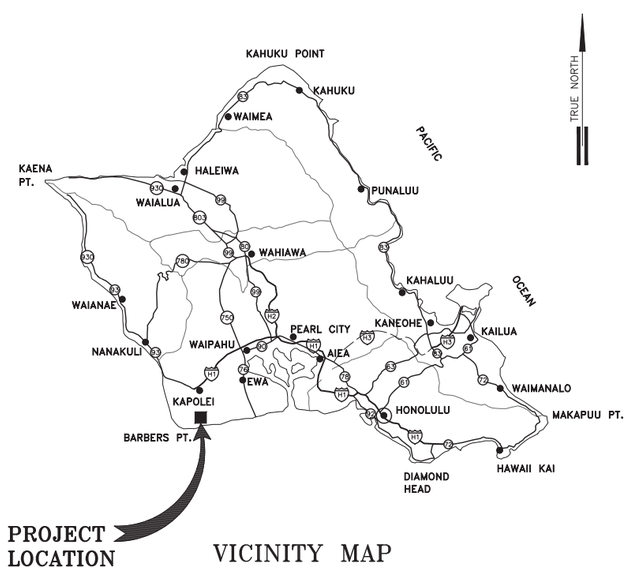
HUNT COMMUNITIES HAWAII LLC

737 BISHOP STREET, SUITE 2750
HONOLULU, HAWAII 96813

Prepared by:

R. M. TOWILL CORPORATION
SINCE 1930

Planning • Engineering • Environmental Services • Photogrammetry • Surveying • Construction Management



VICINITY MAP

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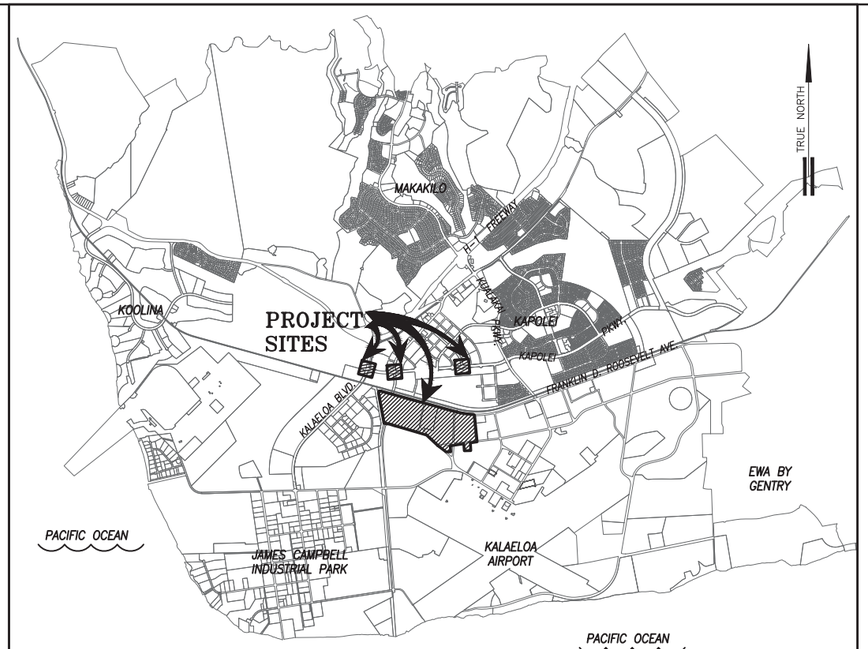
SCALE IN MILES



LOCATION MAP

NOT TO SCALE

APPROVED :

DIRECTOR, DEPARTMENT OF PLANNING & PERMITTING
CITY & COUNTY OF HONOLULU

DATE

2018/CP–147

DEVELOPMENT OF KALAELOA – PARCELS 1, 2 AND 3 – BACKBONE ROADWAY IMPROVEMENTS FEBRUARY 2019

RMTC JOB NO.: 1–22371–OE

K:\civil\22371 Hunt Kalaeloa\DWG\Plans\01–1 TITLE.dwg April 23, 2019

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T=89.77'	T=350.97'	T=192.05'	T=166.19'	T=229.13'	T=171.40'	T=873.94'
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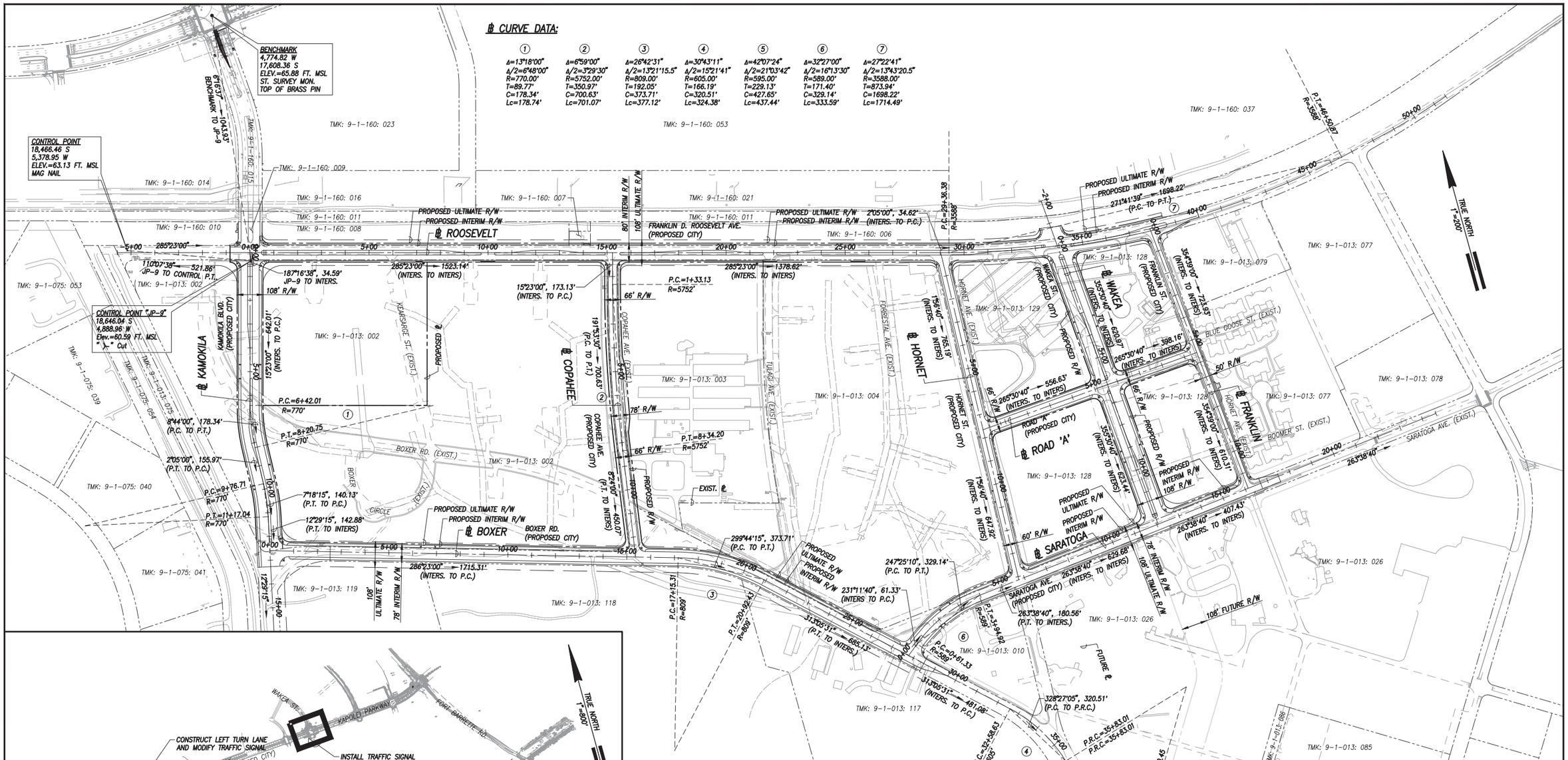

GENERAL ROADWAY PLAN

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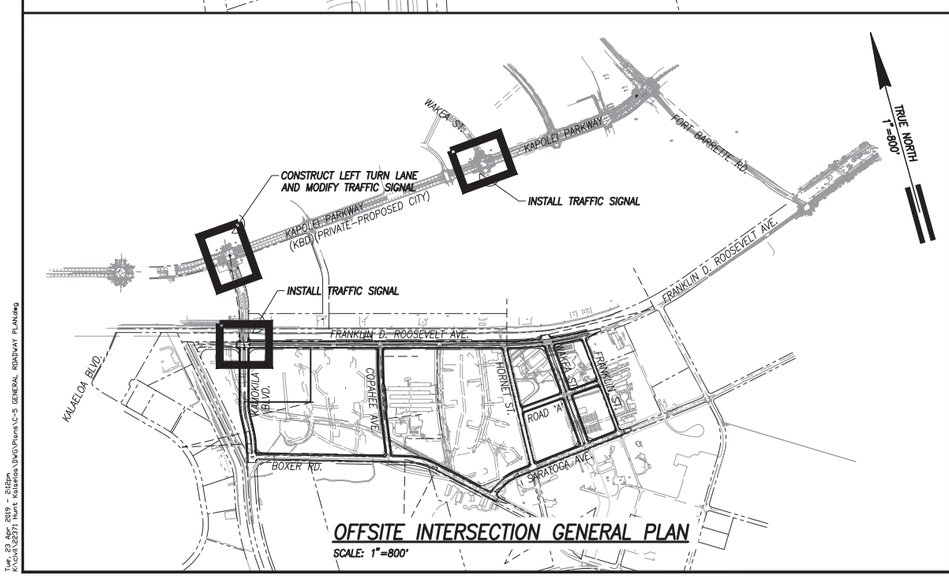

OFFSITE INTERSECTION GENERAL PLAN

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GRAPHIC SCALES:

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1" = 800' 800' 400' 0 800' 1600'

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management

R. M. TOWILL CORPORATION

808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

GENERAL ROAWAY PLAN AND OFFSITE INTERSECTION GENERAL PLAN

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04/20

SIGNATURE DATE

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE

CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

Tue, 23 Apr 2019 - 2:12pm
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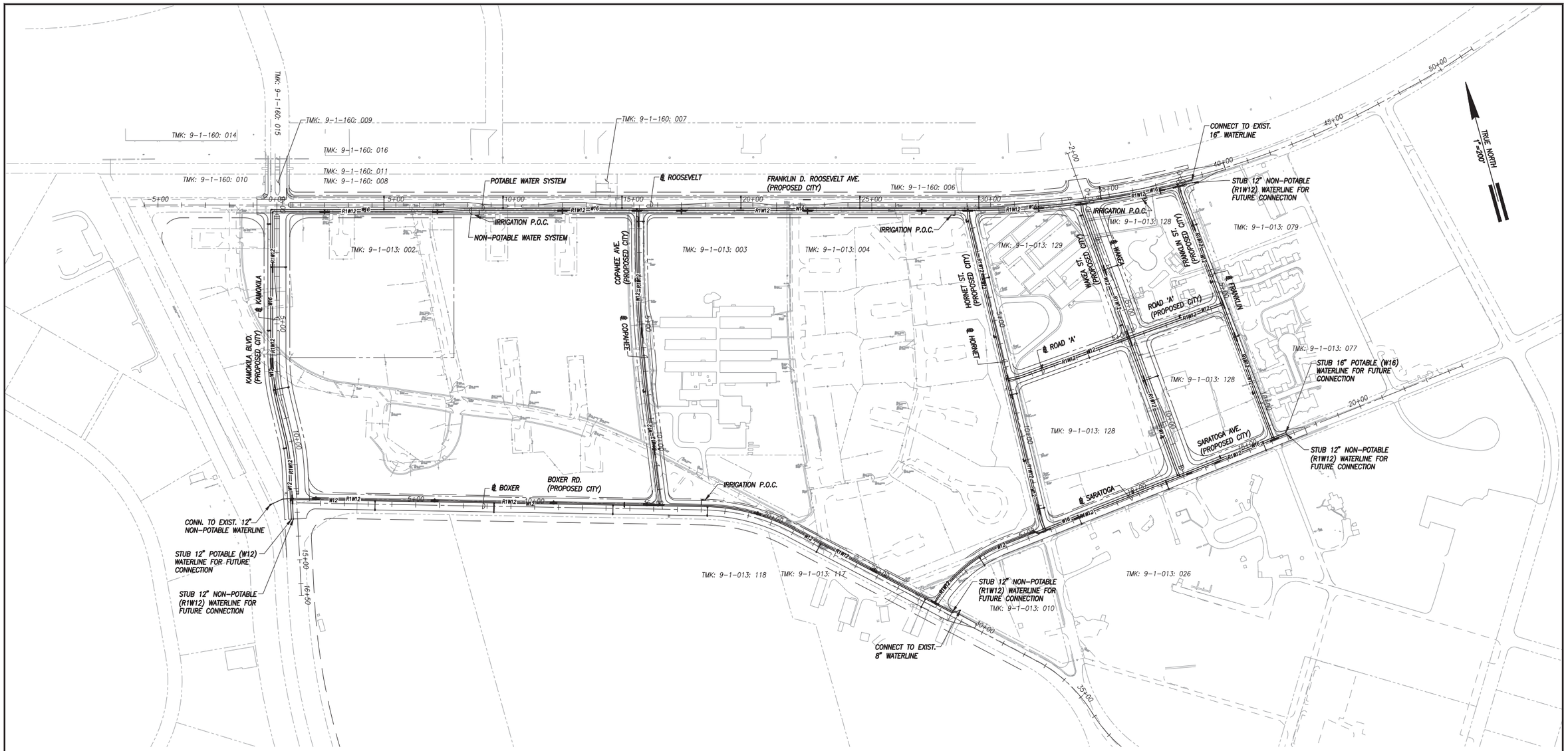

GENERAL WATER SYSTEM PLAN

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GRAPHIC SCALE:

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DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

GENERAL WATER SYSTEM PLAN

APPROVED BY

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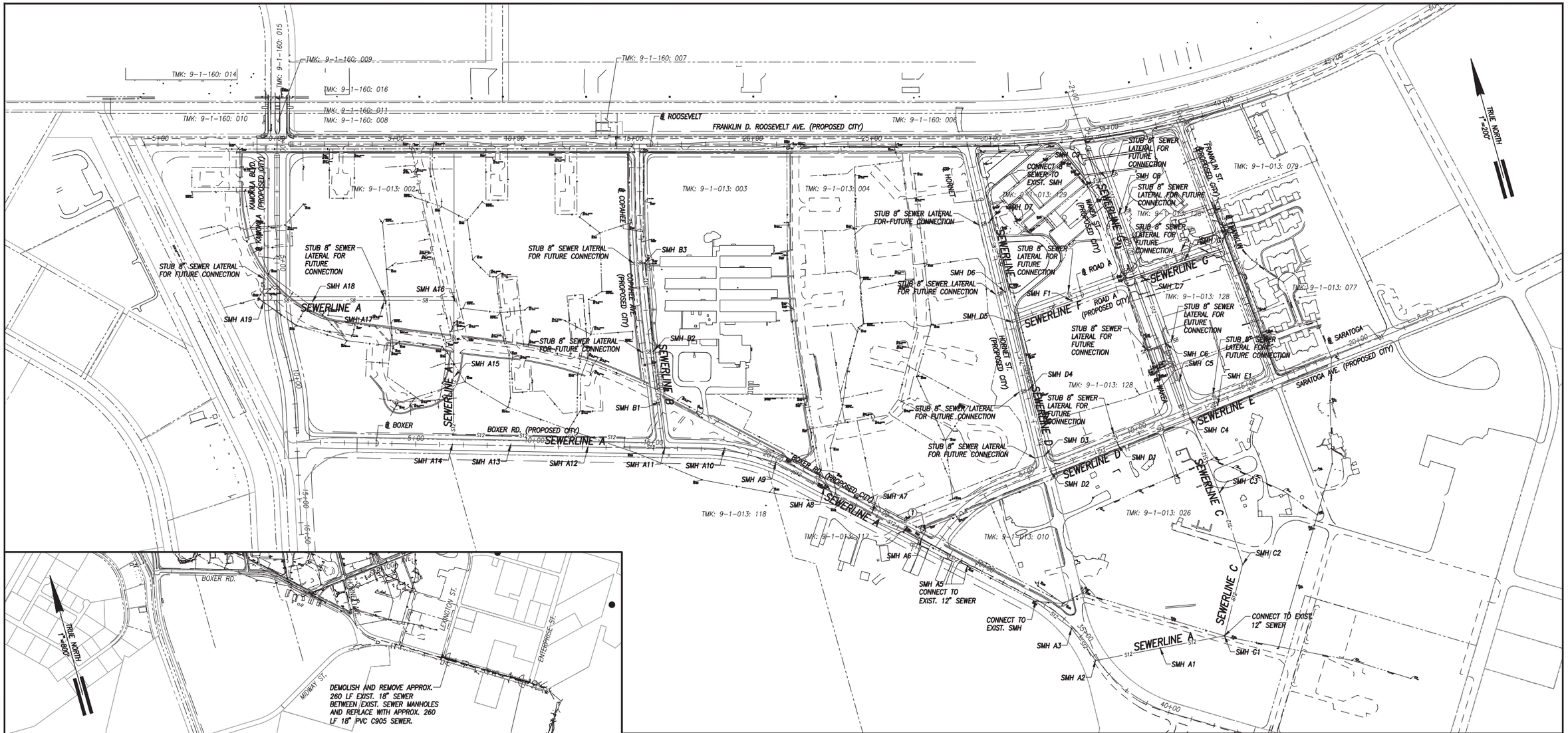

GENERAL SEWER SYSTEM PLAN

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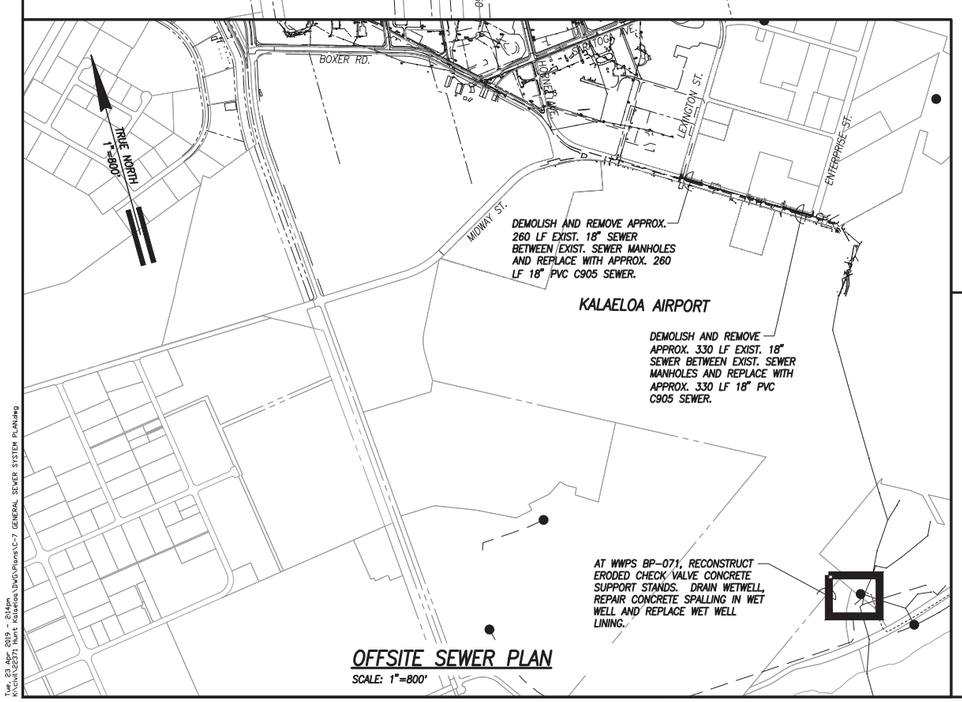

OFFSITE SEWER PLAN

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DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
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GENERAL SEWER SYSTEM PLAN

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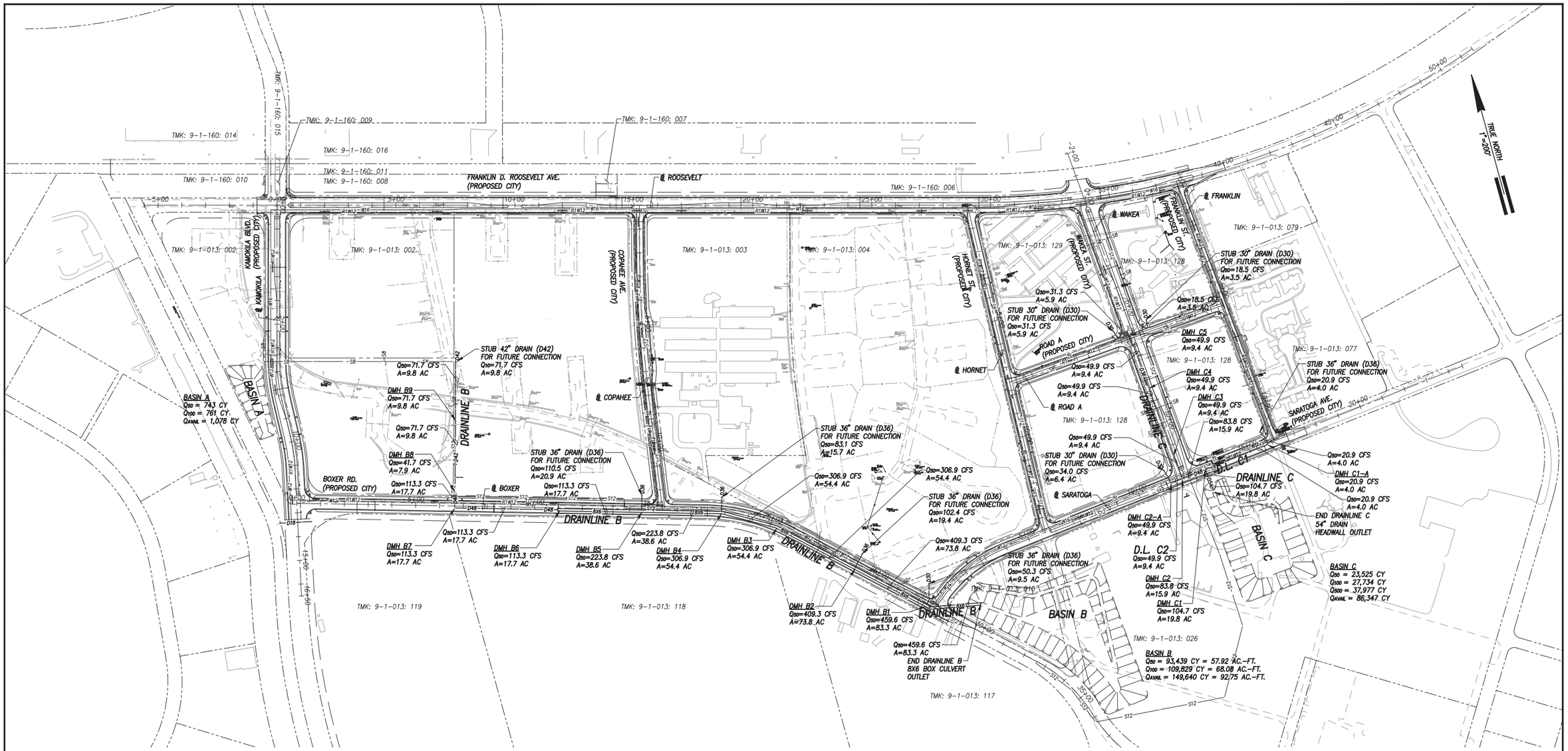

GENERAL DRAINAGE PLAN

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DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management

R. M. TOWILL CORPORATION

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DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
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TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

GENERAL DRAINAGE PLAN AND OFFSITE INTERSECTION GENERAL PLAN

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SIGNATURE 04/20 DATE

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE

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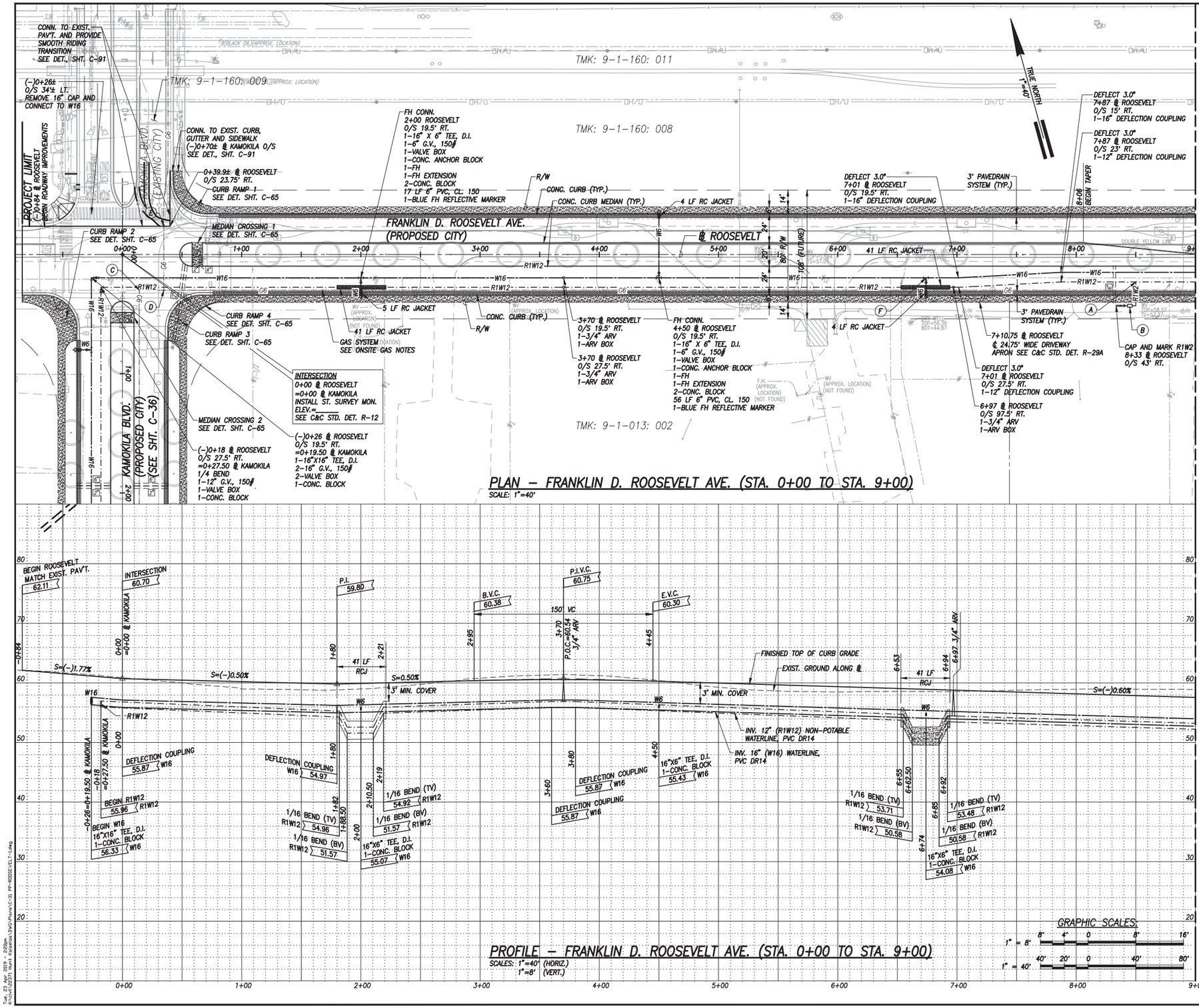

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O/S 23' RT.
CONTRACTOR TO INSTALL TYPE D LATERAL, BLIND METER SPLICE LENGTH TO ACCOMODATE A 1-1/2" METER AND ALL APPURTENANCES IN ACCORDANCE WITH BWS STD. DET. L-15.
1-TYPE "III" METER BOX
1-2" G.V.
1-TYPE 'B' METER BOX

(B) INSTALL BWS APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER AFTER THE METER PRIOR TO ANY BRANCHES OR TEES PER BWS STD. DET. V-9

(C) 0+14.20 @ ROOSEVELT
O/S 30' RT.
1-6" GAS 1/4 BEND (H)

(D) 0+34.75 @ ROOSEVELT
O/S 30' RT.
1-6" X 6" GAS TEE

(E) 0+34.75 @ ROOSEVELT
O/S 23.75' RT.
END G6
INV.=XX.XX
1-6" CAP AND MARKER

(F) FH CONN.
6+74 @ ROOSEVELT
O/S 19.5' RT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
17 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

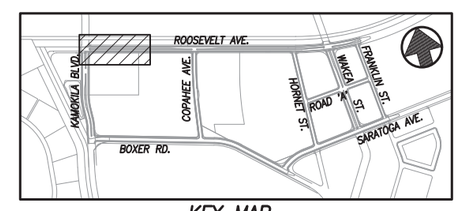
MATCHLINE STA. 9+00 SEE SHEET C-32

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCHING, PIPE BEDDING AND BACKFILLING FOR INSTALLATION OF THE GAS LINES. HAWAII GAS WILL INSTALL THE GAS LINE AND PROVIDE ALL PIPING, VALVES AND APPURTENANCES. THE CONTRACTOR SHALL COORDINATE INSTALLATION WITH HAWAII GAS.

LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 1
FRANKLIN D. ROOSEVELT AVENUE
(STA. 0+00 TO STA. 9+00)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

04/20
SIGNATURE DATE

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 2:00pm
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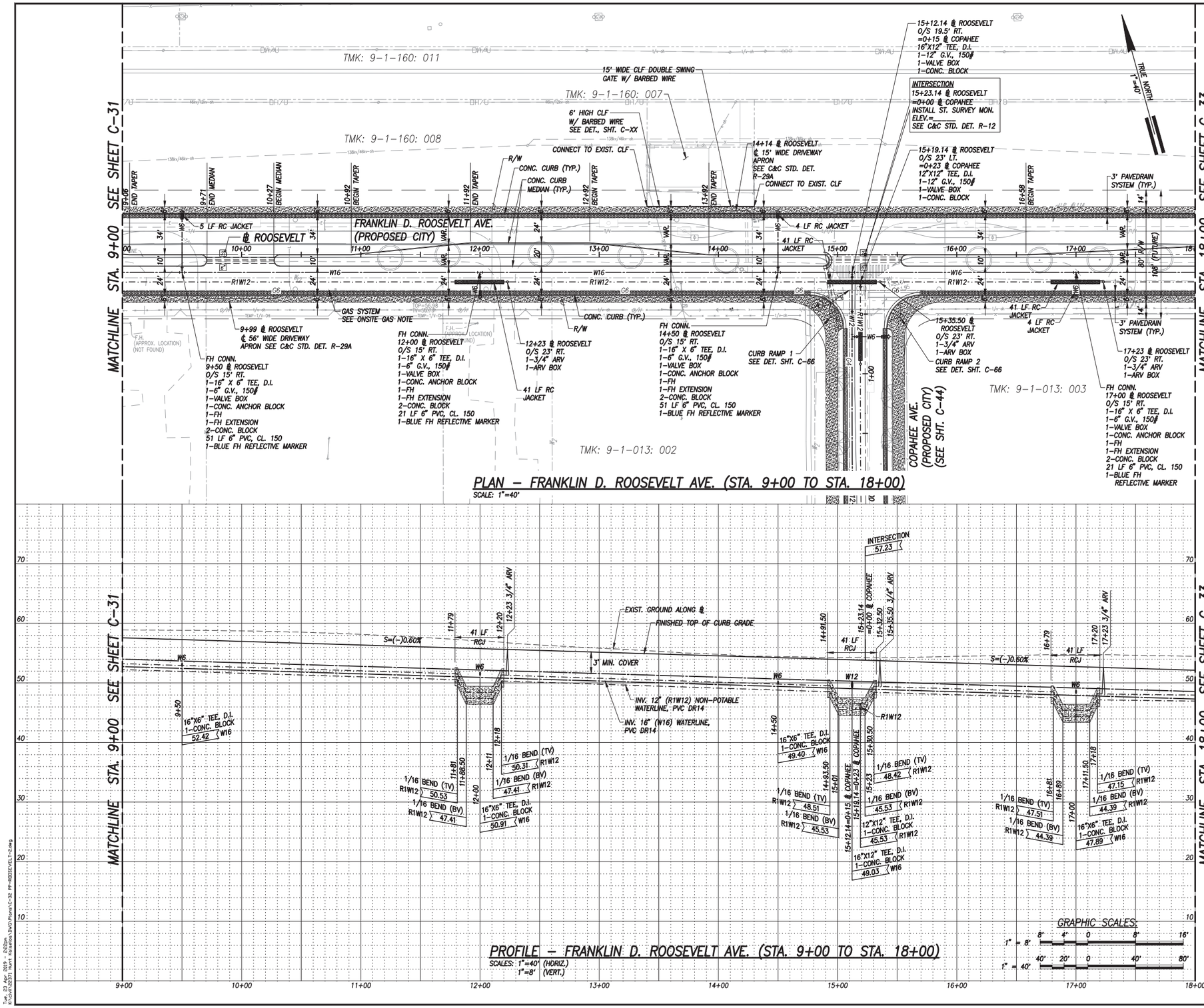

Ⓐ 15+09.84 @ ROOSEVELT O/S 30' RT. 1-6"X4" GAS TEE

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
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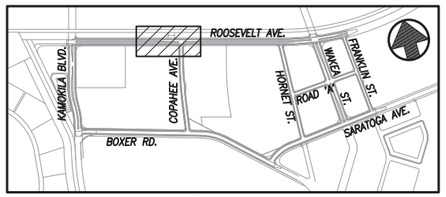
LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 2
FRANKLIN D. ROOSEVELT AVENUE
(STA. 9+00 TO STA. 18+00)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE 04/20 DATE

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 2:22pm
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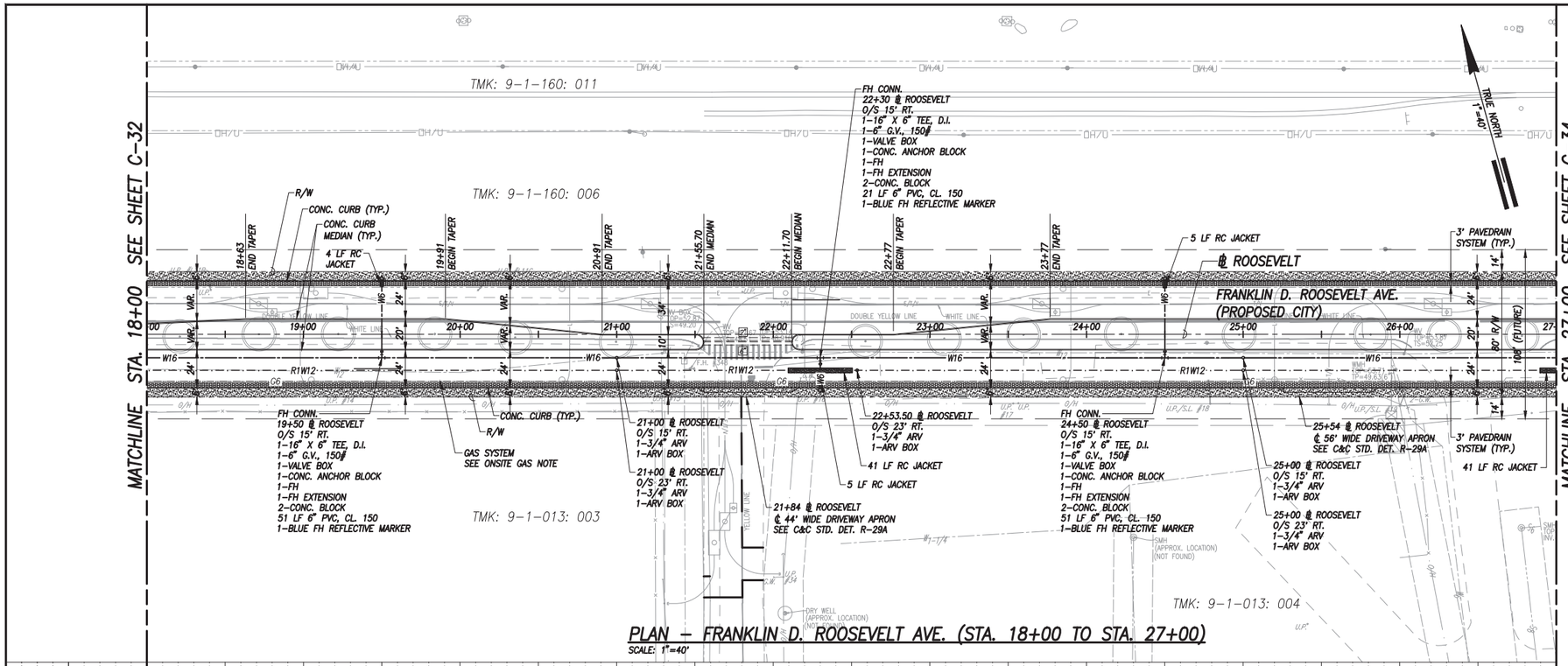
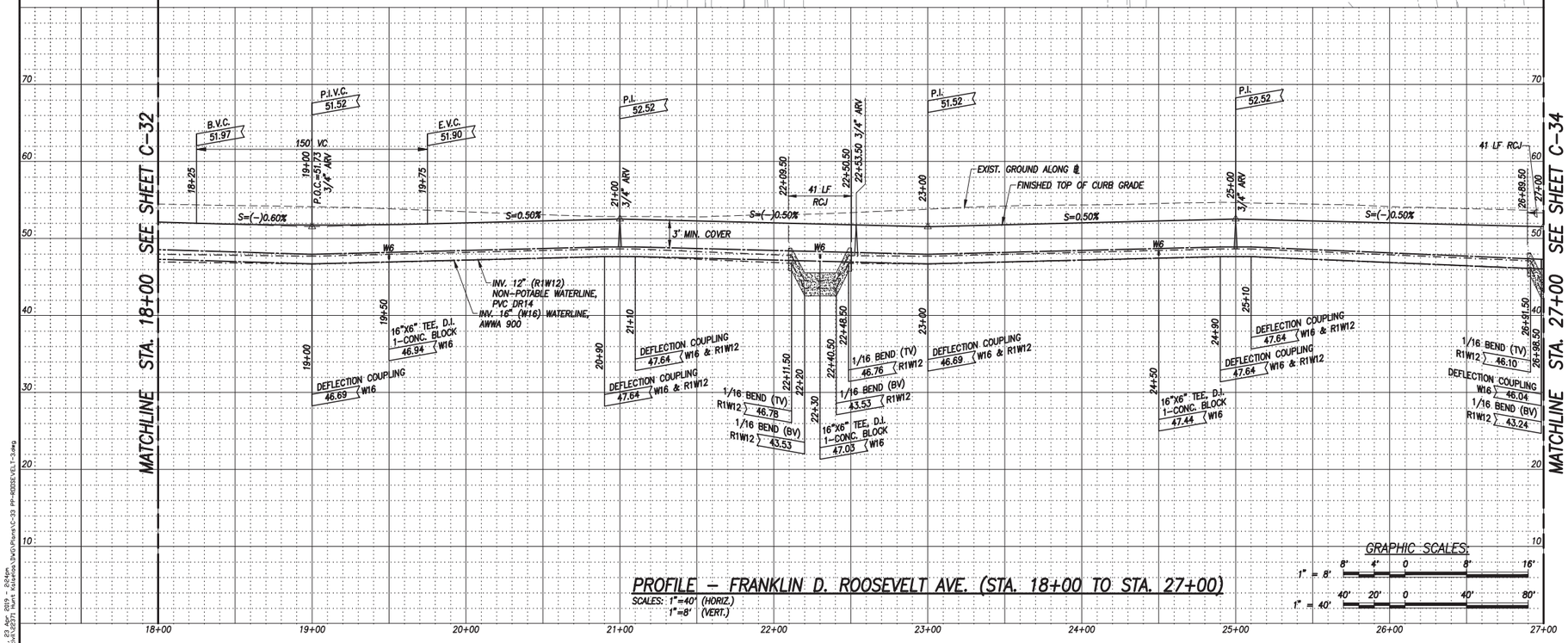


PLAN – FRANKLIN D. ROOSEVELT AVE. (STA. 18+00 TO STA. 27+00)

SCALE: 1"=40'



PROFILE – FRANKLIN D. ROOSEVELT AVE. (STA. 18+00 TO STA. 27+00)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
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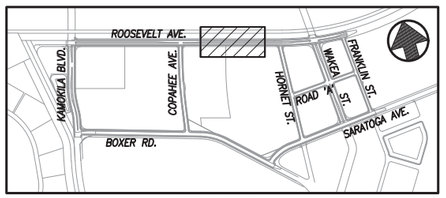
LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 3
FRANKLIN D. ROOSEVELT AVENUE
(STA. 18+00 TO STA. 27+00)

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SIGNATURE — DATE 04/20

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE
CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 2:24pm
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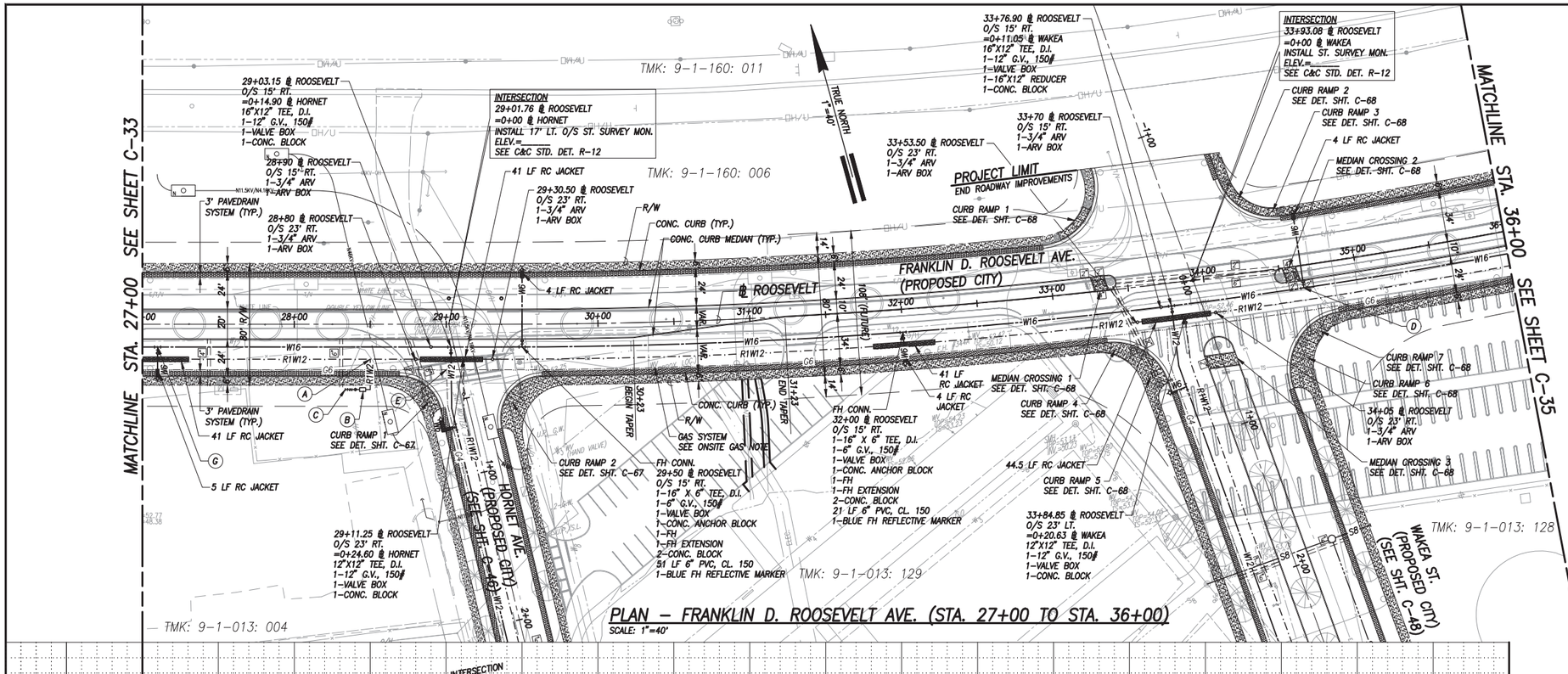
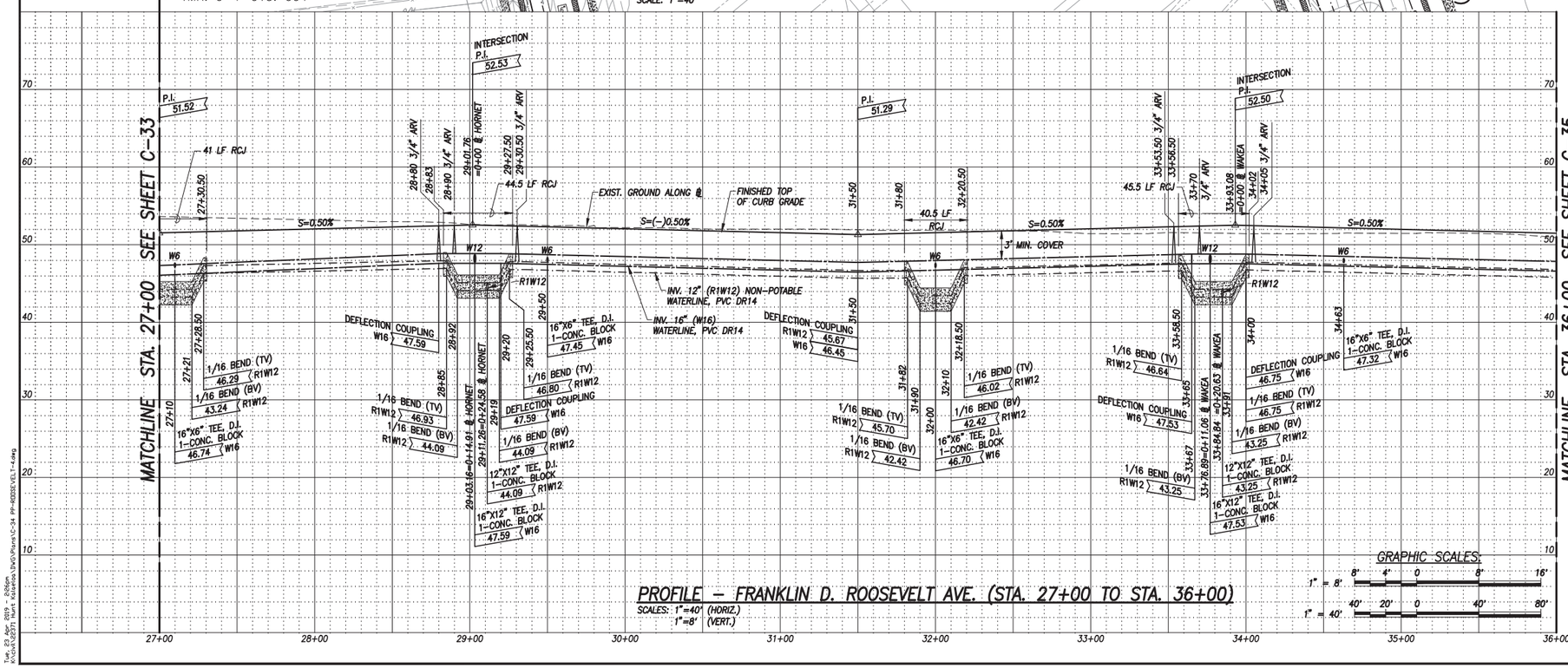


PLAN – FRANKLIN D. ROOSEVELT AVE. (STA. 27+00 TO STA. 36+00)

SCALE: 1"=40'



PROFILE – FRANKLIN D. ROOSEVELT AVE. (STA. 27+00 TO STA. 36+00)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

(A) 28+50 @ ROOSEVELT
O/S 23' RT.
CONTRACTOR TO INSTALL TYPE D LATERAL, BLIND METER SPLICE LENGTH TO ACCOMODATE A 1-1/2" METER AND ALL APPURTENANCES IN ACCORDANCE WITH BWS STD. DET. L-15.
1-TYPE "III" METER BOX
1-2" G.V.
1-TYPE 'B' METER BOX

(B) INSTALL BWS APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER AFTER THE METER PRIOR TO ANY BRANCHES OR TEES PER BWS STD. DET. V-9

(C) CAP AND MARK R1W2
8+33 @ ROOSEVELT
O/S 43' RT.

(D) FH CONN.
34+64.5 @ ROOSEVELT
O/S 15' RT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
51 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(E) 29+00 @ ROOSEVELT
O/S 30' RT.
1-6"X4" GAS TEE

(F) 33+72 @ ROOSEVELT
O/S 30' RT.
1-6"X4" GAS TEE

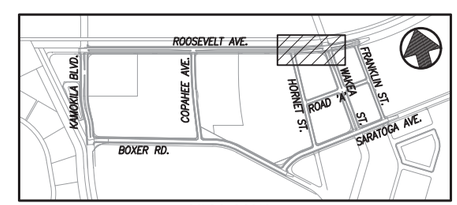
(G) FH CONN.
27+10 @ ROOSEVELT
O/S 15' RT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
21 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCHING, PIPE BEDDING AND BACKFILLING FOR INSTALLATION OF THE GAS LINES. HAWAII GAS WILL INSTALL THE GAS LINE AND PROVIDE ALL PIPING, VALVES AND APPURTENANCES. THE CONTRACTOR SHALL COORDINATE INSTALLATION WITH HAWAII GAS.

LEGEND:

IRRIGATION SLEEVE & SIZE	6
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 4
FRANKLIN D. ROOSEVELT AVENUE
(STA. 27+00 TO STA. 36+00)

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SIGNATURE — DATE 04/20

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE
CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 2:06pm
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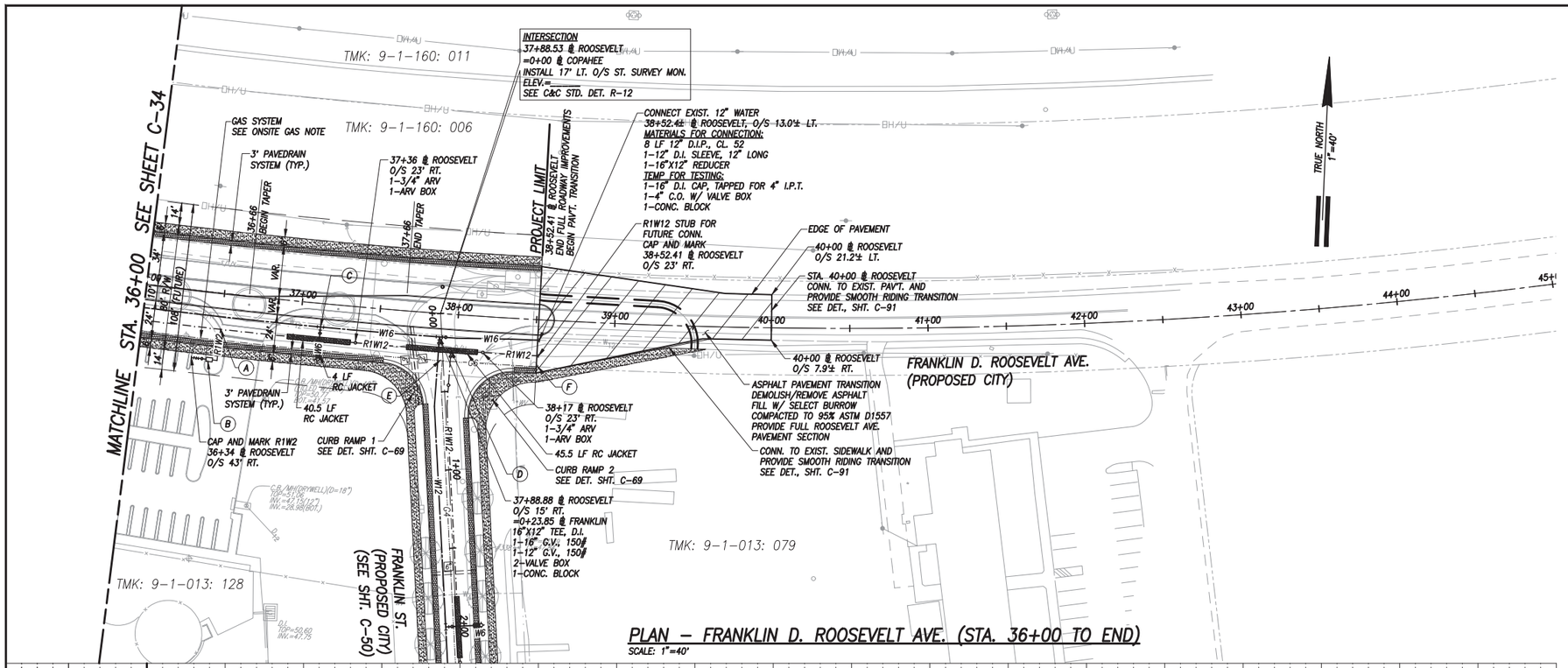

PLAN – FRANKLIN D. ROOSEVELT AVE. (STA. 36+00 TO END)

SCALE: 1"=40'

(A) 36+50 @ ROOSEVELT
O/S 24' RT.
CONTRACTOR TO INSTALL TYPE D LATERAL, BLIND METER SPLICE LENGTH TO ACCOMODATE A 1-1/2" METER AND ALL APPURTENANCES IN ACCORDANCE WITH BWS STD. DET. L-15.
1-TYPE "III" METER BOX
1-2" G.V.
1-TYPE 'B' METER BOX

(B) INSTALL BWS APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER AFTER THE METER PRIOR TO ANY BRANCHES OR TEES PER BWS STD. DET. V-9

(C) FH CONN.
37+13 @ ROOSEVELT
O/S 15' RT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
51 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(D) 37+96.83 @ ROOSEVELT
O/S 23' RT.
=0+14.93 @ FRANKLIN
12"X12" TEE, D.I.
2-12" G.V., 150#
2-VALVE BOX
1-CONC. BLOCK

(E) 37+90.35 @ ROOSEVELT
O/S 30' RT.
1-6"X4" GAS TEE

(F) 38+52.40 @ ROOSEVELT
O/S 30' RT.
END G6
INV.=XX.XX
1-6" GAS CAP AND MARKER

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
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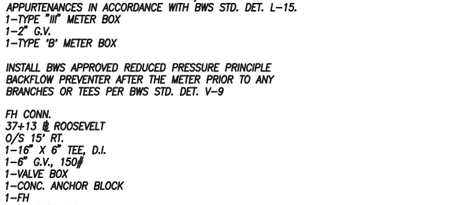
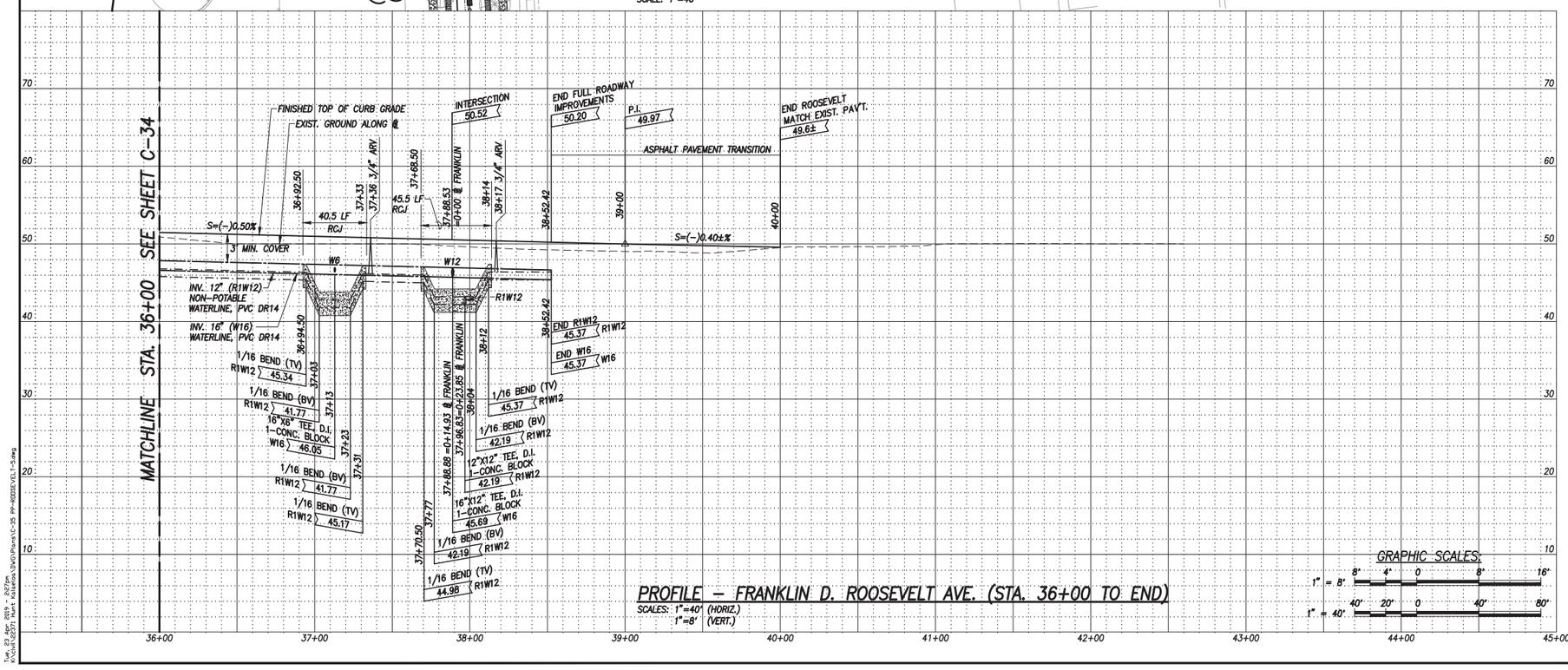
LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
PAVEDRAIN SYSTEM	



KEY MAP



PROFILE – FRANKLIN D. ROOSEVELT AVE. (STA. 36+00 TO END)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

GRAPHIC SCALES:
1" = 8' — 8' 4' 0 8' 16'
1" = 40' — 40' 20' 0 40' 80'

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 5
FRANKLIN D. ROOSEVELT AVENUE
(STA. 36+00 TO END)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE — 04/20 DATE

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE — CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 8:27pm
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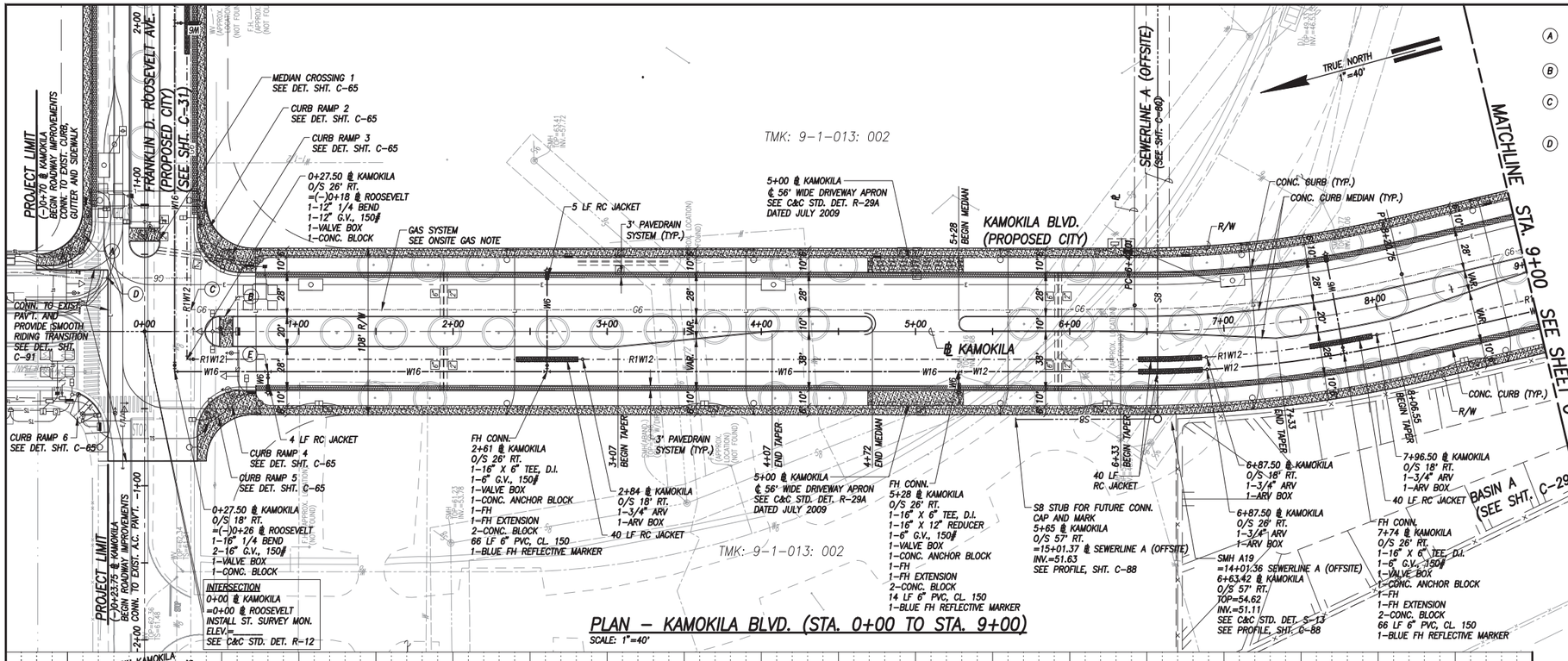
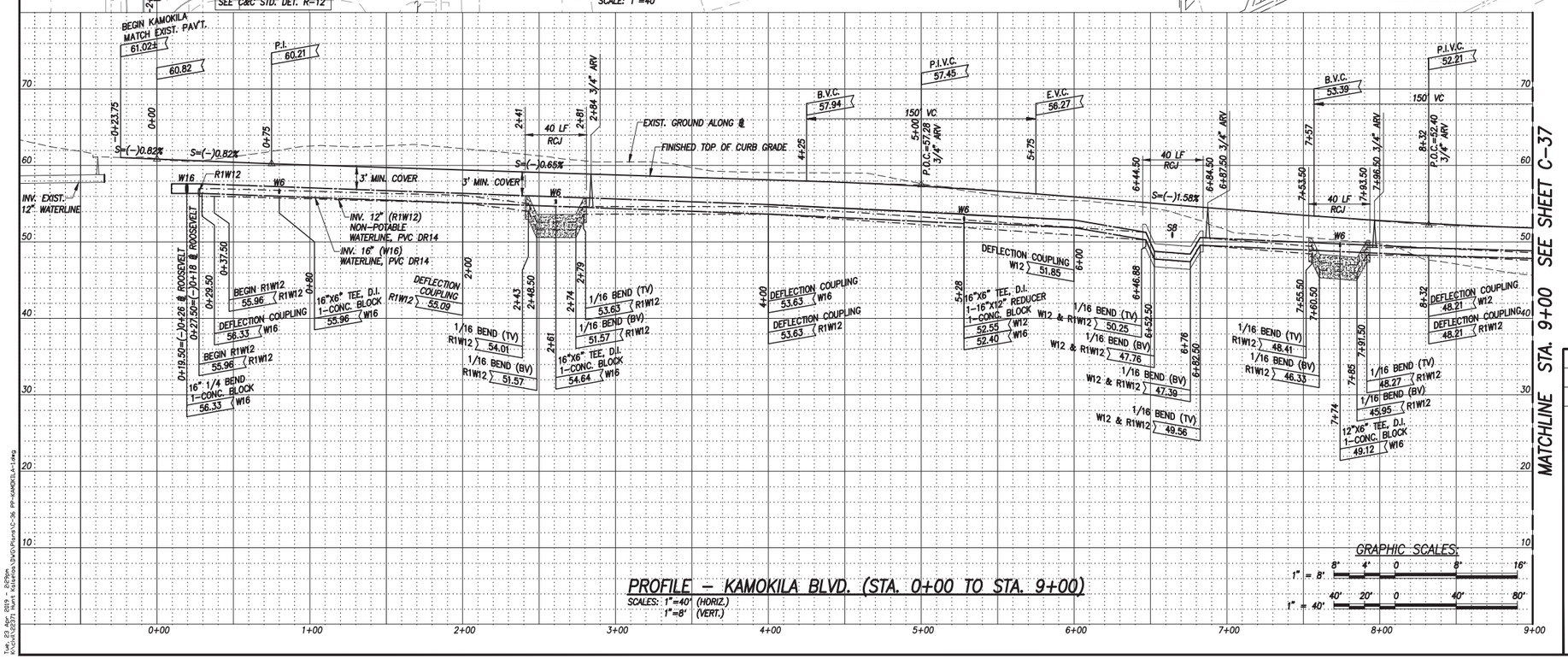


PLAN – KAMOKILA BLVD. (STA. 0+00 TO STA. 9+00)

SCALE: 1"=40'



PROFILE – KAMOKILA BLVD. (STA. 0+00 TO STA. 9+00)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

GRAPHIC SCALES:

1" = 8' 8' 4' 0 8' 16'

1" = 40' 40' 20' 0 40' 80'

(A) CURB RAMP 1
SEE DET. SHT. C-65

(B) MEDIAN CROSSING 2
SEE DET. SHT. C-65

(C) 0+30 @ KAMOKILA
O/S 14.20' LT.
1-6" GAS 1/4 BEND (H)

(D) (–)0+23.75 @ KAMOKILA
O/S 34.75' LT.
END G6
INV.=XX.XX
1-6" CAP AND MARKER

(E) FH CONN.
0+79 @ KAMOKILA
O/S 26' RT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
14 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

NOTES:

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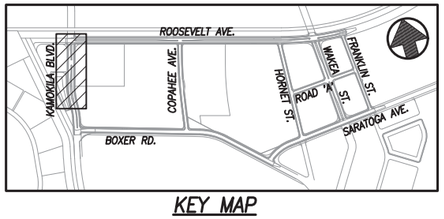
LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 1
KAMOKILA BOULEVARD
(STA. 0+00 TO STA. 9+00)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

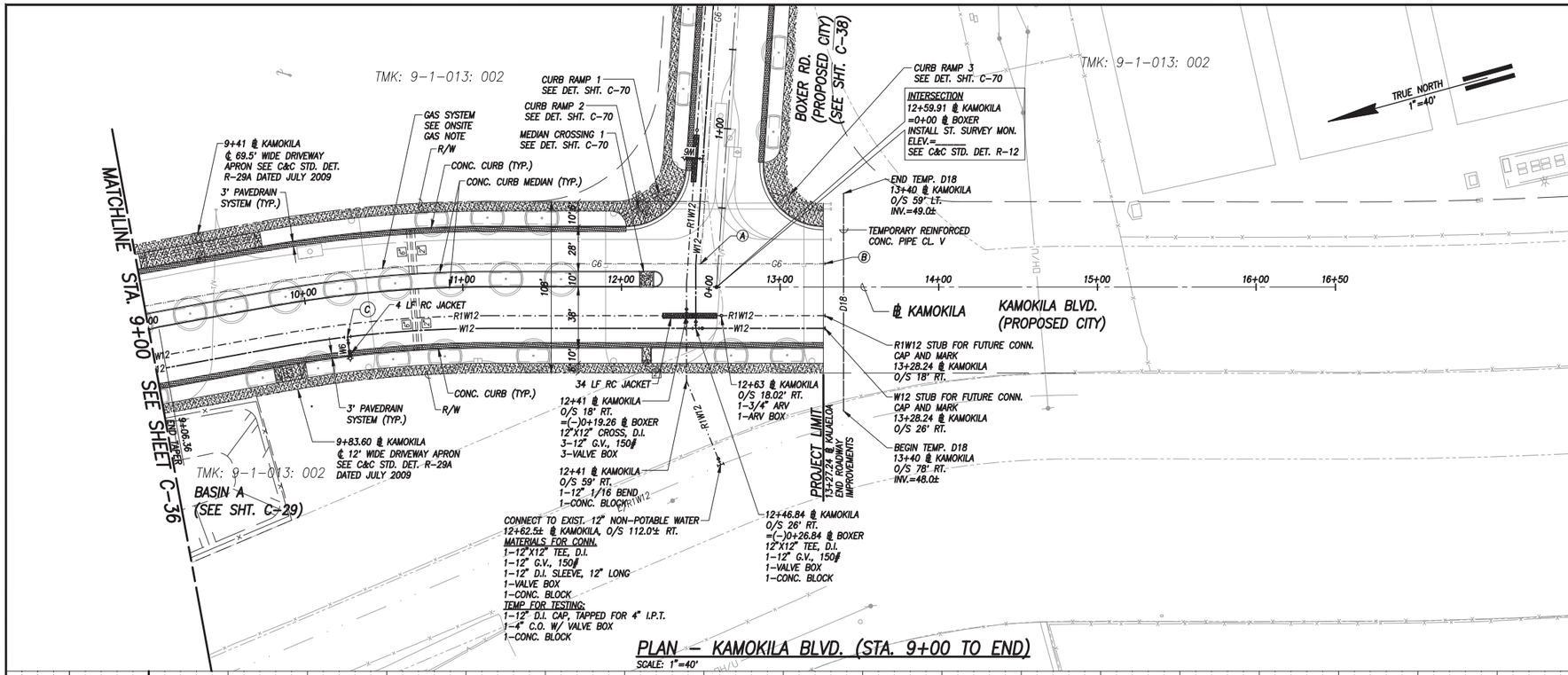
SIGNATURE DATE 04/20

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

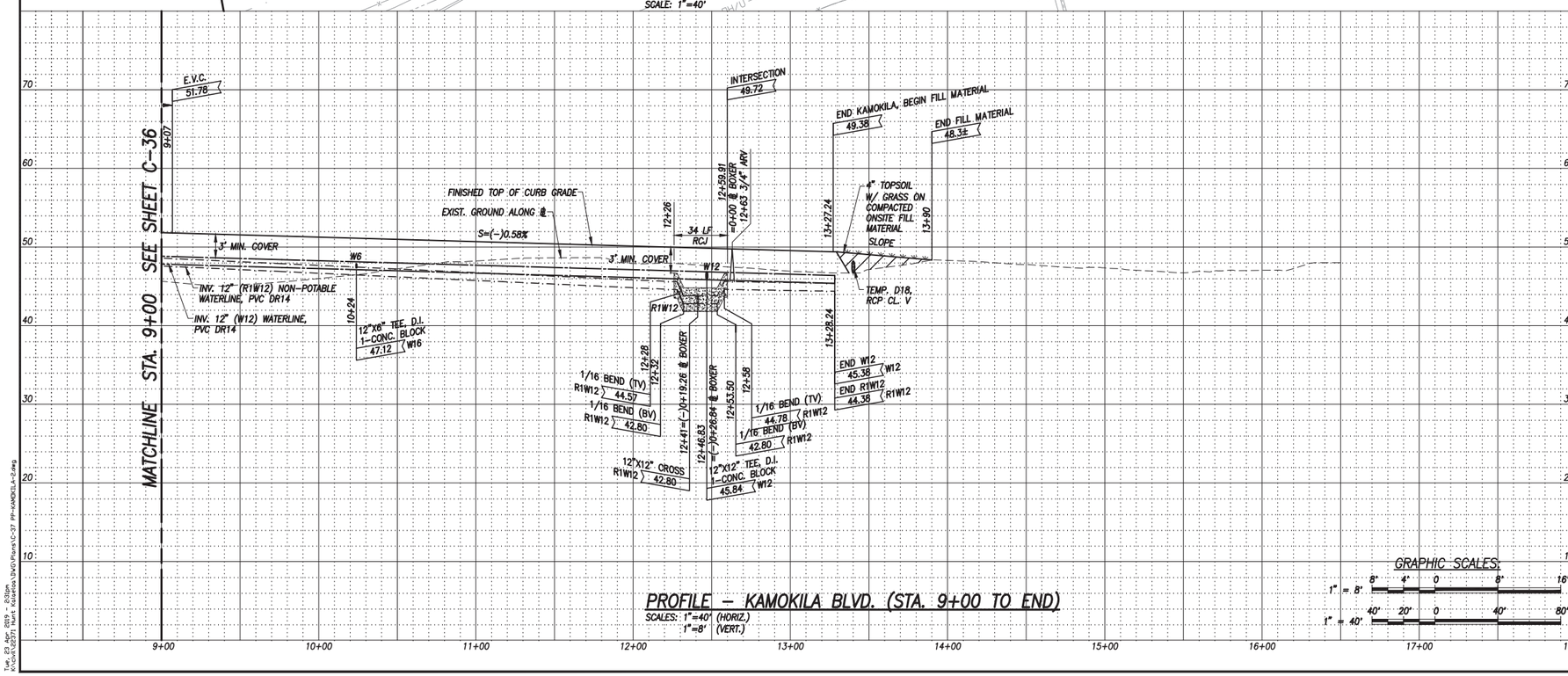
FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 2:29pm
K:\civil\22371 Hunt Kalaeloa\DWG\Plans\C-36 PP-KAMOKILA-1.dwg



PLAN – KAMOKILA BLVD. (STA. 9+00 TO END)

SCALE: 1"=40'



PROFILE – KAMOKILA BLVD. (STA. 9+00 TO END)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

GRAPHIC SCALES:

1" = 8': 8" 4" 0 8" 16"

1" = 40': 40' 20' 0 40' 80'

Ⓐ 12+49.84 @ KAMOKILA
O/S 14.70' LT.
1-6" X 6" GAS TEE

Ⓑ 13+28.22 @ KAMOKILA
O/S 14.70' LT.
END G6
INV.=XX.XX
1-6" CAP AND MARKER

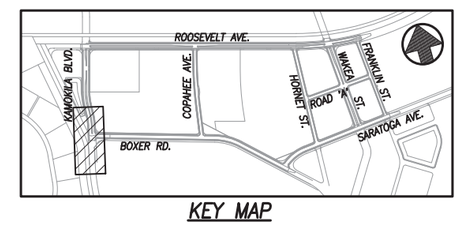
Ⓒ FH CONN.
10+24 @ KAMOKILA
O/S 26' RT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
14 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCHING, PIPE BEDDING AND BACKFILLING FOR INSTALLATION OF THE GAS LINES. HAWAII GAS WILL INSTALL THE GAS LINE AND PROVIDE ALL PIPING, VALVES AND APPURTENANCES. THE CONTRACTOR SHALL COORDINATE INSTALLATION WITH HAWAII GAS.

LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE — DATE 04/20

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

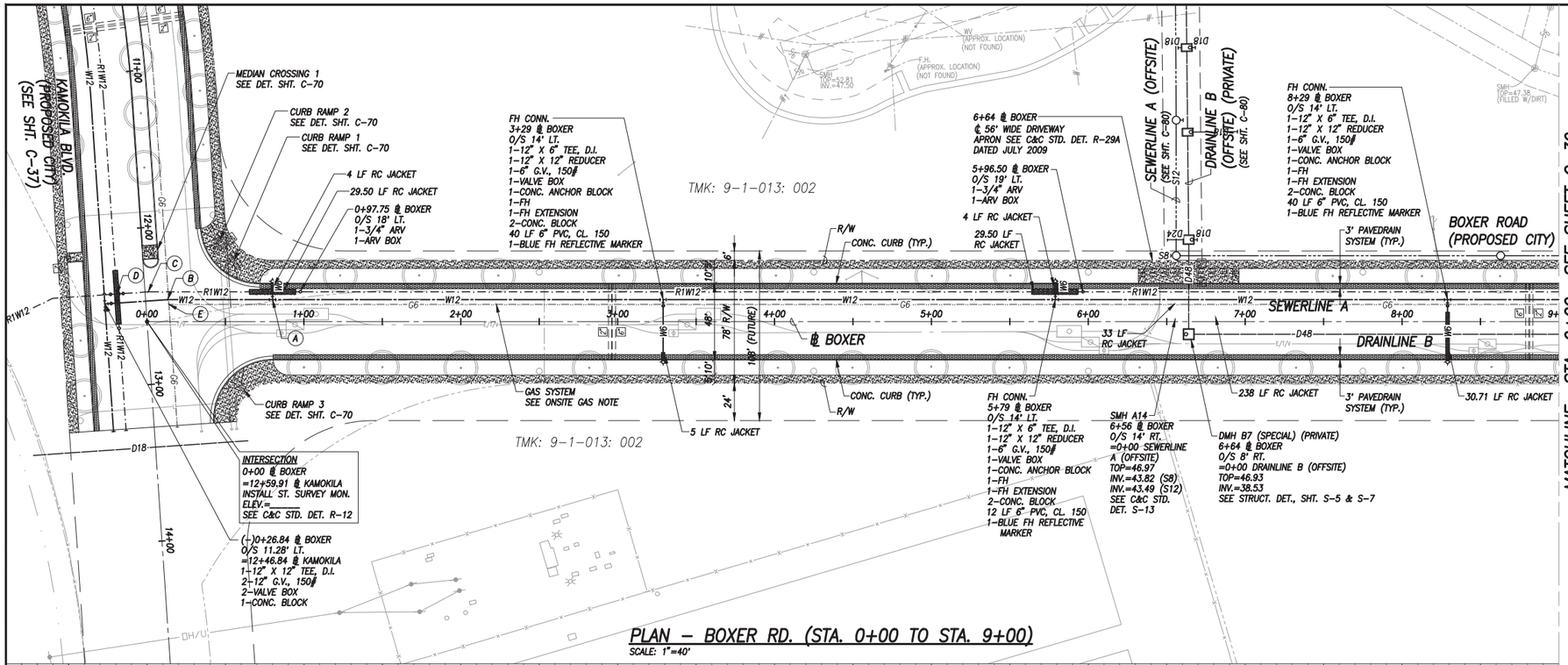
PLAN AND PROFILE – 2
KAMOKILA BOULEVARD
(STA. 9+00 TO END)

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE
CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

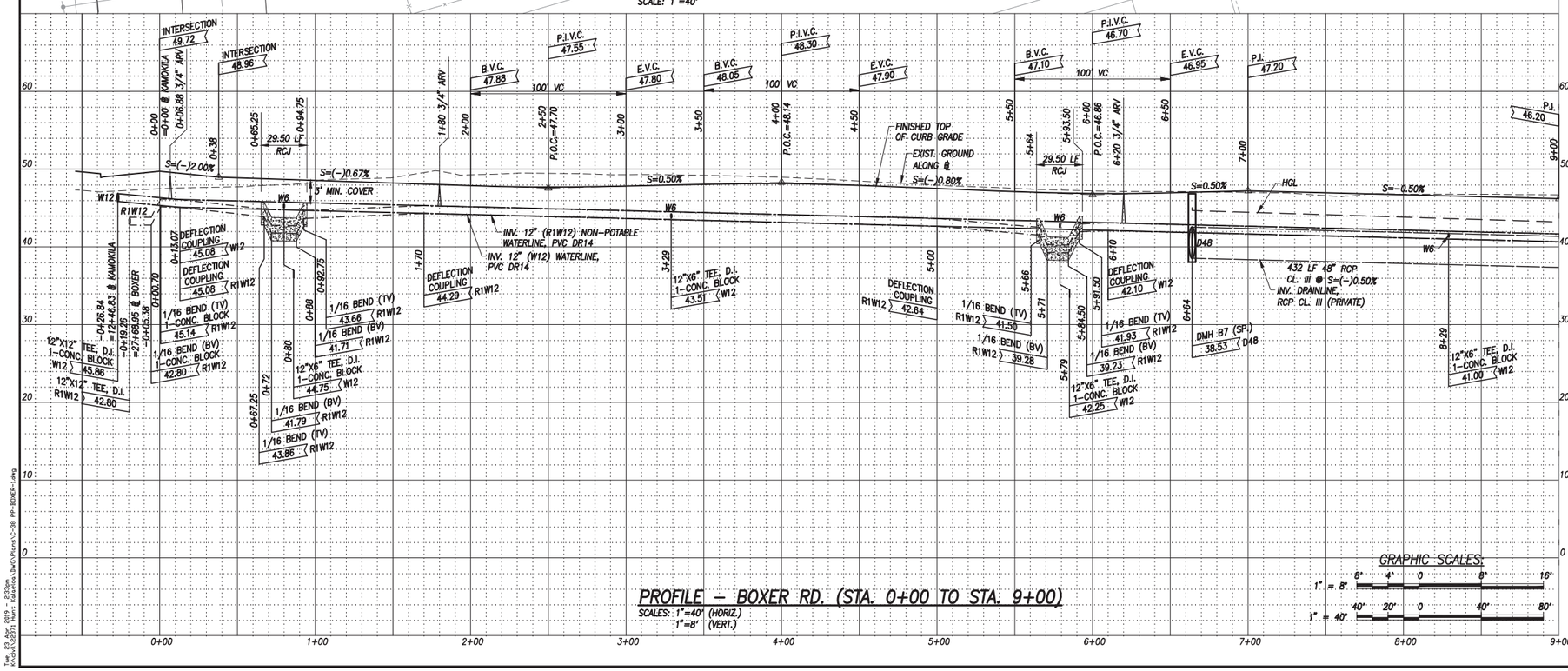
FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 2:32pm
K:\Job\12537\ Hunt Kalaeloa\DWG\Plans\C-37 PP-KAMOKILA-2.dwg



PLAN – BOXER RD. (STA. 0+00 TO STA. 9+00)

SCALE: 1"=40'



PROFILE – BOXER RD. (STA. 0+00 TO STA. 9+00)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

GRAPHIC SCALES:
1" = 8' 8' 4' 0 8' 16'
1" = 40' 40' 20' 0 40' 80'

(A) FH CONN.
0+80 @ BOXER
O/S 14' LT.
1-12" X 6" TEE, D.I.
1-12" X 12" REDUCER
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
12 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(B) DEFLECT 3.9°
0+13.07 @ BOXER
O/S 14' LT.
1-12" DEFLECTION COUPLING

(C) DEFLECT 3.9°
0+00.70 @ BOXER
O/S 19' LT.
1-12" DEFLECTION COUPLING

(D) (-)0+19.26 @ BOXER
O/S 17.64' LT.
=12+41 @ KAMOKILA
1-12" X 12" TEE, D.I.
2-12" G.V., 150#
2-VALVE BOX
1-CONC. BLOCK

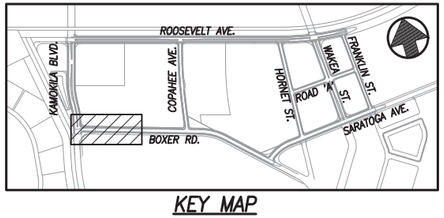
(E) 0+14 @ BOXER
O/S 11' LT.
1-6" X 6" GAS TEE

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCHING, PIPE BEDDING AND BACKFILLING FOR INSTALLATION OF THE GAS LINES. HAWAII GAS WILL INSTALL THE GAS LINE AND PROVIDE ALL PIPING, VALVES AND APPURTENANCES. THE CONTRACTOR SHALL COORDINATE INSTALLATION WITH HAWAII GAS.

LEGEND:

IRRIGATION SLEEVE & SIZE	6
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE — DATE 04/20

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

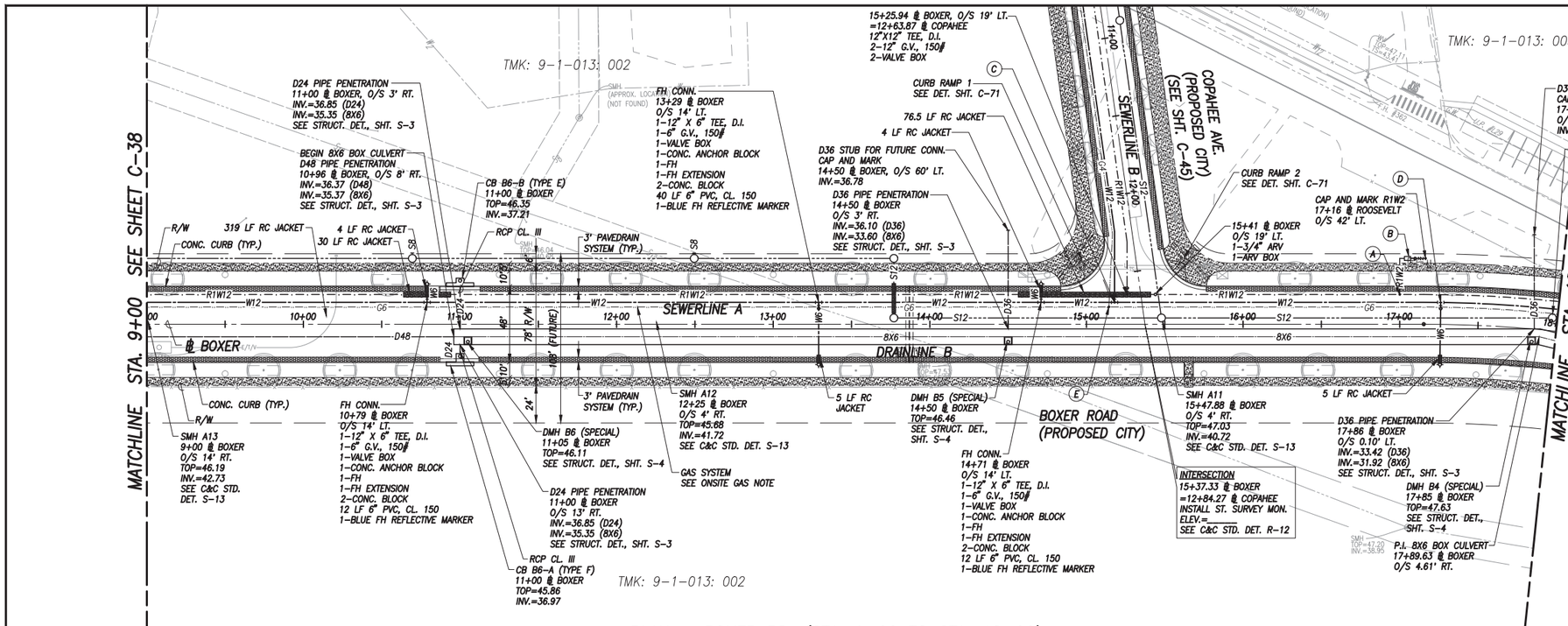
PLAN AND PROFILE – 1
BOXER ROAD
(STA. 0+00 TO STA. 9+00)

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE — CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

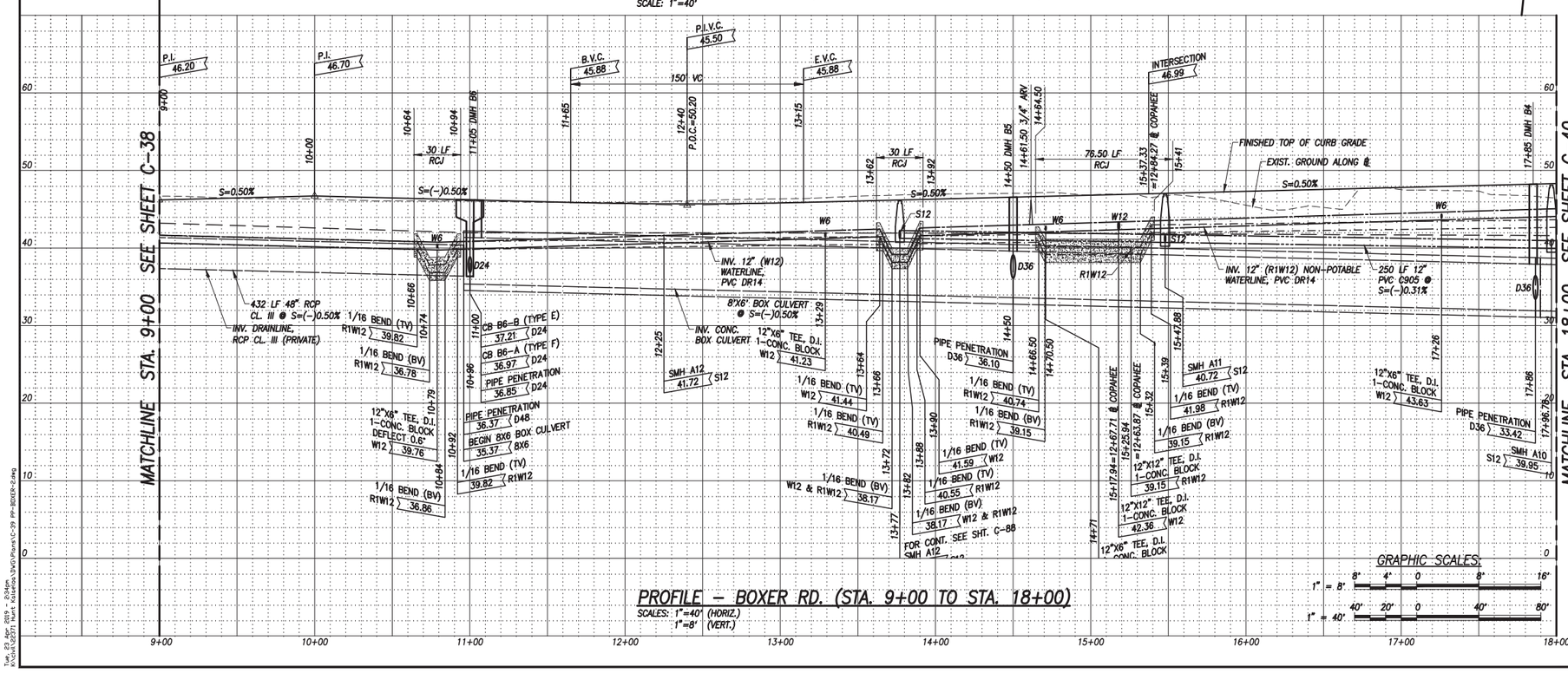
FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 2:33pm
X:\Civil\2537 Hunt Kalaeloa\DWG\Plans\C-38 PP-BOXER-1.dwg



PLAN – BOXER RD. (STA. 9+00 TO STA. 18+00)

SCALE: 1"=40'



PROFILE – BOXER RD. (STA. 9+00 TO STA. 18+00)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

(A) 17+00 @ ROOSEVELT
O/S 19' LT.
CONTRACTOR TO INSTALL TYPE D LATERAL, BLIND METER SPLICE LENGTH TO ACCOMODATE A 1-1/2" METER AND ALL APPURTENANCES IN ACCORDANCE WITH BWS STD. DET. L-15.
1-TYPE "III" METER BOX
1-2" G.V.
1-TYPE "B" METER BOX

(B) INSTALL BWS APPROVED REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER AFTER THE METER PRIOR TO ANY BRANCHES OR TEES PER BWS STD. DET. V-9

(C) 15+17.94 @ BOXER, O/S 17.27
=12+67.71 @ COPAHEE
12"X12" TEE, D.I.
2-12" G.V., 150#
2-VALVE BOX
1-CONC. BLOCK

(D) FH CONN.
17+26 @ BOXER, O/S 14' LT.
1-12" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
40 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

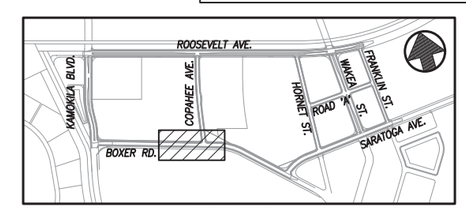
(E) 12+70.15 @ BOXER
O/S 21.30' RT.
1-6" X 4" GAS TEE

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCHING, PIPE BEDDING AND BACKFILLING FOR INSTALLATION OF THE GAS LINES. HAWAII GAS WILL INSTALL THE GAS LINE AND PROVIDE ALL PIPING, VALVES AND APPURTENANCES. THE CONTRACTOR SHALL COORDINATE INSTALLATION WITH HAWAII GAS.

LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 2 BOXER ROAD (STA. 9+00 TO STA. 18+00)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE — DATE 04/20

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE
CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 8:34am
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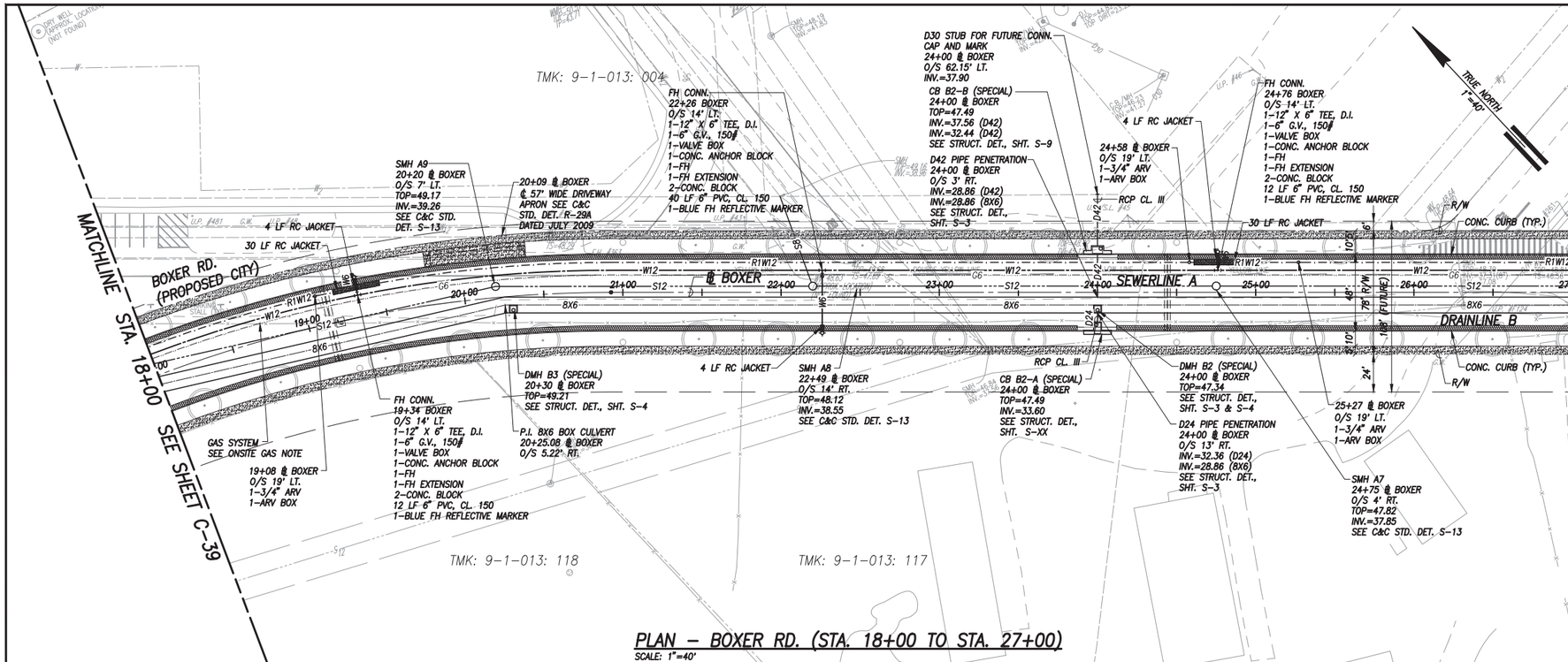
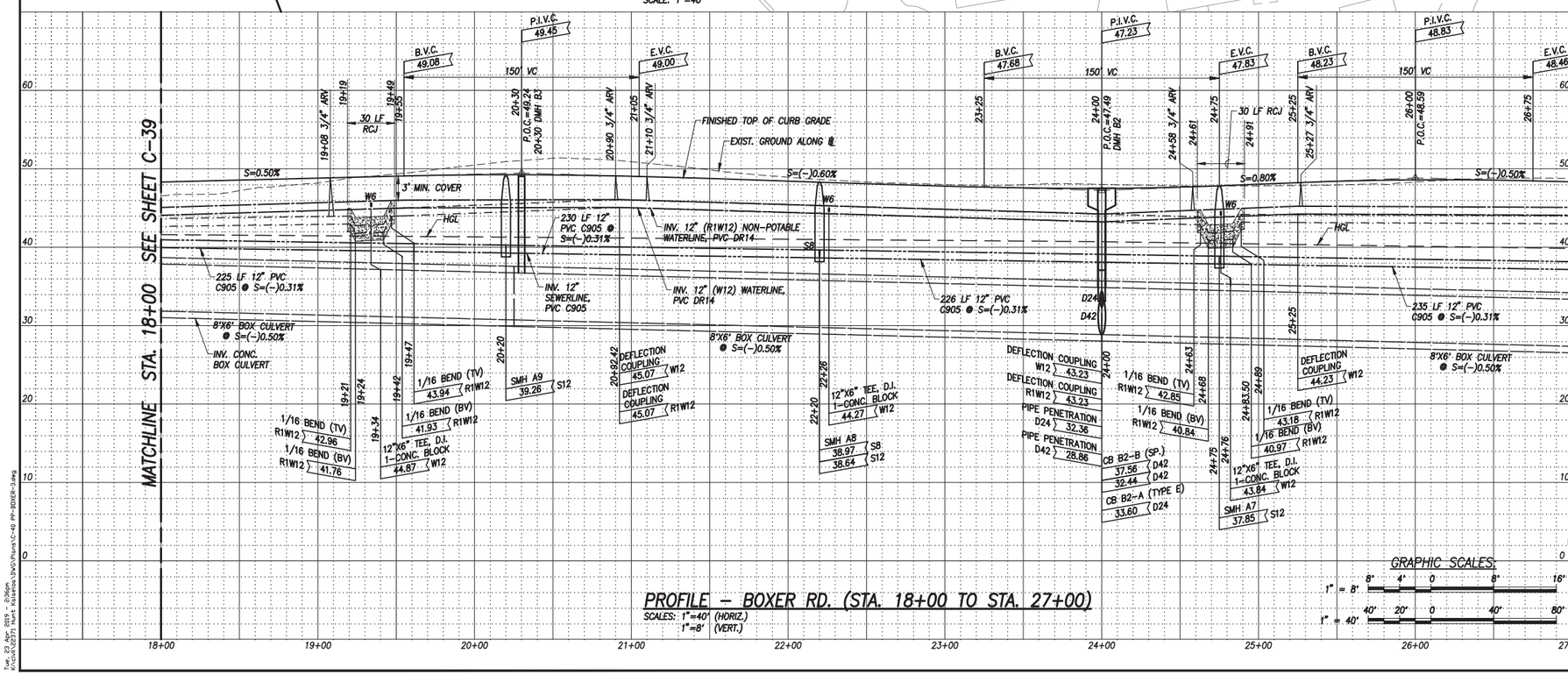


PLAN – BOXER RD. (STA. 18+00 TO STA. 27+00)

SCALE: 1"=40'



PROFILE – BOXER RD. (STA. 18+00 TO STA. 27+00)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
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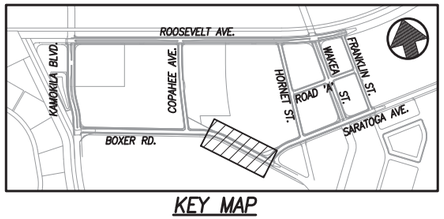
LEGEND:

IRRIGATION SLEEVE & SIZE	6
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 3 BOXER ROAD (STA. 18+00 TO STA. 27+00)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE — DATE 04/20

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE
CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

FILE	POCKET	FOLDER	NO.

Tue, 23 Apr 2019 - 8:06am
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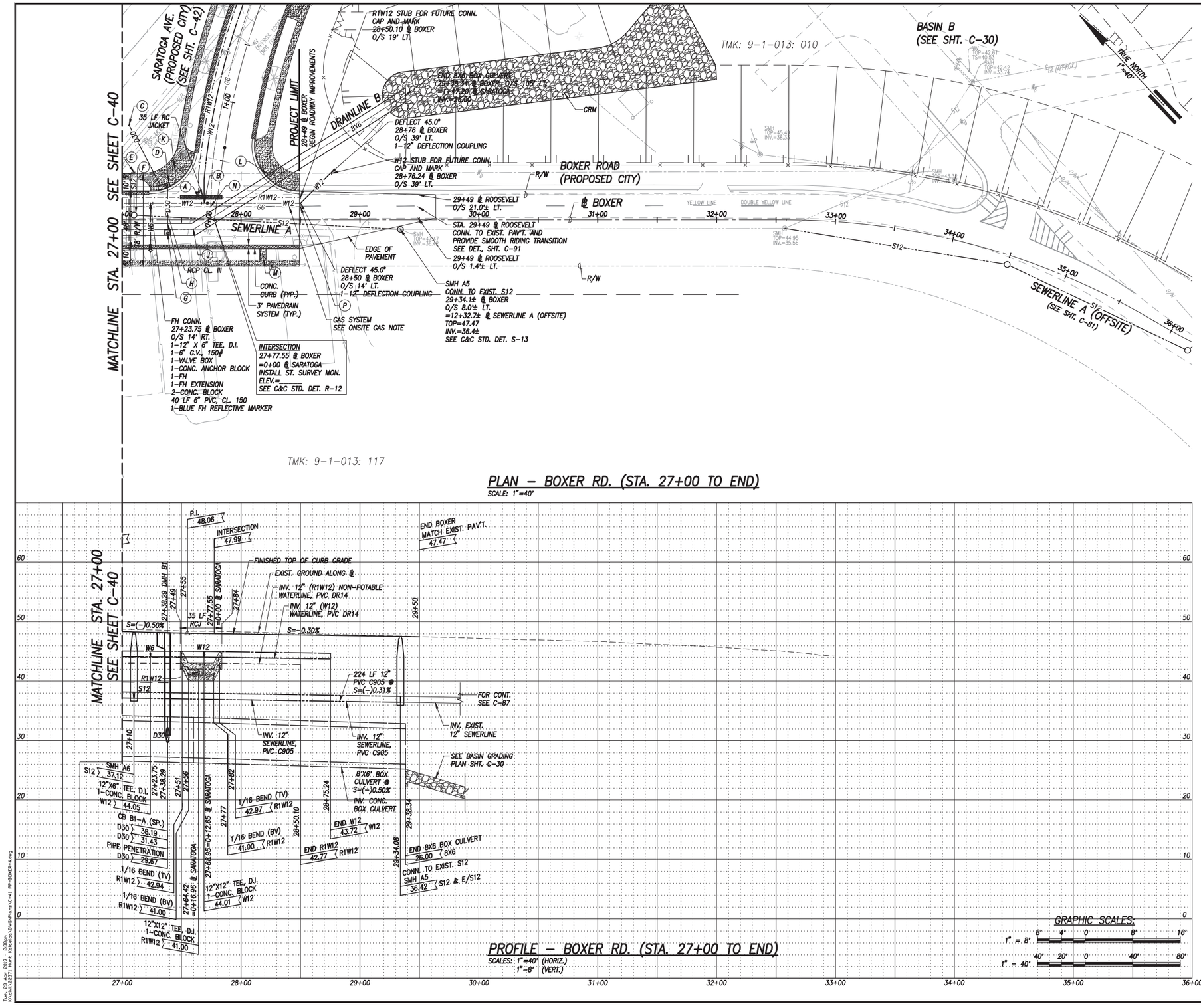

PLAN – BOXER RD. (STA. 27+00 TO END)

SCALE: 1"=40'

PROFILE – BOXER RD. (STA. 27+00 TO END)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

GRAPHIC SCALES:
1" = 8' 8' 4' 0 8' 16'
1" = 40' 40' 20' 0 40' 80'

(A) 27+64.42 @ BOXER O/S 19' LT. =0+16.96 @ SARATOGA 12"X12" TEE, D.I. 2-12" G.V., 150# 2-VALVE BOX 1-CONC. BLOCK

(B) 27+68.95 @ BOXER O/S 14' LT. =0+12.65 @ SARATOGA 12"X12" TEE, D.I. 2-12" G.V., 150# 2-VALVE BOX 1-CONC. BLOCK

(C) D30 STUB FOR FUTURE CONN. CAP AND MARK 25+05.79 @ BOXER O/S 79.88' RT. INV.=38.81

(D) CB B1-A (SPECIAL) 27+35.83 @ BOXER O/S 25.97' LT. TOP=41.18 INV.=38.19 (D30) INV.=31.43 (D30) SEE STRUCT. DET., SHT. S-XX

(E) S8 STUB FOR FUTURE CONN. CAP AND MARK 27+10 @ BOXER O/S 40' LT. TOP=48.27 INV.=36.76

(F) SMH B2 28+00 @ BOXER O/S 13' LT. TOP=47.72 INV.=36.84 SEE C&C STD. DET. S-13

(G) DMH B1 (SPECIAL) 27+38.29 @ BOXER TOP=47.98 SEE STRUCT. DET., SHT. S-3 & S-4

(H) D30 PIPE PENETRATION 27+38.29 @ BOXER O/S 3' RT. INV.=29.67 (D30) INV.=27.17 (8X6) SEE STRUCT. DET., SHT. S-3

(J) P.I. 8X6 BOX CULVERT 27+60.04 @ BOXER O/S 8' RT.

(K) CURB RAMP 1 STD. DET. SHT. C-72

(L) CURB RAMP 2 STD. DET. SHT. C-72

(M) CURB RAMP 3 STD. DET. SHT. C-72

(N) 27+74.43 @ BOXER O/S 11' LT. 1-6"X6" GAS TEE

(P) 28+50 @ BOXER O/S 11' LT. END G6 INV.=XX.XX 1-6" GAS CAP AND MARKER

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
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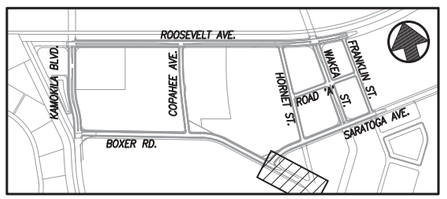
LEGEND:

IRRIGATION SLEEVE & SIZE	6
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 4 BOXER ROAD (STA. 27+00 TO END)

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

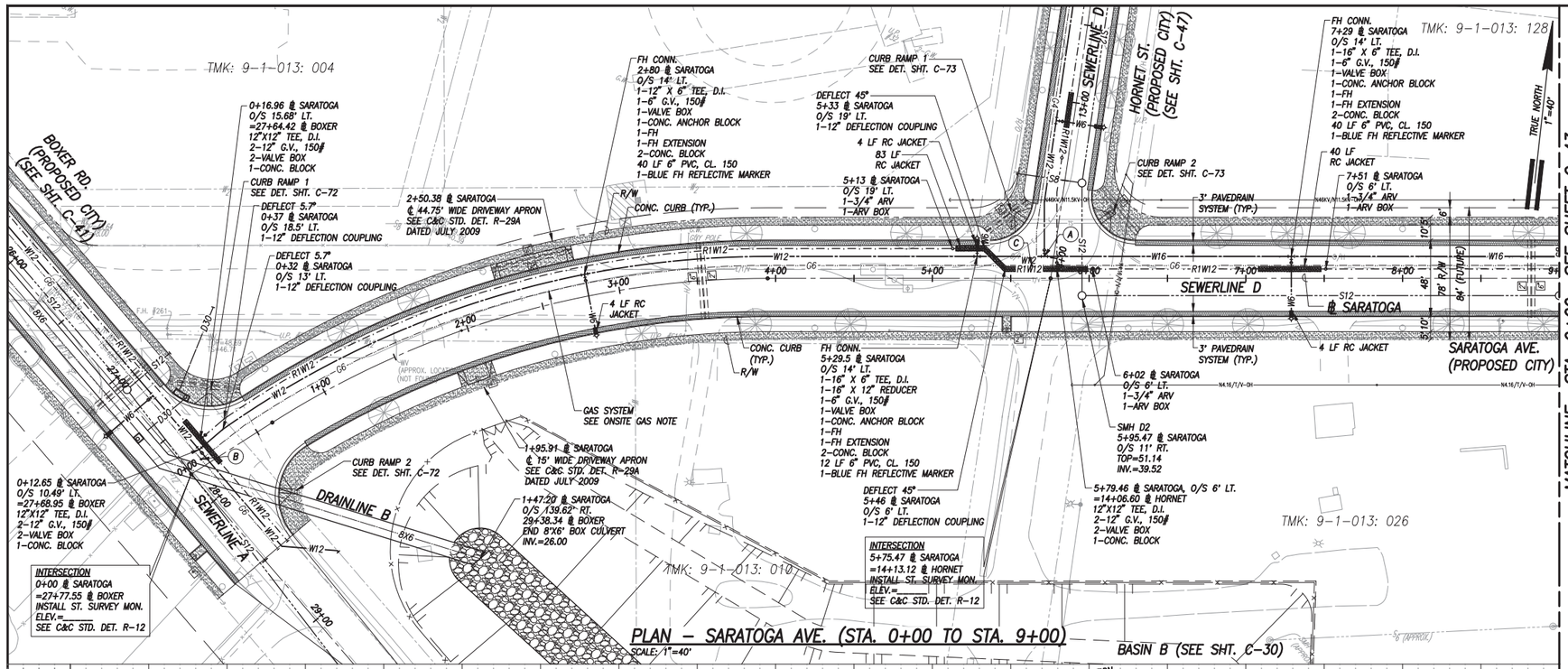
SIGNATURE DATE 04/20

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

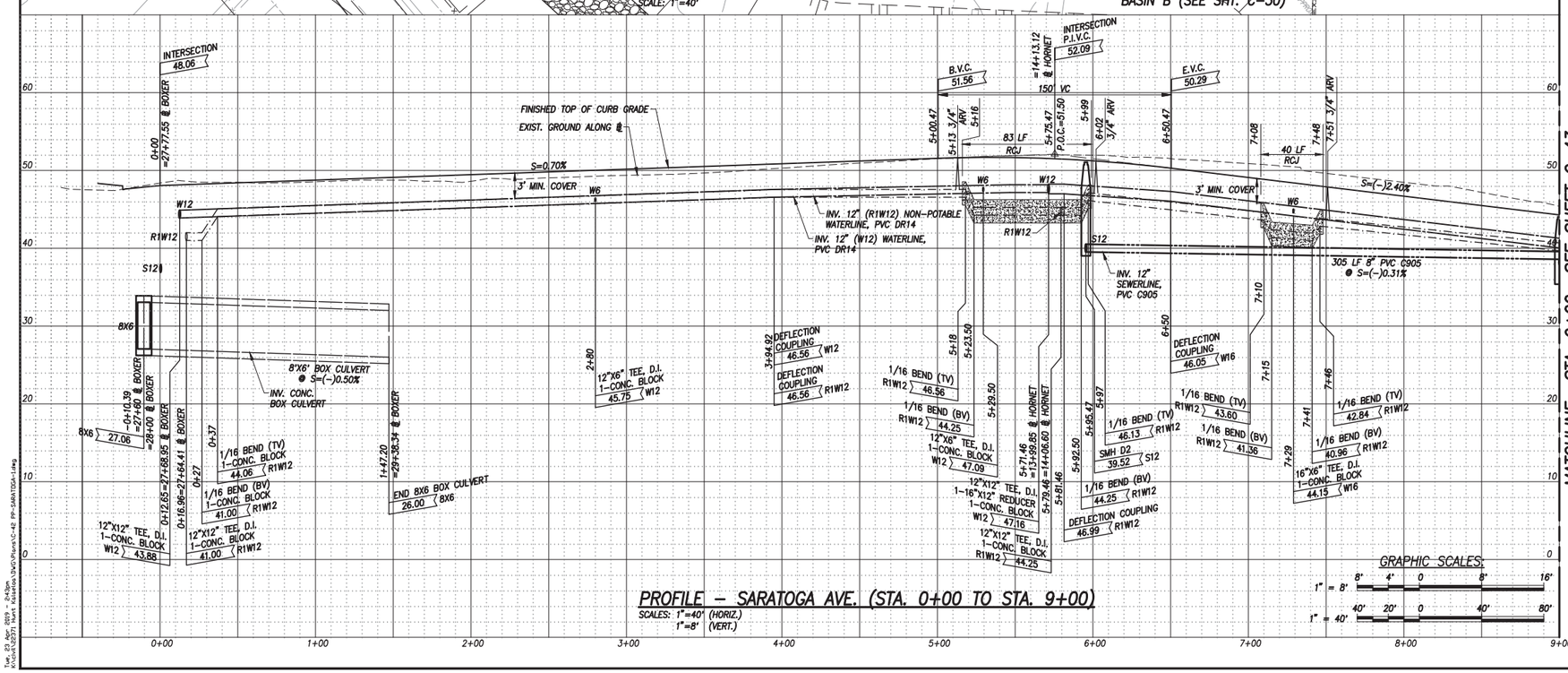
Tue, 23 Apr 2019 - 2:08pm
K:\Civil\32371 Hunt Kalaeloa\DWG\Plans\C-41 PP-BOXER-4.dwg

FILE	POCKET	FOLDER	NO.



PLAN – SARATOGA AVE. (STA. 0+00 TO STA. 9+00)

SCALE: 1"=40'



PROFILE – SARATOGA AVE. (STA. 0+00 TO STA. 9+00)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

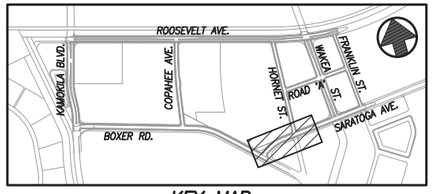
GRAPHIC SCALES:
1" = 8' 8' 4' 0 8' 16'
1" = 40' 40' 20' 0 40' 80'

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCHING, PIPE BEDDING AND BACKFILLING FOR INSTALLATION OF THE GAS LINES. HAWAII GAS WILL INSTALL THE GAS LINE AND PROVIDE ALL PIPING, VALVES AND APPURTENANCES. THE CONTRACTOR SHALL COORDINATE INSTALLATION WITH HAWAII GAS.

LEGEND:

IRRIGATION SLEEVE & SIZE	6
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" AS DEFINED IN CHAPTER 464-1.5, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE 04/20 DATE

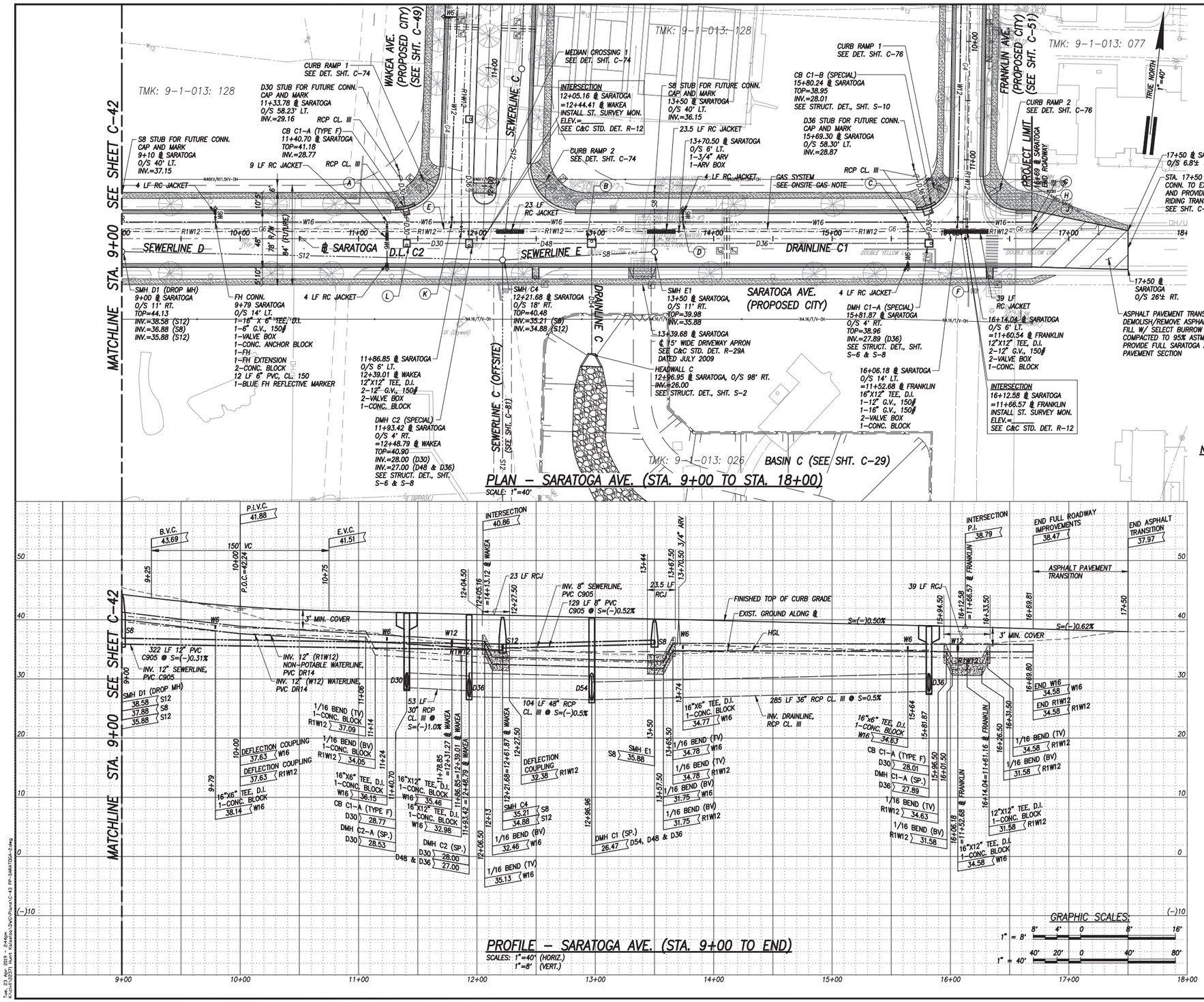
PLAN AND PROFILE – 1
SARATOGA AVENUE
(STA. 0+00 TO STA. 9+00)

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

FILE	POCKET	FOLDER	NO.

Tue 23 Apr 2019 - 2:42pm
K:\Cad\12071 Hunt Kalaeloa\DWG\Plans\C-42 PP-SARATOGA-1.dwg



(A) FH CONN.
11+24 SARATOGA
O/S 14' LT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
40 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(B) DMH C1 (SPECIAL)
12+96.96 @ SARATOGA
O/S 4' RT.
TOP=40.38
INV.=26.47
SEE STRUCT. DET., SHT. S-6 & S-8

(C) FH CONN.
15+64 @ SARATOGA
O/S 14' LT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
40 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(D) FH CONN.
13+74 SARATOGA, O/S 14' LT.
1-16" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
12 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(E) 11+72 @ SARATOGA
O/S 8.30' LT.
1-6"X4" GAS TEE

(F) 16+08.52 @ SARATOGA
O/S 8.30' LT.
1-6"X4" GAS TEE

(G) W16 STUB FOR FUTURE CONN.
CAP AND MARK
16+70 @ SARATOGA
O/S 14' LT.

(H) 16+70 @ SARATOGA
O/S 8.30' LT.
END G6
INV.=XX.XX
1-6" GAS CAP AND MARKER

(J) R1W12 STUB FOR FUTURE CONN.
CAP AND MARK
16+70 @ SARATOGA
O/S 6' LT.

(K) 11+78.85 @ SARATOGA
O/S 14' LT.
12+31.27 @ WAKEA
16"X12" TEE, D.I.
1-16" G.V., 150#
1-12" G.V., 150#
2-VALVE BOX
1-CONC. BLOCK

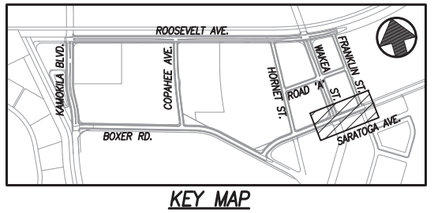
(L) DMH C2-A (SPECIAL)
11+40.70 @ SARATOGA
O/S 4' RT.
TOP=41.17
INV.=28.53
SEE STRUCT. DET., SHT. S-XX & S-XX

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRENCHING, PIPE BEDDING AND BACKFILLING FOR INSTALLATION OF THE GAS LINES. HAWAII GAS WILL INSTALL THE GAS LINE AND PROVIDE ALL PIPING, VALVES AND APPURTENANCES. THE CONTRACTOR SHALL COORDINATE INSTALLATION WITH HAWAII GAS.

LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu, Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

SIGNATURE — DATE 04/20

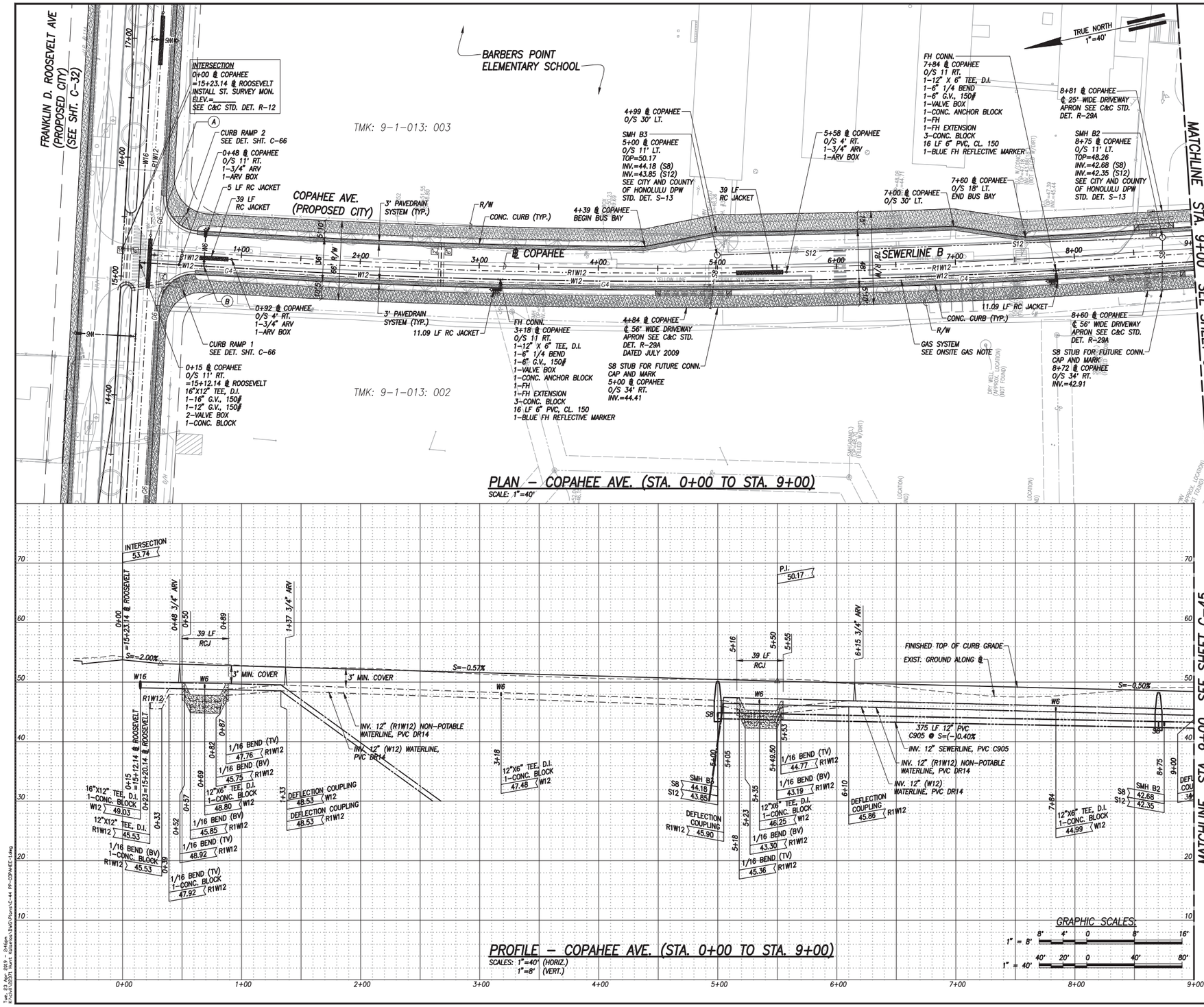
PLAN AND PROFILE – 2
SARATOGA AVENUE
(STA. 9+00 TO END)

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE
CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

FILE	POCKET	FOLDER	NO.

Tue 22 Apr 2019 2:45pm
K:\Civil\2017\ Hunt Kalaeloa\PD\Plans\C-43 PP-SARATOGA-2.dwg



PLAN – COPAHEE AVE. (STA. 0+00 TO STA. 9+00)

SCALE: 1"=40'

PROFILE – COPAHEE AVE. (STA. 0+00 TO STA. 9+00)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
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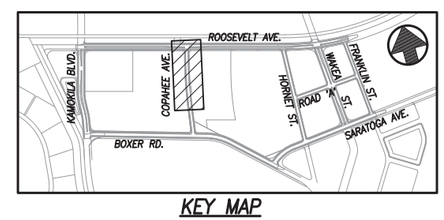
LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

APPROVED

DEPARTMENT OF EDUCATION DATE

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu, Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 1
COPAHEE AVENUE
(STA. 0+00 TO STA. 9+00)

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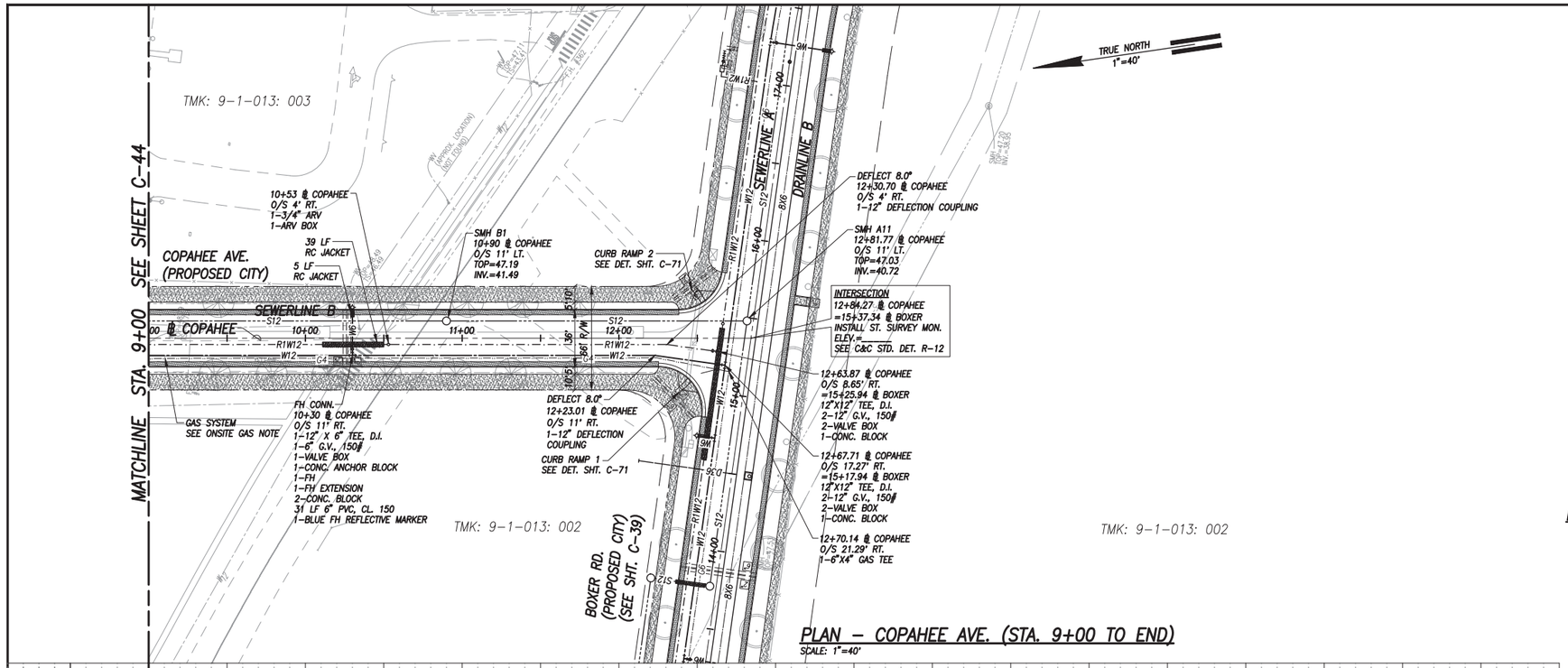
SIGNATURE 04/20 DATE

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

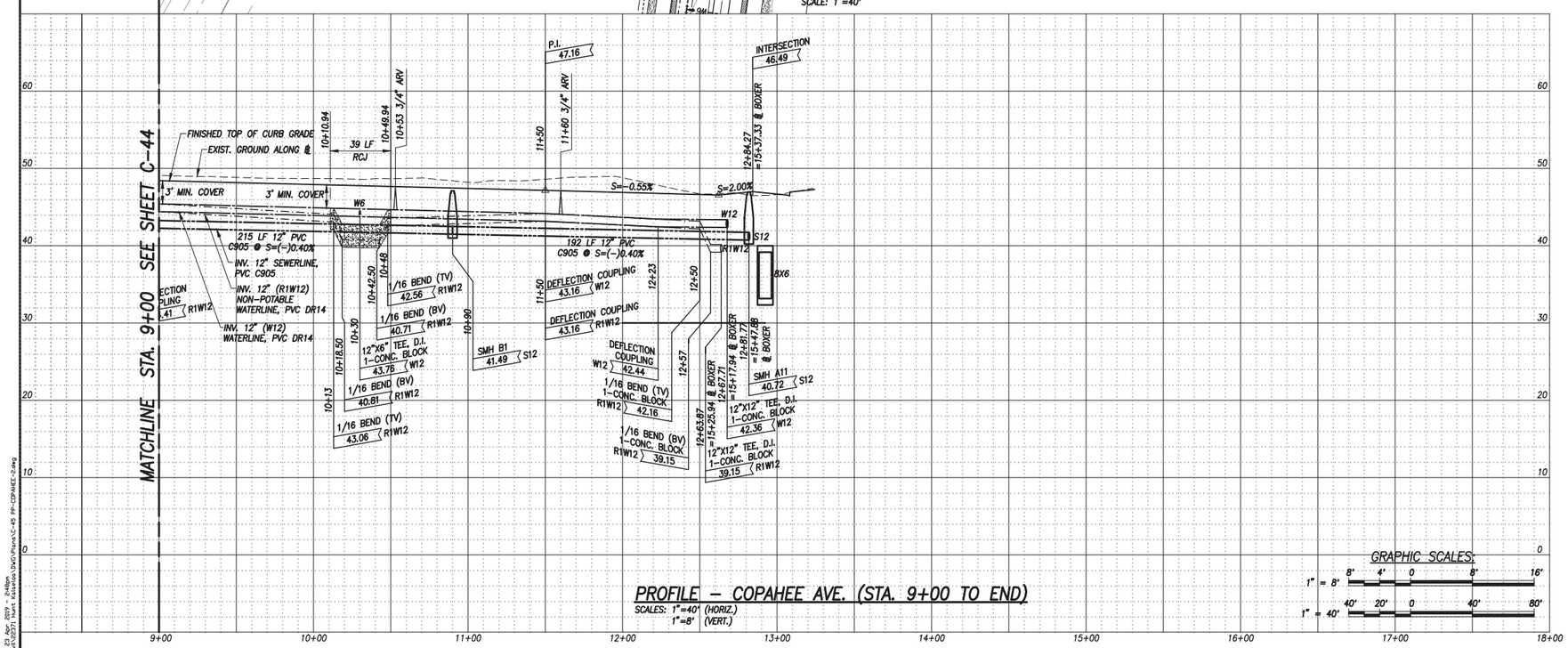
FILE	POCKET	FOLDER	NO.

Tue 22 Apr 2019 8:45pm
K:\Cad\42071 Hunt Kalaeloa\DWG\Plans\C-44 PP-COPAHEE-1.dwg



PLAN – COPAHEE AVE. (STA. 9+00 TO END)

SCALE: 1"=40'



PROFILE – COPAHEE AVE. (STA. 9+00 TO END)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

GRAPHIC SCALES:
1" = 8' 8' 4' 0 8' 16'
1" = 40' 40' 20' 0 40' 80'

NOTES:

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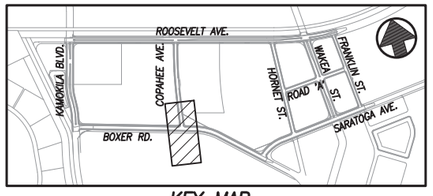
LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

APPROVED

DEPARTMENT OF EDUCATION DATE

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

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SIGNATURE 04/20 DATE

PLAN AND PROFILE – 2
COPAHEE AVENUE
(STA. 9+00 TO END)

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP DATE CHIEF, TRAFFIC REVIEW BRANCH, DPP DATE

FILE	POCKET	FOLDER	NO.

Tue 21 Apr 2020 - 2:08pm
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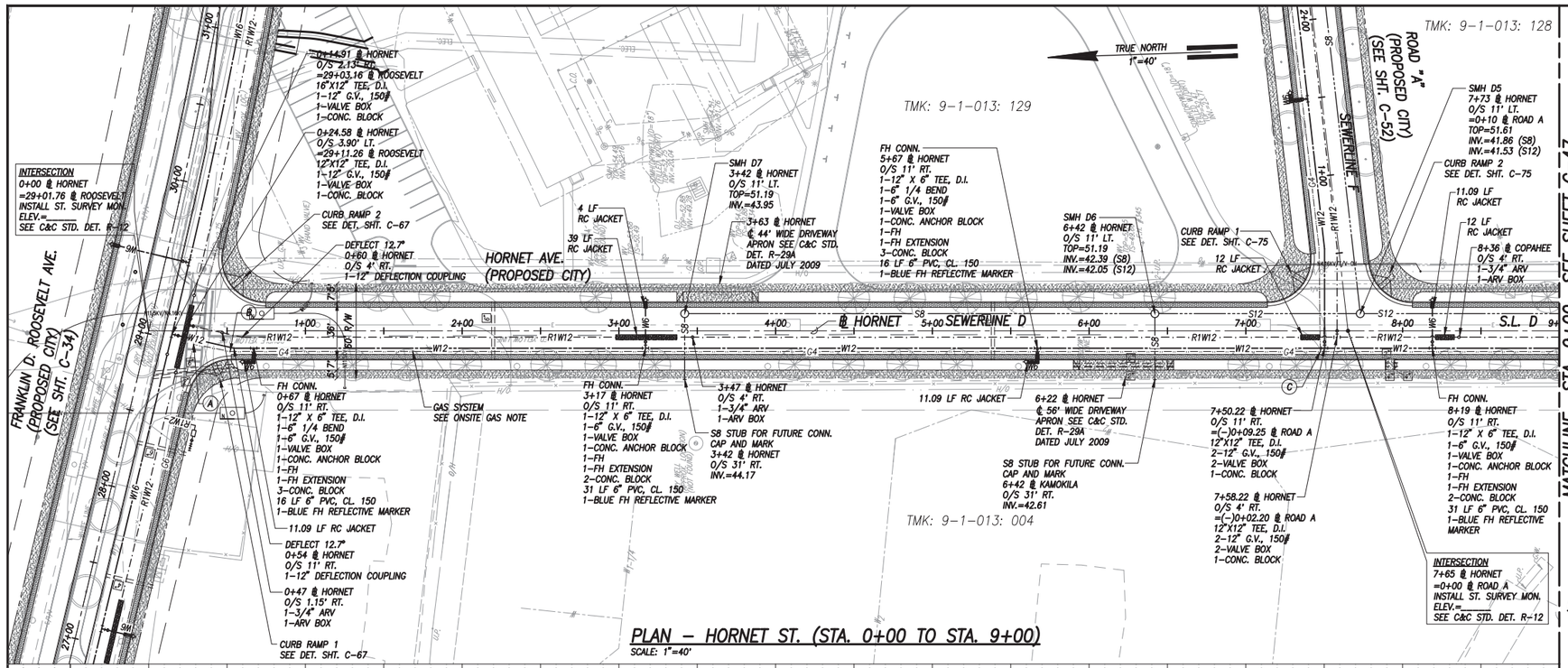

(A) 0+28.71 @ HORNET
O/S 8.53' RT.
1-6"X4" GAS TEE

(B) 0+52 @ HORNET
O/S 13.50' RT.
1-6" GAS 1/32 BEND (H)

(C) 7+47.47 @ HORNET
O/S 13.50' RT.
1-4"X4" GAS TEE

NOTES:

1. DRIVEWAYS AND SIDEWALKS SHALL COMPLY WITH THE DEPARTMENT OF PLANNING AND PERMITTING "JOINTING REQUIREMENTS FOR CONCRETE SIDEWALKS AND DRIVEWAYS" (ENGINEERING AND POLICY MEMORANDUM NO. CEB-1-09), DATED APRIL 6, 2009.
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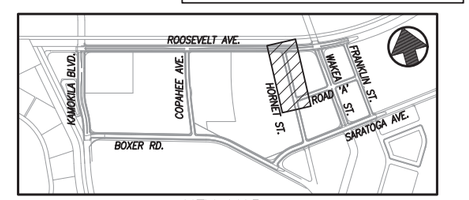
LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 1
HORNET STREET
(STA. 0+00 TO STA. 9+00)

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SIGNATURE — DATE 04/20

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE — CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

FILE	POCKET	FOLDER	NO.

Tue 28 Apr 2020 - 9:56am
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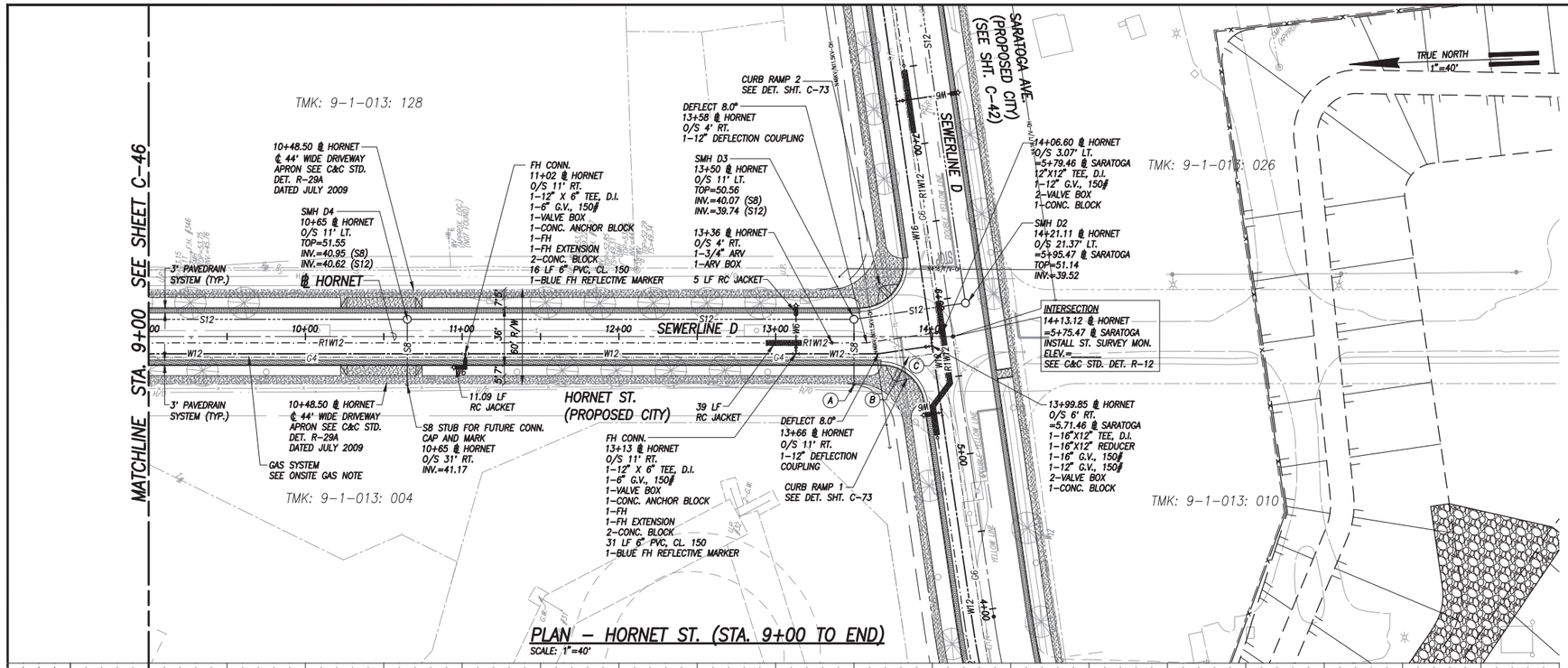
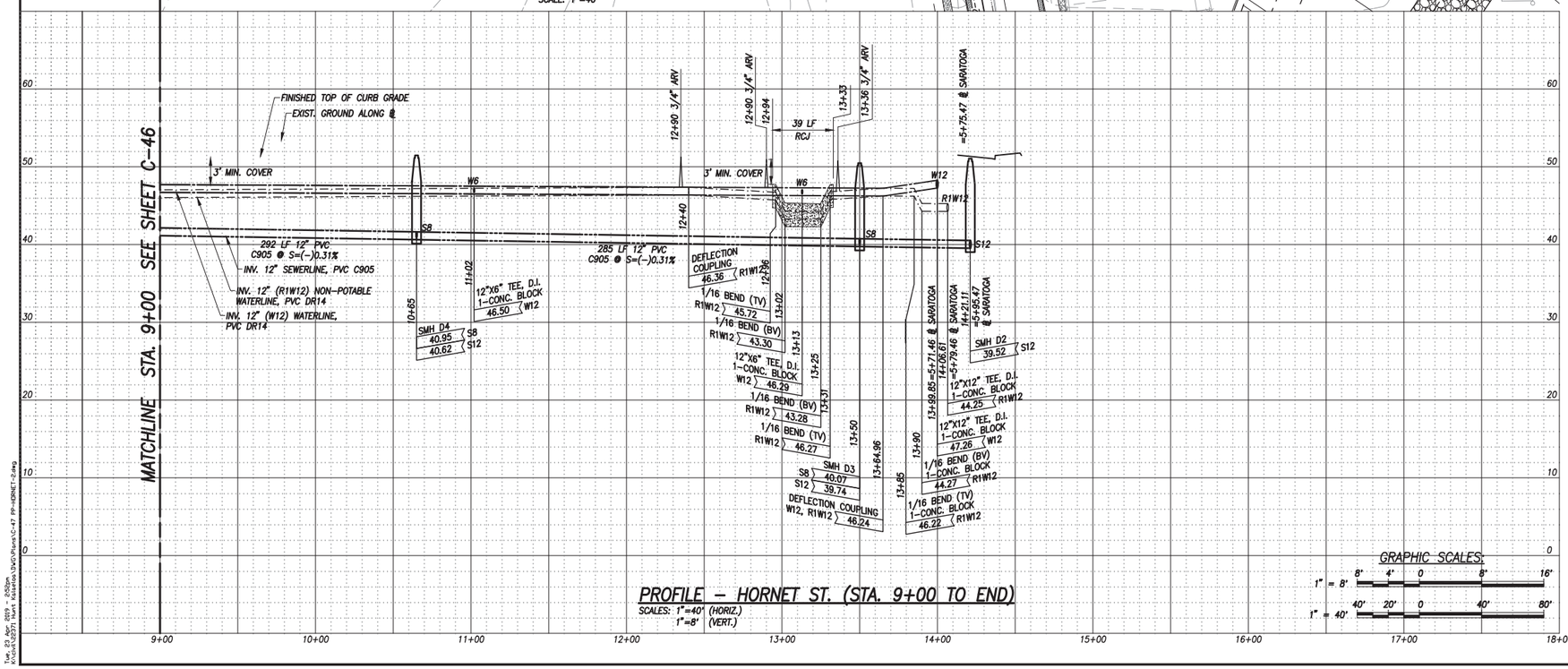


PLAN – HORNET ST. (STA. 9+00 TO END)

SCALE: 1"=40'



PROFILE – HORNET ST. (STA. 9+00 TO END)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

GRAPHIC SCALES:
1" = 8' 8' 4' 0 8' 16'
1" = 40' 40' 20' 0 40' 80'

NOTES:

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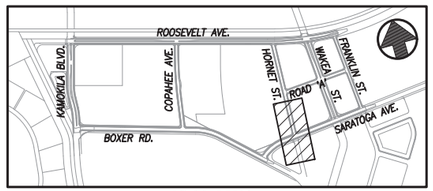
LEGEND:

IRRIGATION SLEEVE & SIZE	6"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

ENGINEER	CN, WM, CL, JS
DRAFTSMAN	CN, WM, JS, JO
CHECKED BY	CL

REVISION	DATE	BRIEF	BY	APPROVED

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SIGNATURE — DATE 04/20

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street, Suite 200 Honolulu Hawaii 96819

DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

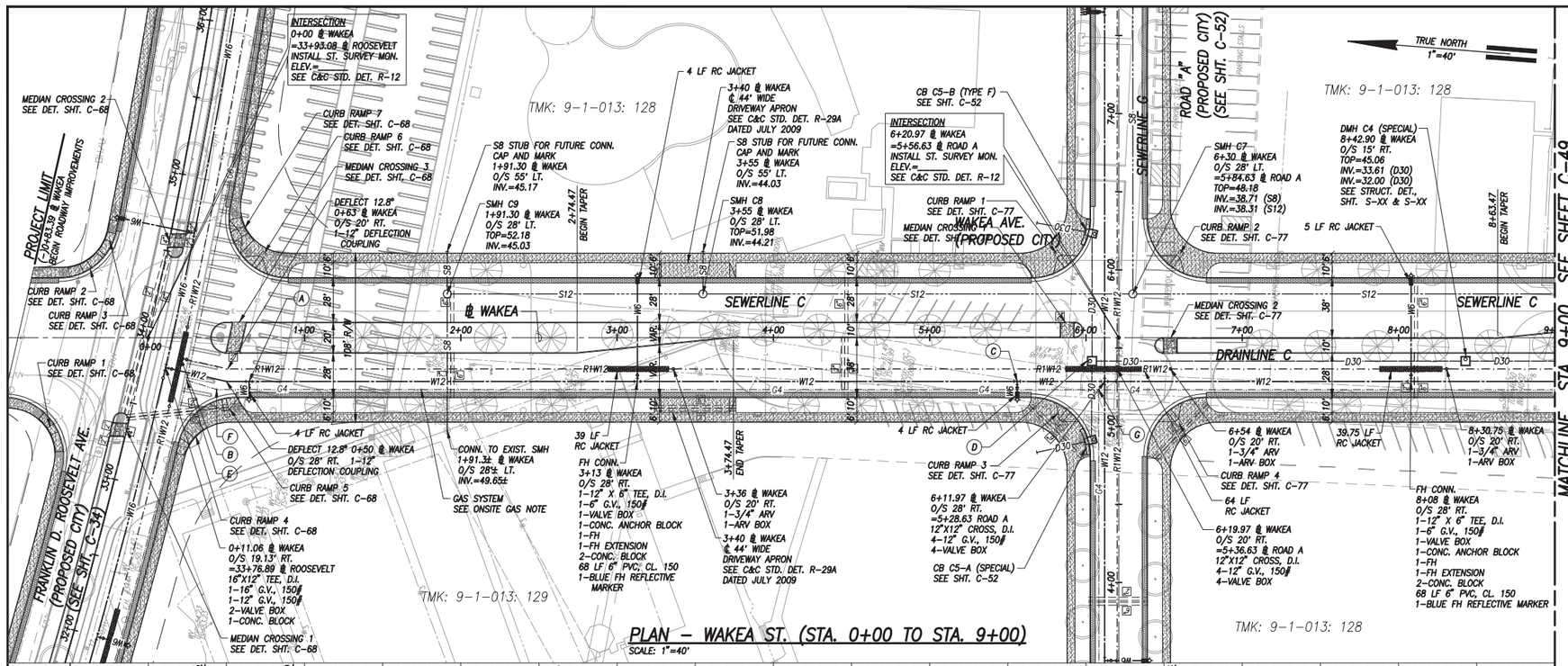
PLAN AND PROFILE – 2
HORNET STREET
(STA. 9+00 TO END)

APPROVED BY

CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE
CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

FILE	POCKET	FOLDER	NO.

Tue, 23 June 2020 - 2:53pm
K:\Jobs\12231 Mark Kalaeloa\DWG\Plans\C-47 PP-HORNET-2.dwg



(A) FH CONN.
0+63 @ WAKEA
O/S 28' RT.
1-12" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
12 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(B) 0+20.63 @ WAKEA
O/S 13.11' RT.
=33+84.84 @ ROOSEVELT
12"X12" TEE, D.I.
2-12" G.V., 150#
2-VALVE BOX
1-CONC. BLOCK

(C) FH CONN.
5+56 @ WAKEA
O/S 28' RT.
1-12" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
12 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(D) DMH C5 (SPECIAL)
6+03.89 @ WAKEA
O/S 15' RT.
=5+41.63 @ ROAD A
TOP=47.89
INV.=40.82 (D30)
INV.=36.00 (D30)

(E) 0+24.68 @ WAKEA
O/S 27.22' RT.
1-4"X4" GAS TEE

(F) 0+43.71 @ WAKEA
O/S 33' RT.
1-4" 1/32 BEND (H)

(G) 6+08.11 @ WAKEA
O/S 33' RT.
1-4"X4" GAS TEE

NOTES:

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LEGEND:

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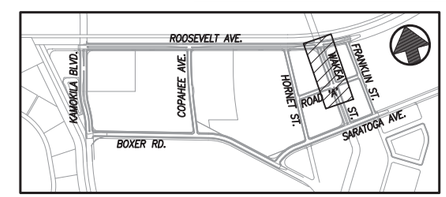
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



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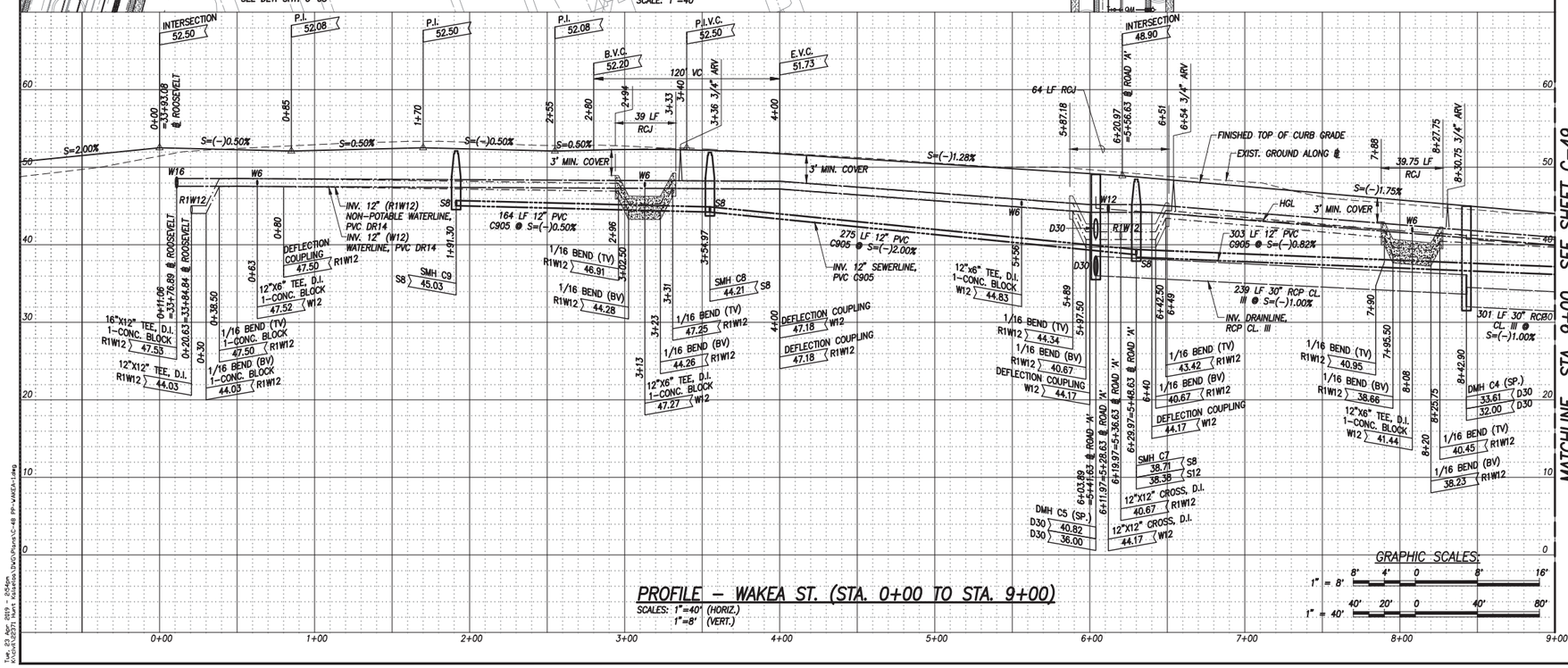

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DRAFTSMAN	CN, WM, JS, JO
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DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 1
WAKEA STREET
(STA. 0+00 TO STA. 9+00)

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SIGNATURE — DATE 04/20

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CHIEF, CIVIL ENGINEERING BRANCH, DPP — DATE — CHIEF, TRAFFIC REVIEW BRANCH, DPP — DATE

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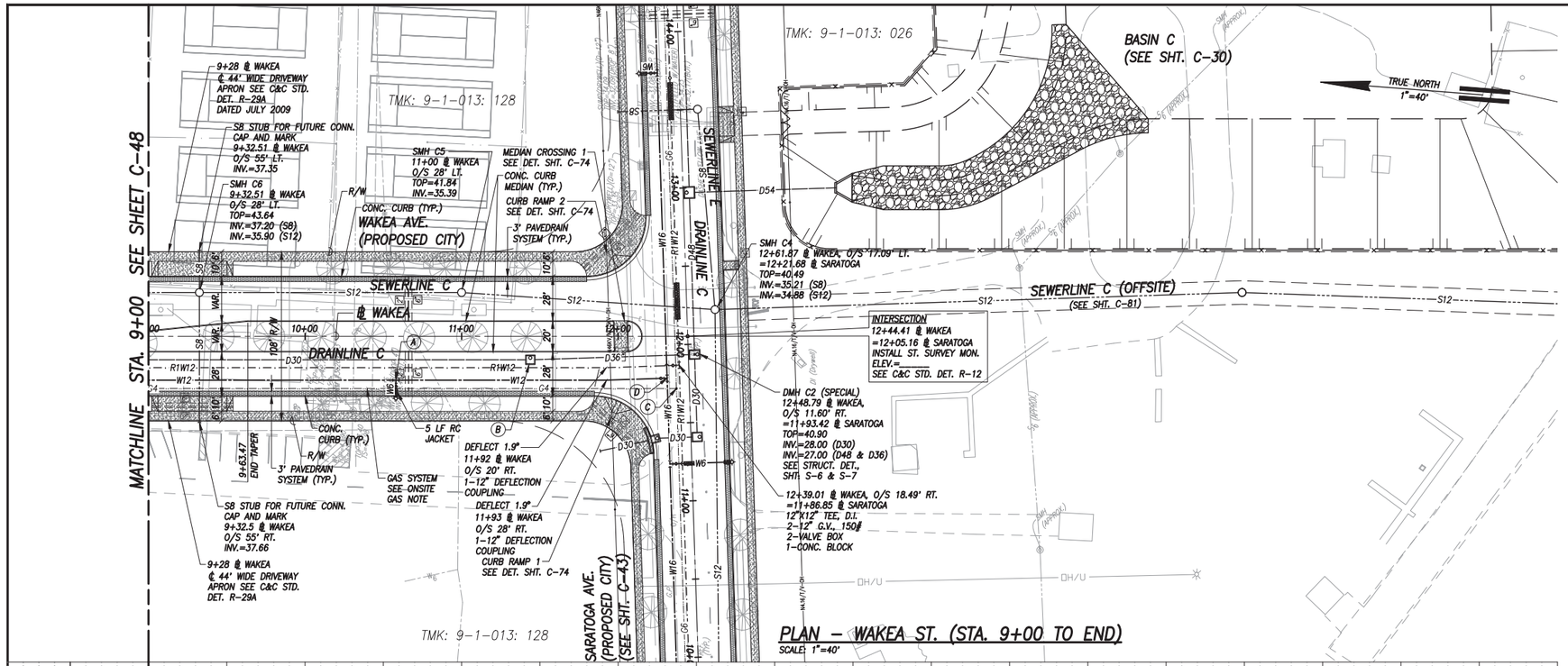


PLAN – WAKEA ST. (STA. 9+00 TO END)

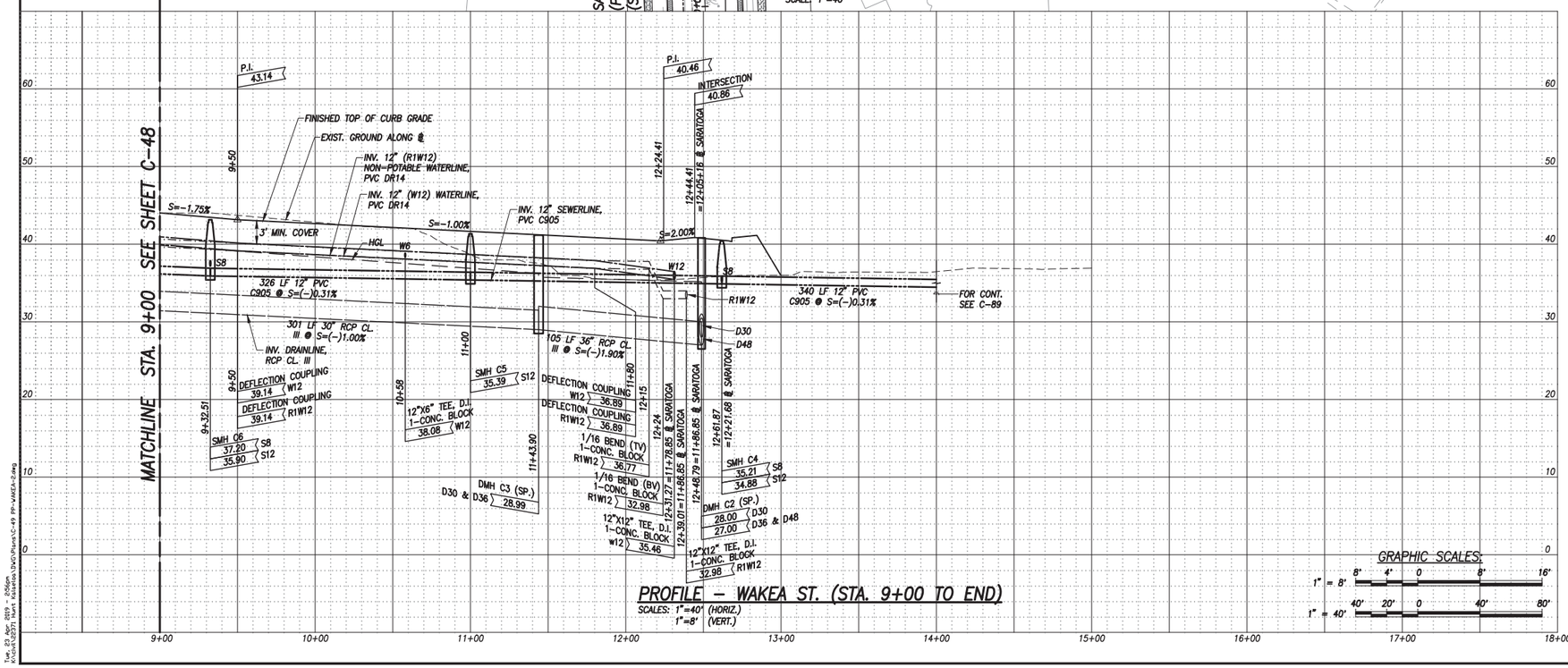
SCALE: 1"=40'

(A) FH CONN.
10+58 @ WAKEA
O/S 28' RT.
1-12" X 6" TEE, D.I.
1-6" G.V., 150#
1-VALVE BOX
1-CONC. ANCHOR BLOCK
1-FH
1-FH EXTENSION
2-CONC. BLOCK
12 LF 6" PVC, CL. 150
1-BLUE FH REFLECTIVE MARKER

(B) DMH C3 (SPECIAL)
11+43.90 @ WAKEA
O/S 15' RT.
TOP=41.66
INV.=28.99
SEE STRUCT. DET.,
SHT. S-6 & S-7

(C) 12+37.21 @ WAKEA
O/S 33.41' RT.
1-6"X4" GAS TEE

(D) 12+31.27 @ WAKEA, O/S 26.75' RT.
=11+78.85 @ SARATOGA
16"X12" TEE, D.I.
1-16" G.V., 150#
1-12" G.V., 150#
2-VALVE BOX
1-CONC. BLOCK



PROFILE – WAKEA ST. (STA. 9+00 TO END)

SCALES: 1"=40' (HORIZ.)
1"=8' (VERT.)

GRAPHIC SCALES:
1" = 8' 8' 4' 0 8' 16'
1" = 40' 40' 20' 0 40' 80'

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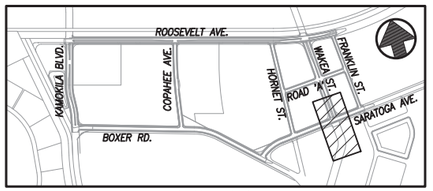
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



KEY MAP

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DEVELOPMENT OF KALAELOA PARCELS 1, 2 AND 3
BACKBONE ROADWAY IMPROVEMENTS
TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 2
WAKEA STREET
(STA. 9+00 TO END)

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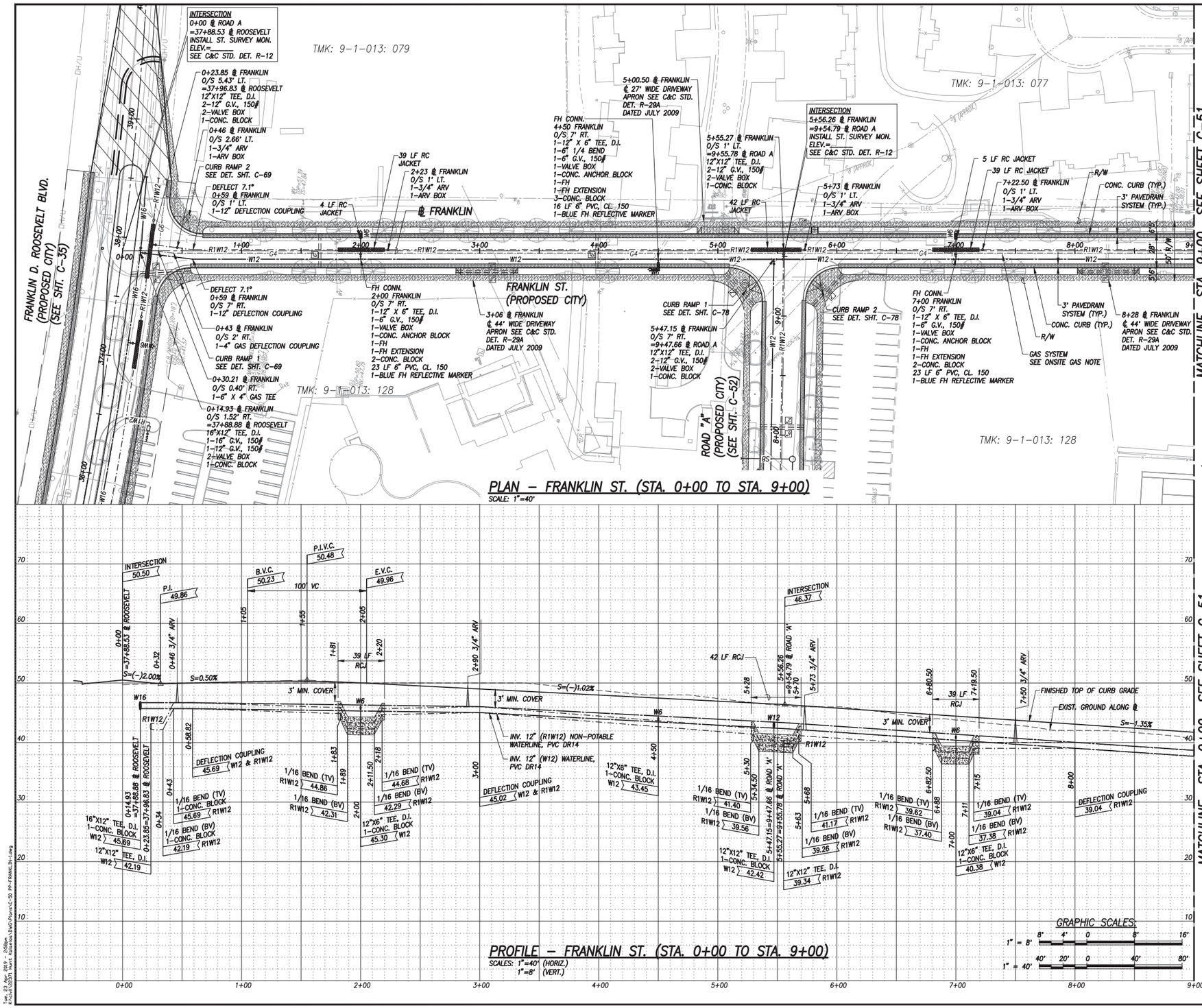

PLAN – FRANKLIN ST. (STA. 0+00 TO STA. 9+00)

SCALE: 1"=40'

PROFILE – FRANKLIN ST. (STA. 0+00 TO STA. 9+00)

SCALES: 1"=40' (HORIZ.)
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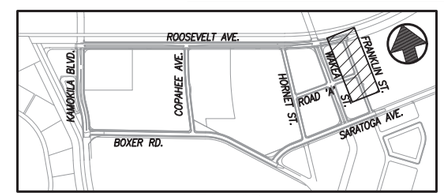
LEGEND:

IRRIGATION SLEEVE & SIZE	6
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
SEWER SYSTEM & SIZE	S8
DRAIN SYSTEM & SIZE	D18
PAVEDRAIN SYSTEM	



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PLAN AND PROFILE – 1
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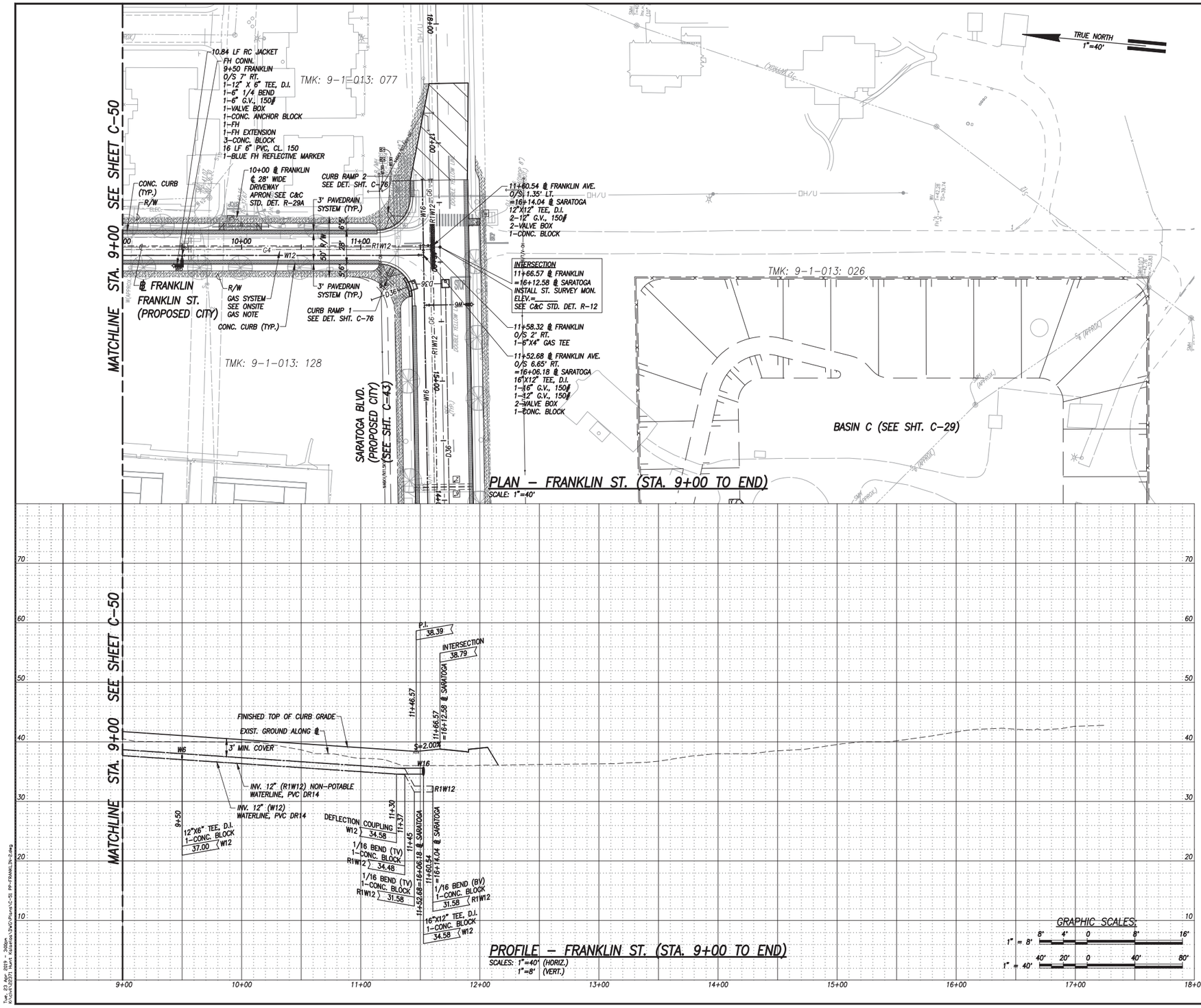

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GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
POTABLE WATER SYSTEM & SIZE	W16
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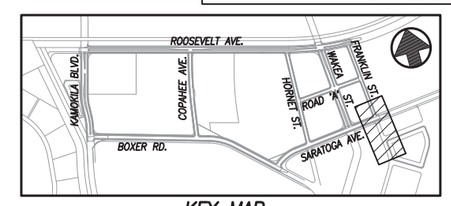

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HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE - 2 FRANKLIN STREET (STA. 9+00 TO END)

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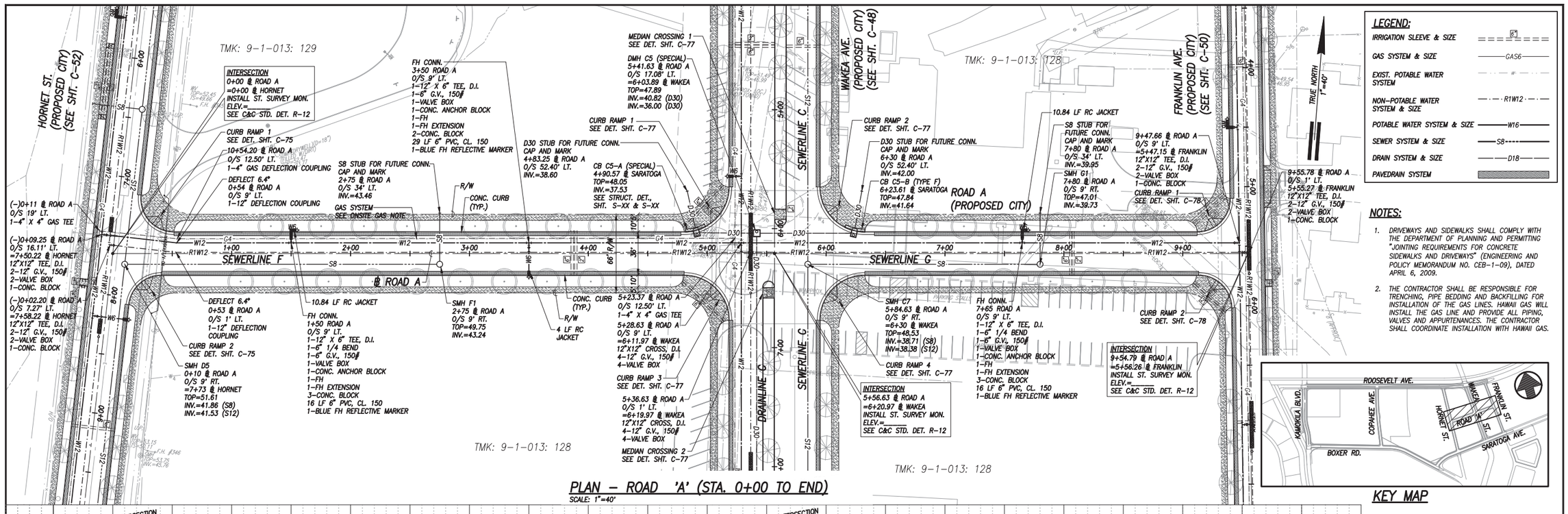

PLAN – ROAD 'A' (STA. 0+00 TO END)

SCALE: 1"=40'

LEGEND:

IRRIGATION SLEEVE & SIZE	4"
GAS SYSTEM & SIZE	GAS6
EXIST. POTABLE WATER SYSTEM	W
NON-POTABLE WATER SYSTEM & SIZE	R1W12
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SEWER SYSTEM & SIZE	S8
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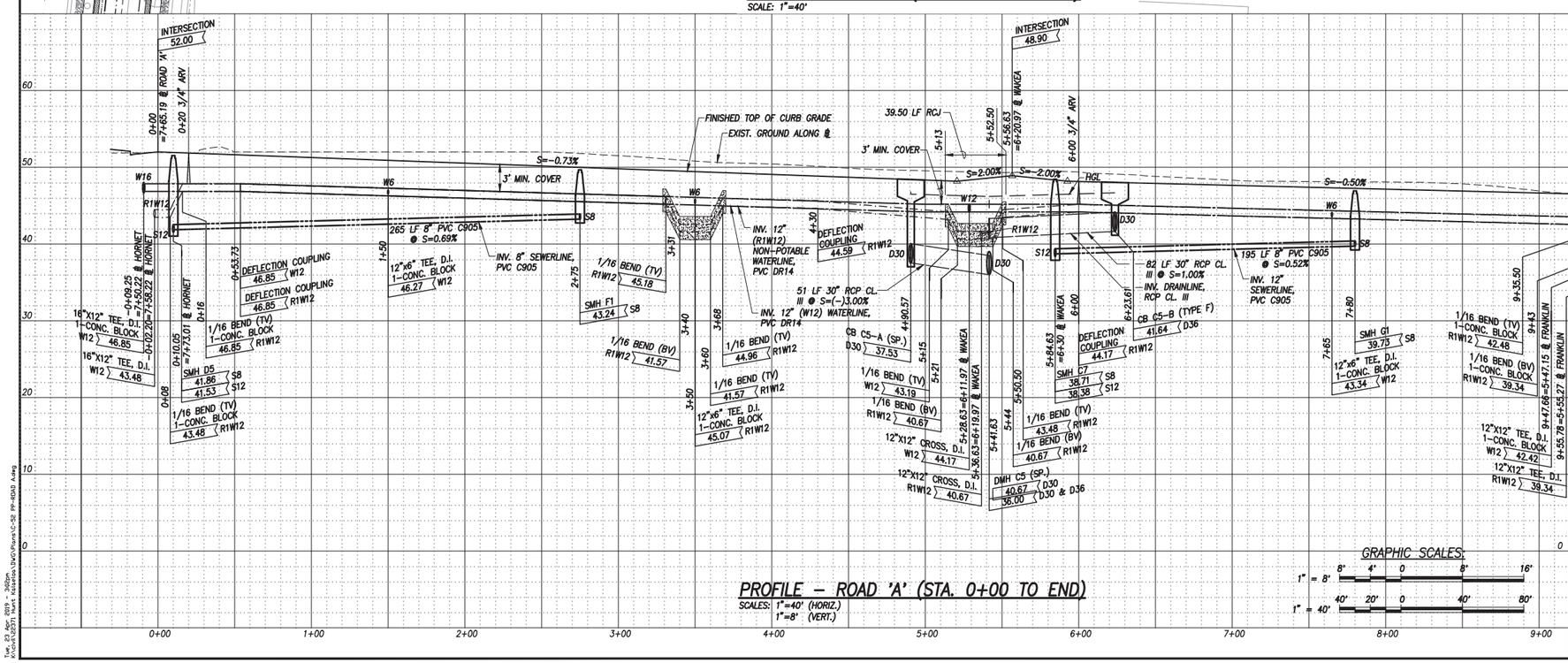

PROFILE – ROAD 'A' (STA. 0+00 TO END)

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1" = 40' 40' 20' 0 40' 80'

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DRAFTSMAN	CN, WM, JS, JO			
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REVISION	DATE	BRIEF	BY	APPROVED

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TMK: (Div. 1) 9-1-017: 004, 072
HONOULIULI, EWA, OAHU, HAWAII

PLAN AND PROFILE – 1
ROAD 'A'
(STA. 0+00 TO END)

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Tue, 22 Apr 2020 - 3:00pm
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Appendix B

Phase I Environmental Site Assessment,
Element Environmental LLC, December 2017

Phase I Environmental Site Assessment
Infrastructure Design for Parcels 1, 2, and 3
Kalaeloa/Barbers Point, Oahu, Hawaii

Tax Map Key: (1) 9-1-013: Parcels 002 (portion), 004 (portion), 128 (portion), and 129 (portion)

Prepared for:

R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Prepared by:

element environmental llc
environmental · engineering · water resources
98-030 Hekaha Street, Unit 9
Aiea, Hawaii 96701

December 2017

element environmental llc
environmental · engineering · water resources

December 19, 2017

Mr. Craig Luke, P.E.
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Subject: **Phase I Environmental Site Assessment**
Proposed Roads for Parcels 1, 2, and 3
Portions of Tax Map Key: (1) 9-1-013: Parcels 002, 004, 128, and 129
Kalaeloa/Barbers Point, Oahu, Hawaii

Dear Mr. Luke,

Element Environmental, LLC (E2) has performed a Phase I Environmental Site Assessment (ESA) for the subject property referenced above. The purpose of the Phase I ESA was to identify environmental issues (if any) associated with proposed roadways on four parcels of developed land located within the former Naval Air Station Barbers Point property.

The accompanying report summarizes our findings and relates our opinions with respect to the property and potential sources of contamination at the property. Our findings and opinions are based on information that we obtained on given dates through records review, site reconnaissance, interviews, and related activities. It is possible that other information exists or subsequently has become known, just as it is possible for conditions we observed to have changed after our observation. For these and associated reasons, E2 and many of its peers routinely advise clients for ESA services that it would be a mistake to place unmerited faith in findings and opinions conveyed via ESA reports. E2 cannot under any circumstances warrant or guarantee that not finding indicators of hazardous substances, or petroleum products means that hazardous substances or petroleum products do not exist on the property.

It has been a pleasure conducting this assessment for you. If you have questions regarding this report, please contact me on my mobile phone at (808) 551-9552.

Respectfully submitted,

Element Environmental, LLC

Arlene H. Campbell, L.G.
Senior Geologist

DRAFT

98-030 Hekaha Street Unit 9 Aiea Hawaii 96701 **tel:** (808) 488-1200 **fax:** (808) 488-1300
www.e2hi.com

DRAFT

ELEMENT ENVIRONMENTAL, LLC

ENVIRONMENTAL CERTIFICATION

E2 Project No.:	170063
Report:	Phase I Environmental Site Assessment, ASTM International E1527-13
Inspection Dates:	October 12, 2017
Report Date:	December 19, 2017
Site:	Infrastructure Design for Parcels 1, 2, and 3 Portions of Tax Map Key: (1) 9-1-013: Parcels 002, 004, 128, and 129 Kalaeloa/Barbers Point, Oahu, Hawaii
Client:	R. M. Towill Corporation

ENVIRONMENTAL PROFESSIONAL CERTIFICATION

We declare that, to the best of our professional knowledge and belief, we meet the definition of *Environmental Professional* as defined in §312.10 of 40 Code of Federal Regulations (CFR) 312.

We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Angela Peltier, Geologist Date: December 19, 2017

Arlene H. Campbell, L.G., Senior Geologist Date: December 19, 2017

DRAFT

DRAFT

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DRAFT

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DRAFT

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Certified Sanborn® Map Report
EDR Historical Topographic Map Report
The EDR-City Directory Image Report

Appendix C Qualifications of Environmental Professionals
Arlene Campbell, Licensed Geologist
Angela Peltier, Geologist

DRAFT

List of Acronyms and Abbreviations

%	percent
ACM	asbestos-containing material
AST	aboveground storage tank
ASTM	ASTM International
AUL	activity and use limitations
BOQ	Bachelor Officers Quarters
BRAC	Base Realignment and Closure
BWS	Board of Water Supply
CCH	City and County of Honolulu
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
CREC	controlled recognized environmental condition
CORRACTS	Corrective Action Sites under RCRA
CWB	Clean Water Branch
CWRM	Commission on Water Resources Management
DAGS	State of Hawaii Department of Accounting and General Services
DLNR	State of Hawaii Department of Land and Natural Resources
DoD	Department of Defense
DoN	Department of the Navy
DRO	diesel range organics
E2	Element Environmental, LLC
EAL	Environmental Action Levels
EDR	Environmental Data Resources, Inc.
EHW	Environmental Health Warehouse
EPA	Environmental Protection Agency, United States
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FDR	Franklin D. Roosevelt
FIFRA	Federal Insecticide, Fungicide, & Rodenticide Act
FTTS	Federal Insecticide, Fungicide, & Rodenticide Act/Toxic Substances Control Act
FUDS	Formerly Used Defense Site
GIS	Geographic Information System
GTE	GTE Corporation, formerly General Telephone & Electronics Corporation
HCDA	State of Hawaii Department of Business, Economic Development, & Tourism, Hawaii Community Development Authority
HDOH	State of Hawaii Department of Health
HDOE	State of Hawaii Department of Education
HDOT	State of Hawaii Department of Transportation

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List of Acronyms and Abbreviations (Continued)

HECO	Hawaiian Electric Company, Inc.
HEER	Hazard Evaluation and Emergency Response
HREC	historical recognized environmental condition
ICIS	Integrated Compliance Information System
IEC	institutional/engineering controls
IRHB	Indoor & Radiological Health Branch
JCIP	James Campbell Industrial Park
Kalaeloa	Kalaeloa Community Development District
LBP	lead-based paint
LDS	Latter Day Saints
LLP	landowner liability protections
LQG	large quantity generators
LUO	Land Use Ordinance
LUST	leaking underground storage tank
MCAS	Marine Corps Air Station
mg/L	milligrams per liter
NASBP	Naval Air Station Barbers Point
NAVFAC	Naval Facilities Engineering Command Pacific Division
NCore	State's National Core Multi-pollutant Monitoring Station
NFA	no further action
NFRAP	No Further Remedial Action Planned
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List (Superfund sites)
NRCS	Natural Resources Conservation Service
OR&L	Oahu Railway and Land Company
ORO	oil range organics
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
REC	recognized environmental condition
RMTC	R. M. Towill Corporation
ROW	right-of-way
SDWB	Safe Drinking Water Branch
SEMS	Superfund Enterprise Management System
SHWB	Solid and Hazardous Waste Branch
SHWS	solid and hazardous waste sites
SLAMS	State and Local Air Monitoring Station
State	State of Hawaii
TMK	tax map key
TPH	total petroleum hydrocarbon
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal

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List of Acronyms and Abbreviations (Continued)

U.S.	United States of America
U.S.C	United States Code
UIC	underground injection control
USDA	United States Department of Agriculture
USGS	United States Geological Survey (U.S. Department of the Interior)
UST	underground storage tank
VRP	Voluntary Response Program
WWII	World War II
WWTP	Wastewater Treatment Plant
WWB	Wastewater Branch

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Executive Summary

Element Environmental, LLC was retained by R. M. Towill Corporation (hereinafter "RMTC") to conduct a Phase I Environmental Site Assessment (ESA) in general conformance with ASTM International (ASTM) Practice E 1527-13, *Standard Practice for Environmental Site Assessments*. The purpose of the Phase I ESA was to identify environmental issues (if any) associated with proposed roadways on four parcels of developed land located within the Kalaeloa Community Development District (Kalaeloa) on Oahu, Hawaii, designated as Tax Map Key (TMK): (1) 9-1-013: portions of parcels 002, 004, 128, and 129; hereinafter referred to as the "site, proposed roadways, subject property, and/or the property."

The parcels are located on former Naval Air Station Barbers Point (NASB) property and are owned by the United States (U.S.) and leased by Kalaeloa Ventures, LLC. The roadways are under various jurisdictions, including the Navy; State of Hawaii Department of Business, Economic Development, & Tourism, Hawaii Community Development Authority (HCDA); State of Hawaii Department of Transportation (HDOT), and the City and County of Honolulu (CCH). For the purposes of this report, the subject property is discussed as three distinct areas:

- *Parcel 1* includes proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcel 002, including:
  - Capahee Avenue, West Perimeter Road and the Kamokila Boulevard Extension and
  - Portions of Saratoga Avenue, Franklin D. Roosevelt (FDR) Avenue, and the Oahu Railway and Land Company (OR&L) utility corridor (including the GTE Corporation [GTE] building).
- *Parcel 2* includes proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcel 004, including:
  - Portions of Hornet Avenue, FDR Avenue, Saratoga Avenue, Boxer Road, and Structure 272 Transformer Station A (272: Transformer Station A).
- *Parcel 3* includes proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcels 128 and 129, including:
  - Road "A" and the Wakea Street Extension;
  - Portions of Hornet Avenue, FDR Avenue, Franklin Street, Saratoga Avenue, and the OR&L utility corridor;
  - Structure 1906 Tennis Pro Shop Building (1906: Tennis Pro Shop); and
  - Portions of Structures 73 Paradise West Club Complex (73: Paradise West Club Complex), 68C concrete pad (68C: concrete pad), and 713 tennis courts (713: tennis courts)

A site visit was conducted on October 12, 2017, to observe the general site setting, indications of current and past uses of the subject property, and visible portions of adjoining properties from the subject property. Interviews were conducted with available individuals with knowledge of the current and past uses of the subject adjoining properties.

The assessment has revealed evidence of recognized environmental conditions (RECs) and controlled RECs (CRECs) as defined by ASTM, associated with the site and/or adjoining properties. ASTM guidance defines

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a REC as the presence or likely presence of any hazardous substances or petroleum products, in, on, or at the property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. ASTM defines a CREC as a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls.

RECs and CRECS are summarized in Tables ES-1 and ES-2, respectively. Table ES-3 provides a summary of potential environmental concerns; while they are not considered to be RECs, they bear mention.

Table ES-1: Recognized Environmental Conditions

Report Component	Section	Concern Noted or Reported	Description Concern
On-Site Sources and Potential Sources	4	Yes	**Site Listing on Environmental Databases:** Environmental Data Resources, Inc. (EDR) identified "Naval Air Station Barbers Point" (NASBP) on the Department of Defense (DoD) database. It is possible that historical military use has negatively impacted the soil and groundwater beneath the site. EDR also identified "Barbers Point Central Office" (GTE Building) (Parcel 1) on the Underground Storage Tank (UST) database. The UST and associated piping at the site poses a risk of future release of hazardous substances and/or petroleum products to the site.
	4	Yes	**Pipelines:** "Black oil" and "white gas" pipelines are located within the subject property right of ways (ROWs) on FDR Avenue and the OR&L utility corridor. It is possible that soil and groundwater beneath the site have been or may be impacted by releases associated with the pipelines.
	4	Yes	**Releases:** *272: Transformer Station A:* Transformer 444, installed in the early 1940s, was retrofilled in 1988 because polychlorinated biphenyls (PCBs) were detected in the dielectric fluid and wipe samples collected from the concrete pad. No additional information was available. It is possible that historical releases from the transformer have negatively impacted surface materials in the vicinity of the transformer as well as the soil and groundwater beneath the site.
	5	Yes	**Solid Waste:** Evidence of illegal dumping of miscellaneous debris and litter adjacent to the ROWs included but was not limited to general household trash, 1-gallon paint cans, several cans of brake fluid, wooden pallets, and electronics. It is possible that illegal dumping activities have negatively impacted soil and groundwater beneath the site.

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Report Component	Section	Concern Noted or Reported	Description Concern
			Hazardous Substances and Petroleum Products: Hazardous and/or regulated substances (e.g., oils, gasoline, grease, petroleum-based products) may be used/stored within the GTE Building (Parcel 1) and 272: Transformer Station A (Parcel 2). The nature of the activities conducted in these two areas poses a material threat of a future release to the environment.
Off-Site Sources and Potential Sources	4	Yes	**Leaking UST:** Adjacent Structure 77 Wakea Garden Apartments (former Bachelor Officers Quarters [BOQ) (interior of Parcel 3) previously had diesel and fuel oil USTs (BP19 and BP20) (installed in 1958). The tanks, boilers, and piping were removed in October 1991, at which time visual evidence of soil contamination was noted. No additional information was available. It is possible that contamination associated with the release(s) remains in the soil and groundwater beneath the site.
	4	Yes	**Releases:** Contaminated surface soil (arsenic and selenium) and groundwater (total petroleum hydrocarbons [TPH] as diesel range organics and TPH as oil range organics) were identified on an adjacent property to the northwest of Parcel 1 hydraulically upgradient (now occupied by Costco). It is possible that contamination from this site is migrating to the subject property. Soil sampling conducted within Parcel 1 in 2016 indicated the presence of elevated pesticide concentrations in some areas, which will require management during redevelopment. It is possible that subject property is negatively impacted by historical pesticide use on Parcel 1. Soil sampling conducted within drywells located within Parcel 1 and potentially within the proposed roadway expansion indicate the presence of elevated chromium concentrations in well L18-01. It is possible that contamination from this dry well is on or migrating to the subject property.

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Table ES-2: Controlled Recognized Environmental Conditions

Category	Controlled Recognized Environmental Conditions (RECs)
Leaking UST (LUST) Sites	The LUST associated with former Building 74 (exact location is unknown; approximated to be within the southwest interior portion of Parcel 3) (Facility ID 9-103191, Release ID 030039), located within the interior of Parcel 3, is listed as Site Cleanup Completed (No Further Action [NFA]).

Table ES-3: Potential Environmental Concerns

Potential Environmental Concern Category	Potential Environmental Concern
Former Military Use	The site is part of the former NASBP and was used by the military during and after World War II, mainly as a housing and recreation area. It is possible that historical military use of the subject property has negatively impacted the site.
Former Agricultural Use	The subject property was identified by the State of Hawaii Geographic Information System map as being historically used for activities associated with sugarcane cultivation; however, all other reports indicate it is part of a Sisal Plantation. Typically pesticides and herbicides are not used in sisal crops. If the property was used for sugar cane cultivation, it is possible that soil and/or groundwater beneath the site has been impacted by historical sugarcane use (typically no chemical fertilizers are used for sisal cultivation).
Railroad Tracks	According to historical topographic maps and aerial photographs, portions of the railroad tracks were located within the subject property crossing the Kamokila Boulevard Extension and GTE Building on Parcel 1 and Wakea Extention on Parcel 3 from c. 1890 to c. 1970. It is possible that methyl phenols and creosote (used to treat railroad ties), metals and polychlorinated biphenyls (associated with used oil commonly applied to tracks and weeds/dusty roads), and/or pesticides (weed control) may be present in soil and groundwater in the vicinity of the former tracks.
Wells	One well (well 3-1904-003), owned by GTE Hawaiian Tel Co. Inc., is located on the subject property (Parcel 1). The well is listed as other.
	Stormwater runoff within Kalaeloa is discharged into an extensive system of more than 250 dry wells that are permitted by the State of Hawaii Department of Health (HDOH). Sixteen dry wells are present within the area bounded by the proposed roadways.
UST Site	A UST fill pipe was discovered during excavation work for a housing development on the adjacent property northeast of the intersection of FDR and Franklin Street within TMK: (1) 9-1-013: parcel 077. The UST was removed on November 12, 1993, and a closure report was prepared (the report was unavailable). No release was reported.
Residual Lead in Soil Attributable to Lead-Based Paint (LBP)	LBP may have been used in the construction and/or maintenance and upkeep of the former/current structures at the site. It is possible that residual levels of lead are present in the soil beneath, and in the vicinity of former structures as a result of normal paint deterioration and/or demolition activities.
Residual Lead on roadways from historic use of leaded gasoline	Heavy metals (i.e., lead) may be present in soil along the roadways from the historical use of leaded gasoline in vehicles prior to January 1, 1996.
Residual Pesticides Attributable to Termite Treatment	It is possible that residual levels of termiticides (i.e., chlordane) are present in the soil beneath and in the vicinity of the former/current structures at the site.
EDR Identified Sites	EDR identified the following sites that may pose potential environmental concerns to the subject property: • One SPILLS, Federal Insecticide, Fungicide, & Rodenticide Act/Toxic Substances Control Act (FTTS), and two underground injection control (UIC) identified on the adjacent Barbers Point Elementary School and Kalaeloa Airport (DWS) (listed at the same address) property. • One Federal Resource Conservation and Recovery Act Large Quantity Generator site, State Hazardous Waste Site, and UST site identified on the Costco Wholesale #10 site, located adjacent to the northwest of Parcel 1 located hydraulically upgradient. • One State LUST site within ¼ mile, NEX Touch N'Go Gas. • One Formerly Used Defense Site was identified approximately ½ mile to the northeast hydraulically upgradient of the site.
Unmappable Site	Five of the six unmappable sites listed in the EDR report were determined to be in the vicinity of the subject property: 1) Fort Barrette, 2) Barbers Point Naval Air Station, Mission Street, 3)

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Potential Environmental Concern Category	Potential Environmental Concern
	Hawaii Army National Guard, 4) DLA Disposition Services, and 5) Former Oahu Sugar Company Pump 15 Station.

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Section 1 Introduction

1.1 Overview

R. M. Towill Corporation (hereinafter, "*RMTC*") retained Element Environmental, LLC (E2) to conduct a Phase I Environmental Site Assessment (ESA) in general conformance with ASTM International (ASTM) Practice E 1527-13, *Standard Practice for Environmental Site Assessments*.

The purpose of the Phase I ESA was to identify environmental issues (if any) associated with proposed roadways on four parcels of developed land located within the Kalaeloa Community Development District (Kalaeloa) on Oahu, Hawaii, designated as Tax Map Key (TMK): (1) 9-1-013: portions of parcels 002, 004, 128, and 129; hereinafter referred to as the "*site, proposed roadways, subject property, and/or the property*." The parcels are located on former Naval Air Station Barbers Point (NASBP) property and are owned by the United States (U.S.) and leased by Kalaeloa Ventures, LLC. The proposed roads are owned by the State of Hawaii (State) and the City and County of Honolulu (CCH). For the purposes of this report, the subject property is discussed as three distinct areas, as identified in Table 1-1, below.

Table 1-1: Subject Property Identification

Identification	TMK	Information
Parcel 1	(1) 9-1-013:002 (portion)	U.S (owner) Kalaeloa Ventures, LLC (lessee) No Associated Address
	Franklin D. Roosevelt (FDR) Avenue (portion)	right-of-way (ROW)
	Oahu Railway & Land Company (OR&L) Easement (Utility Corridor) (portion)	GTE Corporation (GTE), formerly General Telphone & Electronics Corporation, (also known as Hawaiian Telephone) building (portion) to remain on the north side of FDR Avenue.
	Copahee Avenue	ROW
	Saratoga Avenue (portion)	ROW
	Kamokila Boulevard Extension	Proposed extension of the road through the interior of TMK: (1) 9-1-013:002.
	West Perimeter Road	Proposed Road adjacent to the James Campell Industrial Park (JCIP) Drainage Canal on the west side.
Parcel 2	(1) 9-1-013:004 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) No associated address
	FDR Avenue (portion)	ROW and a portion of structure 272 (Transformer Station A) to remain on the corner of FDR and Hornet Avenues.
	Hornet Avenue (portion)	ROW
	Boxer Road (portion)	ROW
	Saratoga Avenue (portion)	ROW
Parcel 3	(1) 9-1-013:129 (portion)	U.S. (owner) Kalaloa Ventures, LLC (lessee) Kalaeloa BOQ LLC (sub-lessee) 91-1245 FDR Avenue
	(1) 9-1-013:128 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) 91-1267 FDR Avenue

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Identification	TMK	Information
	FDR Avenue (portion)	ROW
	OR&L Easement (Utility Corridor)	ROW
	Franklin Street (portion)	ROW
	Hornet Avenue (portion)	ROW
	Saratoga Avenue (portion)	ROW
	Road A	Proposed ROW connects Hornet Avenue and Franklin Street. A portion of existing structure 73 (Paradise West Club Complex) is within the ROW and is slated for demolition.
	Wakea Street Extention	Proposed ROW connects FDR and Saratoga Avenues. Existing buildings are in the ROW and are slated for demolition, including building 1906 (Tennis Pro Shop), a portion of structure 68C (concrete pad with unknown use), and structure 713 (tennis courts).

1.2 Purpose

The purpose of the ASTM practice is to define good commercial and customary practice in the U.S. for conducting an ESA of a parcel of commercial real estate with respect to the range of contaminants within the scope of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (42 U.S. Code [U.S.C.] §9601) and petroleum products. As such, this practice is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations on CERCLA liability (hereinafter, the "landowner liability protections," or "LLPs"): that is, the practice that constitutes all appropriate inquiries into the previous ownership and uses of the property consistent with good commercial and customary practice as defined at 42 U.S.C. §9601(35)(B).

For the purposes of this practice:

- The definition of a release includes contamination in the soil vapor phase, as well as in soil or groundwater.
- "Migrate" and "migration" refer to the movement of hazardous substances or petroleum products in any form, including solid and liquid, at the surface or subsurface, and vapor in the subsurface.
- Vapor migration/intrusion (excluding impacts to indoor air from releases of hazardous substances into the environment) *does not fall under the category of an Indoor Air Quality concern* and is not included in the ASTM 1527 scope of work.

ASTM guidance defines a recognized environmental concern (REC) as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment (ASTM 2013).

A controlled REC (CREC) is defined as a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (e.g., as evidenced by the issuance of a no further action (NFA) letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed

to remain in place subject to the implementation of required controls (e.g., property use restrictions, activity and use limitations [AULs], institutional/engineering controls [IECs]) (ASTM 2013).

A historical REC (HREC) is defined as a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls (e.g., property use restrictions, AULs, IECs) (ASTM 2013).

RECs do not include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies (ASTM 2013).

1.3 Detailed Scope-of-Services

This Phase I ESA was performed under the conditions of, and, in general accordance with the ASTM *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM Designation E 1527-13). Adherence to the ASTM standard is intended to limit the liability of property owners from inherited environmental contamination.

The Phase I ESA included the following tasks:

- **Review of regulatory records.** E2 reviewed standard environmental record sources including the U.S. Environmental Protection Agency (EPA) Superfund Enterprise Management System (SEMS) (formerly Comprehensive Environmental Response Compensation and Liability Information System [CERCLIS]) database, EPA's Resource Conservation and Recovery Act (RCRA) database, U.S. IEC database, EPA's Emergency Response Notification System (ERNS) database, State Department of Health (HDOH) Hazard Evaluation and Emergency Response (HEER) Office site list, HDOH Underground Storage Tank (UST) list, HDOH Leaking UST (LUST) list, HDOH list of landfills and other solid and hazardous waste sites (SHWS), HDOH Voluntary Response Program (VRP) sites list, and the HDOH Brownfield sites list.
- **Review of site history.** E2 reviewed reasonably ascertainable standard historical sources including historical maps, aerial photographs, building permits, zoning records, and property tax records available online; various printed publications as well as publications posted on the internet; and documents and/or records provided by the owner/user and/or their representatives.
- **Review of site geology and hydrogeology.** E2 reviewed reasonably ascertainable published information on surface and subsurface conditions at the site and surrounding area. E2 used this information to assess topography, drainage, surface water bodies, anticipated subsurface geology, and groundwater occurrence and usage in the area.
- **Site reconnaissance.** During the site reconnaissance E2 specifically looked for hazardous substances; petroleum products; above-ground storage tanks (ASTs) and USTs; odors; pools of liquid; drums; electrical and hydraulic equipment; means for heating and cooling structures; stains or corrosion; drains and sumps; pits, ponds, or lagoons; stained soil or pavement; stressed vegetation; solid waste; wastewater; wells; and septic systems.

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- **Data evaluation and report preparation.** E2 evaluated the information collected and prepared this report that documents our assessment and presents our findings, opinions, and conclusions.

1.4 Significant Assumptions

In preparing this report, E2 has relied on certain verbal information and representations provided by government employees and others; responses of government agencies to public requests for information are complete and accurate; documents provided by the Phase I ESA owner/user or their representatives; and a computer search of government databases by a firm whose business is to provide that service. Except as discussed, E2 has relied on that information and did not attempt to verify its accuracy or completeness independently, but did not detect any inconsistency or omission of a nature that might call into question the validity of the data. To the extent that the conclusions in this report are based in whole or in part on such information, they are contingent on its validity. E2 assumes no responsibility for any consequence arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to E2.

1.5 Limitations and Exceptions

Phase I ESAs, by their very nature, are limited. E2 has endeavored to meet what it believes is the applicable standard of care and, in so doing is obliged to advise its client, RMTC, of the Phase I ESA limitations. This Phase I ESA did not assess environmental issues or conditions at the property that are outside the scope of ASTM Practice E1527-13, including, but not limited to, asbestos-containing material (ACM), biological agents, cultural and historical resources, ecological resources, endangered species, health and safety, indoor air quality unrelated to releases of hazardous substances or petroleum products into the environment, industrial hygiene, lead-based paint (LBP), lead in drinking water, mold, radon, regulatory compliance, and wetlands, nor did it include any sampling or testing for biological agents and mold, radon, methane, ACM, LBP, or other environmental contaminants. Our investigation was limited to the procedures described in the Phase I ESA Standard Practice (ASTM 2013).

The conclusions presented in this report are professional opinions based solely upon visual observations of the site and vicinity and our interpretation of the available historical and regulatory information and documents reviewed. They are intended exclusively for the purpose outlined herein and apply only to the site location and project indicated.

The findings and opinions are based on information that E2 obtained on given dates through records review, site reconnaissance, interviews, and related activities. It is possible that other information exists or subsequently has become known, just as it is possible for conditions E2 observed to have changed after our observation. For these and associated reasons, E2 and many of its peers routinely advise clients for ESA services that it would be a mistake to place unmerited faith in findings and opinions conveyed via ESA reports. E2 cannot under any circumstances warrant or guarantee that not finding indicators of hazardous substances or petroleum products mean that hazardous substances or petroleum products do not exist on the site.

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1.6 Special Terms and Conditions

E2's services are performed, within limits prescribed by our clients, with the usual thoroughness and competence of the consulting profession in accordance with the standard for professional services at the time those services are rendered. No warranty or representation, either expressed or implied, is included or intended in the proposals, contracts, or reports.

Findings and opinions presented herein apply to site conditions existing at the time of E2's investigation and those reasonably foreseeable; they cannot necessarily apply to site changes of which E2 is not aware and has not had the opportunity to evaluate.

1.7 Data Gaps

Based on the information obtained during this ESA, it is E2's professional opinion that a historical data failure, as defined in the ASTM guidelines, has occurred in attempting to document the history of the subject property back to the earlier part of 1940 or the first developed usage of the property in five-year increments, as follows:

- Historical information regarding the subject property from 1878 to 1898, 1903 to 1919, 1921 to 1927, 1929 to 1936, 1954 to 1961, and 1986 to 1991 was limited.
- No user questionnaire was completed.
- EDR was unable to obtain fire insurance maps, building permit records, and/or property tax map reports because there is no coverage for the area.
- The current landowner/tenant were not available for interview.
- The OR&L utility corridor and associated structures, including the GTE building, were not included in the site reconnaissance.
- Structures 272: Transformer Station A, 1906: Tennis Pro Shop, and 73: Paradise West Club Complex were not included in the site reconnaissance.

Based on the information obtained, the lack of documentation is not deemed critical and did not affect the ability to identify potential REC(s) associated with the subject property.

1.8 User Reliance

This report is intended for the use of RMTC and its assignees. The scope of services performed in execution of this investigation may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of the said user.

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Section 2 Site Description

2.1 Location and Legal Description

The subject property is located within the former NASBP facility in the Ewa Plain area of Kalaeloa, Oahu, Hawaii, as shown in Figure 1, included in Appendix A. The site is comprised of proposed roadways on four parcels of land designated as portions of TMK: (1) 4-2-013: parcels 002, 004, 128, and 129 (CCH 2017). The roadways are under various jurisdictions, including the Navy; State Department of Business, Economic Development, & Tourism, Hawaii Community Development Authority (HCDA); State Department of Transportation (HDOT), and the CCH.

2.2 Site and Vicinity General Characteristics

The proposed roadways are shown in Figure 2, included in Appendix A. The site consists of approximately 34.6 acres of land within the former NASBP.

- Parcel 1 proposed roadway improvements include the following:
  - FDR Avenue 10-foot widening and a 14-foot setback for future 108-foot ROW Reserve.
  - Copahee Avenue 11-foot widening and an 11-foot setback for future 66-foot ROW Reserve.
  - Saratoga Road 18-foot widening and a 24-foot setback for future 108-foot ROW Reserve
  - Construction of the Kamokila Boulevard Extension with a 108-foot ROW.
  - West Perimeter Road Extension (owned by HCDA) is to be closed after the construction of Kamokila Boulevard Extension.
  - The GTE Building located within the OR&L ROW and on the FDR Avenue 10-foot widening and 14-foot setback near the intersection of Copahee Avenue to remain in use.
- Parcel 2 proposed roadway improvements include the following:
  - FDR Avenue 10-foot widening and a 14-foot setback for future 108-foot ROW Reserve.
  - Hornet Avenue widening to an 80-foot ROW.
  - Saratoga Avenue 18-foot widening and a 6-foot setback for future 108-foot ROW Reserve.
  - Boxer Road 18-foot widening and a 6-foot setback for future 108-foot ROW Reserve.
  - Copahee Avenue 11-foot widening and an 11-foot setback for future 66-foot ROW Reserve.
  - A portion of 272: Transformer Station A to remain.
- Parcel 3 proposed roadway improvements include the following:
  - FDR Avenue 10-foot widening and a 14-foot setback for future 108-foot ROW Reserve.
  - Franklin Street 50-foot ROW.
  - Saratoga Avenue 18-foot widening and a 6-foot setback for future 108-foot ROW Reserve.
  - Hornet Avenue widening to an 80-foot ROW.
  - Construction of Road A with a 66-foot ROW.
  - Demolition of 73: Paradise West Club Complex partially within the proposed Road A ROW.
  - Construction of Wakea Street Extension 108-foot ROW.
  - Demolition of 1906: Tennis Pro Shop within the proposed Wakea Street Extension ROW.
  - Demolition of 68C: concrete pad partially within the proposed Wakea Street Extension ROW.

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- Demolition of the 713: tennis courts partially within the proposed Wakea Street Extension ROW.

2.3 Current Use of the Property

The subject property consists mainly of roadway ROWs and adjacent road verge. Seven structures are currently located within the proposed roadways as follows: the GTE building within Parcel 1; 272: Transformer Station A within Parcel 2; and 1906: Tennis Pro Shop and portions of 73: Paradise West Club Complex, , 68C: concrete pad (unknown historical use), and 713: tennis courts on Parcel 3. Only the GTE building (Parcel 1) and 272: Transformer Station A (Parcel 2) are proposed to remain on the subject property.

2.4 Current Uses of the Adjacent Properties

Table 2-1 lists the parcel numbers and owner/occupant activities for the adjacent properties. The site is generally bounded by the JCIP Drainage Canal on the east, a solar generating facility on a portion of the former NASBP to the south, and land being developed for residential and business uses to the north and west. Figure 2, included in Appendix A, shows the locations of adjacent properties.

Table 2-1: Adjacent Properties

Parcel Number	Owner/Occupant	Owner/Occupant Activities
Parcel within the interior boundary Parcel 1		
9-1-013:002 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) No associated address	Vacant (only compacted coral pads from former Coral Rose Manor housing units remain)
Parcels adjacent to the north of Parcel 1		
	FDR Avenue (portion)	ROW
	Renton Road	ROW
9-1-160:014	Costco Wholesale Corporation (owner) 4589 A. Kapolei Parkway	Costco
9-1-160:008	Hunt Communities Hawaii, LLC (owner) No associated address	Drainage ditch
9-1-160:021	D.R. Horton – Schuler Homes, LLC (owner) No associated address	Drainage ditch
Parcel adjacent to the east of Parcel 1		
9-1-013:003	State Department of Education (HDOE) (owner) 91-1001 Boxer Street (3001 Boxer Road)	Barbers Point Elementary School
	Copahee Avenue	ROW
	Boxer Road	ROW
Parcels adjacent to the west of Parcel 1		
	JCIP Drainage Ditch	Waterway
9-1-075:053	Board of Water Supply (BWS) (owner) 115 Uu Place	Hardware Hawaii
9-1-075:039	BWS (owner) 2052 Lauwiliwili Street	Kapolei State and Local Air Monitoring Station (SLAMS) (2002) and State's National Core Multi-pollutant Monitoring Station (NCore) site (2011)

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Parcel Number	Owner/Occupant	Owner/Occupant Activities
9-1-075:040	John Robert Associates, LLC (owner) Doitnow, Inc. (lessee) 2060 Lauwiliwili Street	Carrier Hawaii
9-1-075:041	Church of Jesus Christ Latter Day Saints (LDS) (owner) 2074 Lauwiliwili Street	The Church of Jesus Christ of LDS
Parcels within the interior of Parcel 2		
9-1-013:004 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) No associated address	Vacant
9-1-013:003	HDOE (owner) 91-1001 Boxer Street (3001 Boxer Road)	Barbers Point Elementary School
	Tulagi Avenue	ROW
Parcel to the north of Parcel 2		
	FDR Avenue (portion)	ROW
	Renton Road	ROW
9-1-160:021	D.R. Horton – Schuler Homes, LLC (owner) No associated address	Drainage ditch
Parcels adjacent to the east of Parcel 2		
	Hornet Avenue	ROW
9-1-013:129 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) Kalaloa BOQ, LLC (sub-lessee) 91-1245 FDR Avenue	Wakea Garden Apartments at Kalaeloa (former Bachelor Officers Quarters [BOQ] housing for NASBP)
9-1-013:128 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) 91-1267 FDR Avenue	
Parcels adjacent to the south of Parcel 2		
	Saratoga Avenue (portion)	ROW
	Boxer Road (portion)	ROW
9-1-013:010	Kalaeloa Ventures, LLC (owner) 91-1010 Saratoga Avenue	
9-1-013:117	Hawaiian Home Lands (owner) No associated address	
9-1-013:118	Hawaiian Home Lands (owner) Kalaeloa Solar One, LLC (lessee) No associated address	Solar farm and electrical substation
Parcel adjacent to the west of Parcel 2		
9-1-013:003	HDOE (owner) 91-1001 Boxer Street (3001 Boxer Road)	Barbers Point Elementary
	Tulagi Avenue	ROW
Parcels within the interior of Parcel 3		
9-1-013:129 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) Kalaloa BOQ, LLC (sub-lessee) 91-1245 FDR Avenue	Wakea Garden Apartments at Kalaeloa (former BOQ housing for NASBP)
9-1-013:128 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) 91-1267 FDR Avenue	

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Parcel Number	Owner/Occupant	Owner/Occupant Activities
Parcels adjacent to the north of Parcel 3		
	FDR Avenue (portion)	ROW
	Renton Road	ROW
9-1-160:021	D.R. Horton – Schuler Homes, LLC (owner) No associated address	Drainage ditch
Parcels adjacent to the east of Parcel 3		
	Franklin Street (portion)	ROW
9-1-013:079	U.S. (owner) Kalaeloa Ventures, LLC (lessee) No associated address	
9-1-013:077	RP Kaimana Owner, LLC (owner) 91-1347 FDR Avenue	
Parcels adjacent to the south of Parcel 3		
	Saratoga Avenue (portion)	ROW
9-1-013:026	U.S. (owner) Kalaeloa Ventures, LLC (owner) 91-1040 Saratoga Avenue	
9-1-013:077	RP Kaimana Owner, LLC (owner) 91-1347 FDR Avenue	
Parcels adjacent to the west of Parcel 3		
	Hornet Avenue	ROW
9-1-013:004 (portion)	U.S. (owner) Kalaeloa Ventures, LLC (lessee) No associated address	

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Section 3 User Provided Information

A completed User Questionnaire has not been submitted as of the date of this draft report.

3.1 Reason for Performing the Phase I ESA

The purpose of the Phase I ESA was to identify environmental issues (if any) as part of the proposed improvements to roadways within the former NASBP.

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Section 4 Records Review

4.1 Standard Environmental Record Sources

4.1.1 Environmental Data Resources, Inc. Report

To identify the presence of adverse environmental conditions at the subject property, several published sources of environmental records were reviewed. This section lists the records that were searched and the results of each search.

ASTM E1527-13 specifies search distances for specific environmental record sources. Table 4-1, identifies the record sources searched for incidents or sites within the listed search distances of the subject property.

Table 4-1: Environmental Record Sources Searched

Standard Environmental Record Sources	Search Distance (miles)	Number of Sites Identified
Federal National Priorities List (NPL) site list	1.0	0
Federal Delisted NPL site list	0.5	0
Federal SEMS list (formerly CERCLIS)	0.5	0
Federal SEMS-Archive (formerly CERCLIS No Further Remedial Action Planned [NFRAP]) site list	0.5	0
Federal RCRA Corrective Action Sites under RCRA (CORRACTS) facilities list	1.0	0
Federal RCRA Non-CORRACTS Treatment, Storage, and Disposal (TSD) facilities list	0.5	0
Federal RCRA generators list (conditionally exempt small quantity generators, small quantity generators, and large quantity generators [LQG])	Subject and Adjacent properties	1
Federal IEC registries	Subject property only	0
Federal ERNS list	Subject property only	0
State list of SHWS identified for investigation or remediation (NPL or CERCLIS equivalents)	1.0	7
State landfill and/or solid waste disposal site lists	0.5	0
State LUST list	0.5	2
State registered UST list	Subject and Adjacent properties	2
State IEC registries	Subject and Adjacent properties	0
State VRP sites	0.5	0
State Brownfield sites	0.5	0

E2 used an online regulatory database search service, provided by Environmental Data Resources, Inc. (EDR), to review the above listed Federal and State government databases within the prescribed search distance. A copy of the EDR report is included in Appendix B.

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In reviewing the environmental databases, it should be noted that the specific regulatory agencies do not instantaneously update such databases. Depending on the database and the agency, updates may be as infrequent as annually. The dates of the most recent updates for the searched environmental databases are listed in the EDR report in Appendix B.

The subject property was identified on databases searched by EDR, including the Department of Defense (DoD) and UST databases.

E2 reviewed the sites identified by EDR within the search radii. The closest sites (those located within a one-eighth mile of the site) and/or those with environmental concerns located beyond a one-eighth mile are listed in Table 4-2. Refer to the EDR report (Appendix B) for a full listing of the sites within the search radius.

Table 4-2: Sites Located within 1/8-mile of Subject Property and/or Sites with Environmental Concerns Beyond 1/8-mile of Subject Property

Facility/Address	Database/List	Location Relative to the Subject Property	Environmental Concerns/Information
NASBP (Closed) NASBP	DoD	Subject and Adjacent Properties	Navy
Barbers Point Central Office (Hawaiian Telcom) (GTE Building) Roosevelt & Copahee Kapolei, HI 96707	UST	Subject Property (Parcel 1)	Facility ID: 9-203295 Currently in Use: 550-gallon diesel 1987
Barbers Point Elementary School 3001 Boxer Road Kapolei, HI 96707	SPILLS	Adjacent property within boundaries (equal elevation / crossgradient)	Integrated Compliance Information System (ICIS) Activity Date 09/0/2007
	Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA)/ Toxic Substances Control Act (TSCA) (FTTS)		Inspection No. 20070905HI-08 1; Violations occurred
	Underground Injection Control (UIC)		UIC Permit Number: UO-2071 (expired 10/30/2004) three injection wells on permit
Kalaeloa Airport (DWS) 3001 Boxer Road Barbers Point Kapolei Kapolei, HI 96707	UIC		UIC Permit Number: UO-2072 (expired 02/14/2016)
Costco Wholesale #10 4589 Kapolei Parkway Kapolei, HI 96707	RCRA-LQG	Adjacent to northwest (higher elevation / upgradient)	RCRA-LQG No violations found Wastes listed include ignitable waste, corrosive waste, mercury, selenium, silver, 2,4-dichlorophenoxyacetic acid, benzene, m-cresol, cresol, salts, and nicotine.

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Facility/Address	Database/List	Location Relative to the Subject Property	Environmental Concerns/Information
	UST		Facility ID 9-203850 Currently in use 30,000-gallon gasoline 2009 30,000-gallon gasoline 2009 30,000-gallon gasoline 2009
Costco Kapolei Kamokila Boulevard & Kapolei Parkway Kapolei, HI 96825	SHWS		09/30/2006: NFA – Hazard Undetermined Response Not Necessary
DLA Disposition Services Building 140, Midway Street Kapolei, HI 96707	Orphan SEMS	¼ to ½ mile south (lower elevation / downgradient)	Site ID: 900294 NFRAP
NEX Touch N'Go Gas Building 1928 Tank 81, 82, 83 Saratoga Avenue Kapolei, HI 96707	LUST	¼ to ½ mile east (lower elevation / crossgradient)	Facility ID 9-102001, Release ID 130008 – Soil Vapor Sampling 01/28/2015 Release ID 070005 – Monitored Natural Attenuation 08/24/2010 Release ID 940200 – Monitored Natural Attenuation 08/24/2010 Site Cleanup Completed (NFA)
Fort Barrette Other, HI	Formerly Used Defense Site (FUDS)	½ to 1-mile north-northeast (higher elevation / crossgradient)	The site contains exposed cesspools, exposed manholes, underground concrete boxes, septic tanks and fuel tank vaults, an underground reservoir and poses potential safety hazards to Kapolei Regional Park (former Fort Barrette) visitors. The site consists of 38.53 acres of land purchased by the U.S. Government in 1931 and transferred to the Navy in 1956.

Five of the six unmappable sites listed by EDR were determined to be in the vicinity of the subject property: 1) Fort Barrette (listed in Table 4-2), 2) Barbers Point Naval Air Station, Mission Street, 3) Hawaii Army National Guard, 4) DLA Disposition Services (listed in Table 4-2), and 5) Former Oahu Sugar Company Pump 15 Station. Unmappable sites cannot be plotted due to inaccurate or missing information in the environmental database record provided by its applicable agency.

4.1.2 Additional Environmental Record Sources

4.1.2.1 City and County of Honolulu, Department of Planning and Permitting

Available information obtained from the CCH, Department of Planning and Permitting, including zoning, land use, and building permits, is provided below.

Zoning Land Use Ordinance (LUO) Designation

The State Land Use District for the subject property and surrounding area is Urban. The CCH zoning LUO designations for the subject property and surrounding properties to the east, south, and west are F-1 Federal, and surrounding properties to the north are AG-1 Restricted Agriculture, P-2 General Preservation, R-5 Residential, AMX-2 Apartment Mixed Use High-density, and A-1 Apartment Low-density

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(CCH 2017). The subject property is not within the Special Management Area, tsunami, or extreme tsunami evacuation zones (CCH 2017).

Building Permits

E2 reviewed the Building Permit information obtained from the CCH Department of Budget and Fiscal Services Real Property Assessment Division regarding the subject property. No building permits maintained by the CCH were identified for the subject property.

4.1.2.2 Land Title Records

E2 is not a professional title search company and does not warrant the completeness or accuracy of the information provided, but considers the data useful in screening the subject property for environmentally suspect owners and/or lessees. Recorded land title records for the subject property were provided by EDR (2017b), previous environmental reports, and the information is included in Table 4-3, below.

Table 4-3: Summary of Land Title

Date	Information
2017-02	Quitclaim Deed Lot 13049 TMK: (1) 9-1-013:004: Kalaeloa Ventures LLC (grantee) to Hunt Communities Hawaii, LLC (grantor) Deed Document No. T-9807136 - Parcel 1: Land CT Lot 13047: Map 957 Land Court Order No. 134783 with Land Court Application 1069, covered by Transfer Certificate of Title No. 529,664 issued to the U.S. - Parcel 2: TMK: (1) 9-1-013:004; Land CT Lot 13049: Map 957 Land Court Order No. 134783 with Land Court Application 1069, covered by Transfer Certificate of Title No. 529,664 issued to the U.S. - Parcel 3: TMK: (1) 9-1-013:128 Land CT Lot 13051-A-1 and (1) 9-1-013:130 Land CT Lot 13051-A-3: Map 1609 Order of Subdivision dated April 2014 and noted on Transfer Certificate of Title No. 529,664 issued to the U.S.
2002-06	Governor Benjamin Cayetano signed into law Senate Bill 2702 (Act 184) which repealed HRS 206G and transferred responsibility for Kalaeloa Community Development District from the NASBP Redevelopment Commission to HCDA.
2000-04	The U.S. Navy authorized the sale or lease of approximately 675 acres of Navy retained land in Kalaeloa including the majority of land along Roosevelt Road.
1994	Hawaii State Legislature established the NASBP Redevelopment Commission for preparing a plan for the conveyance and subsequent reuse of the surplus land at Kalaeloa.
1993	U.S. DoD through the Base Realignment and Closure (BRAC) process, designated the NASBP for closure and roughly 2,165 acres were declared as surplus, making them available for conveyance to State and local government agencies.
1941	James Campbell leased what became the NASBP to the U.S. Navy.
1877	Honouliuli sold to James Campbell

4.2 Other Information Sources

The following sections describe information obtained from other information sources.

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4.2.1 State of Hawaii Department of Health File Review

E2 submitted requests to access public information for the subject and adjacent properties as shown in Table 4-4. Responses from HDOH branches are discussed in the sections below.

Table 4-4: HDOH Public Information Requests

HDOH Branch	Contact	Notes:
Clean Water Branch (CWB)	Mr. Bobbie Teixeria, Environmental Health Specialist	Kalaeloa Solar One, adjacent to the south, HIR10D826 Kalaeloa Ventures, LLC HIR10D697
HEER Office	Ms. Mae Rose Domingo, Administrative Assistant	<u>Adjacent property to the northwest, Costco Wholesale Warehouse</u> • Phase I ESA and Phase II Environmental Site Investigation conducted by Environet, Inc. and a Rezoning Application completed by LP&D Hawaii. Environmental concerns and/or notes are listed in Table 4-7.
Indoor & Radiological Health Branch (IRHB)	Mr. Jeffrey M. Eckerd, Program Manager	Notifications of asbestos abatement were found for TMK: (1) 9-1-013: Parcels 002, 004, 026, 128, and 129. No other communications regarding noise, radiation, indoor air quality, mechanical ventilation, asbestos or lead problems were identified on the subject or adjoining properties.
Safe Drinking Water Branch (SDWB)	Mr. Norris Uehara, Supervisor of the Groundwater Pollution Control Section	<u>Navy Retention Area at Barbers Point</u> • UIC Permit UO-1995 Change-of-Operator 07-14-2014 from U.S. Department of the Navy (DoN) to Kalaeloa Ventures, LLC. • UIC Permit UO-2986 Change-of-Operator 10/07/2014 from DoN to Kalaeloa Ventures, LLC for 22 of the 56 drainage injection wells which are currently under UIC permit UO-1995. Gravity flow of the runoff water. UIC wells located within Parcels 1, 2, and 3 are shown in Figure 3, included in Appendix B.
Solid and Hazardous Waste Branch (SHWB)	Ms. Amy Susana Liana, Planner	<u>Adjacent Property to the northeast of Parcel 1, Costco Wholesale</u> - HW-2677 Hazardous Waste and Used Oil Compliance Evaluation Inspection – no violations - UST 9-203850 (3) 30,000-gallon gasoline USTs (two unleaded and one premium) installed on 02/26/2009 and (2) 1,000-gallon diesel UST installed on 02/27/2009.
Wastewater Branch (WWB)	Ms. Lori Morikami, Planner	The subject property and surrounding area are connected to the Honouliuli Wastewater Treatment Plant (WWTP).
Environmental Health Warehouse (EHW)	Online Database	<u>Adjacent Property, Kapolei City Urban Core (4-7) Roads and Kapolei City Urban Core (4-7 Roads) (area between FDR Avenue and Renton Road)</u> -National Pollutant Discharge Elimination System (NPDES) Permit HIR10D042-4 05/16/2008 to 10/21/2012 -NPDES Permit HIR10D042-5 05/16/2008 to 06/18/2010

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HDOH Branch	Contact	Notes:
		Adjacent Property, Parcel 1 (interior) -UST Site: Facility ID 9-203295, Installation 05/01/1987 Adjacent Property, Parcel 3 (interior), Building 74 Tank BP92 NASBP (the building location was not definitely known) -UST Site: Facility ID 9-103191 Installation Date 11/18/1993 -LUST Site: Release ID 030039 11/18/1993 Site Cleanup Completed NFA

4.2.2 Department of Land and Natural Resources

E2 interviewed Mr. Jonas Burgon with the State Department of Land and Natural Resources (DLNR) Commission on Water Resources Management (CWRM) on October 14, 2017. According to the maps and documents provided by Mr. Burgon, there is one well on the subject property (Parcel 1). Table 4-5 lists the wells identified within one mile of the subject property.

Table 4-5: Well Information

Well Identification Number	Location to Subject Property	Owner	Well Use/Status
3-1905-003 Barbers Point	Subject Property within GTE Building (Parcel 1)	GTE Hawaiian Tel. Co. Inc.	Other
3-1905-005 Caprock 1	Adjacent to the west of Parcel 1 within TMK: (1) 9-1-075: parcel 053	CCH BWS	Unused
3-1905-004 Ewa Desalt Basal		CCH BWS	Unused
3-1905-006 Caprock 1	Adjacent to the west of Parcel 1 within TMK: (1) 9-1-075: parcel 039	CCH BWS	Abandoned/sealed
3-1905-007 Caprock 2		CCH BWS	Unused
3-1905-009 Caprock 3		State DLNR	Unused
3-1904-001 EP 31&32	To the northeast of Parcel 3 across FDR Ave, OR&L utility easement, Renton Road, and drainage basin within TMK: (1) 9-1-160 parcel 063	Campbell Estate	Abandoned/sealed
3-1904-002 Makakilo G C 1		Puu Makakilo	Abandoned/sealed
3-1904-003 Makakilo G C 2		Puu Makakilo	Abandoned/sealed
3-1905-010 KBP	To the southwest of Parcel 1	Not listed	Abandoned/sealed
3-2005-001 Honouliuli	To the north of Parcel 1 across H-1	Pac Conc Quarry	Abandoned/sealed
3-1805-016 VIP Sanitation	To the northwest of Parcel 1 near the intersection of Saratoga Street and Malakole Street.	VIP Sanitation, Inc.	Industrial use
3-1805-001 Barbers Point		Campbell Estate	Unused
3-1905-002 Campbell Industrial Park	To the west of Parcel 1 to the west of Highway 95	Campbell Estate	Other
3-1905-008 Kapolei Irr 1	To the north of Parcel 2 across FDR Ave, OR&L utility easement, Renton Road, and drainage basin within TMK: (1) 9-1-160 parcel 014	CCH BWS	Unused
3-1905-010 Kapolei Irr 2		CCH BWS	Unused

4.2.3 City and County of Honolulu Fire Department

E2 submitted requests to access public information for the subject and adjacent properties as shown in Table 4-4. Responses from CCH Fire Department, Fire Prevention Bureau, are discussed in the section below. No records were found for the subject property.

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4.2.3.1 Local Electric Utility Company

No transformers were identified within the proposed roadways; therefore, Hawaiian Electric Company, Inc. (HECO) was not contacted, the DoN would most likely own any transformers on the subject property.

4.3 Physical Setting Sources

4.3.1 U.S. Geological Survey Topographic Map Coverage

Topographic map coverage of the site is included on the U.S. Department of the Interior Geological Survey (USGS) 7.5-minute Ewa quadrangle map, as shown in Figure 1. The property is located approximately 1.5 miles north of the shoreline. The site is located at 21° 19' 23.95" north latitude and 158° 4' 45.66'' west longitude. Kalaeloa is relatively flat, with an average slope across the entire area of about 0.5 percent (%). The ground surface slopes gently southward with an elevation of approximately 52 feet above mean sea level.

4.3.2 Climate

The climate in the region of the Kalaeloa has monthly mean temperatures ranging from 62 to 88 degrees Fahrenheit (Western Regional Climate Center 2017) with an average annual rainfall of approximately 21.49 inches per year (Giambelluca et al. 2013).

The prevailing wind direction is from the east and northeast. Northeasterly trade winds prevail over Oahu approximately 80% of the time, with average wind speeds ranging from 10 to 15 miles per hour. The trade winds blow most strongly and consistently from April through November. Southerly or "Kona" winds occur roughly less than half the time during December through March.

4.3.3 Geologic and Hydrogeologic Setting

E2 reviewed published geologic and hydrogeologic reports and maps to obtain information regarding subsurface conditions in the general area of the site and to evaluate the potential migration of contaminants.

4.3.3.1 Geology

The island of Oahu is of volcanic origin and was built by the Waianae and the Koolau Volcanoes, which are now deeply eroded (MacDonald et al. 1983). The Waianae Range rises 1.2 kilometers above sea level, making it higher than the younger, adjacent Koolau Range (MacDonald et al. 1983). The Waianae and Koolau Volcanic Shields were built during the late Pliocene and early Pleistocene by thin-bedded lava flows. The main shield building activities ceased approximately 3.5 to 2.5 million years ago (Stearns 1985).

The site is situated on the Ewa Coastal Plain which extends seaward off the southeastern flank of Waianae Volcano and the southwestern flank of the Koolau Volcano. This plain was formed by the accumulation of a thick wedge of sediments and coral reef formations on the flanks of the two volcanoes.

High sea level stands during the Pleistocene Epoch caused the formation of reef deposits at correspondingly higher elevation. Subaerial exposure of the sediments and calcareous materials caused consolidation of the lagoonal deposits and induration of the reef materials.

Sinkholes, depressions in the surface of the earth where there is little fill over the coral reef limestone, are found across the Ewa Plain. Unique anchialine pools, which are sinkholes that connect to the ocean

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through cracks in the substrate, are preserved at the Kalaeloa Unit of the Pearl Harbor National Wildlife Refuge, approximately 1.4 miles south of the proposed roadways.

4.3.3.2 Soils

According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the soil in the area of the site is classified as follows:

- Coral outcrop land consists of coral or cemented calcareous sand. The coral reefs formed in shallow ocean water during the time the ocean stand was at a higher level. Small areas of coral outcrop are exposed on the ocean shore, on the coastal plains, and at the foot of the uplands. This type of land is used for military installations, quarries, and urban development.
- Mamala cobbly silty clay loam, 9 to 12% slopes, consists of shallow, well-drained soils along the coastal plains formed in alluvium deposited over coral limestone and consolidated calcareous sand. Runoff is very slow, the erosion hazard slight to moderate, and the permeability is moderate. In a representative profile, the surface layer is dark-reddish-brown stony silty clay loam about 8 inches thick. The subsoil is dark reddish-brown silty clay loam about 11 inches thick. The substratum is coral limestone and consolidated calcareous sand.

4.3.3.3 Hydrogeology

Mink and Lau (1990) identify the following two types of groundwater beneath the majority of the subject property: a shallow, predominantly caprock groundwater system and an underlying deep basal aquifer. They classify the groundwater as within the Ewa Aquifer System of the Pearl Harbor Aquifer Sector in the two systems as follows:

- The uppermost member is characterized as an unconfined basal aquifer contained in sedimentary nonvolcanic lithology layers. This caprock groundwater is given a Status Code of 13321 which indicates that the groundwater has moderate salinity (i.e., with a chloride content of 1,000 to 5,000 milligrams per liter [mg/L]). Under the Mink and Lau system, the code indicates that the shallow caprock groundwater is currently used but not as a drinking or ecologically important groundwater source, is a replaceable resource, and has a high vulnerability to contamination.
- The deep, underlying aquifer is characterized as a confined basal aquifer contained in dike compartments. Under the Mink and Lau system, the groundwater contained in the deep aquifer is given a Status Code of 13213, indicating that the groundwater has a low salinity (i.e., with a chloride content of 250 to 1,000 mg/L). Under the Mink and Lau system, the code indicated that the deep groundwater is currently used as neither a drinking-water or ecologically important source and has a low susceptibility to contamination because of confinement and the overlying caprock.

Up to about 1,650 feet from the coast, the water table is from 3 to 10 feet below the surface and thus is accessible from sinkholes.

The UIC line was established by HDOH to determine groundwater utility. The UIC line is used to determine the level of protectiveness afforded an aquifer as reflected by water quality standard criteria. In general, groundwater situated mauka (inland) of the UIC line is considered a potential source of drinking water. Groundwater situated makai (seaward) of the UIC line is generally considered not to be a potential source

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of drinking water. The subject site lies mauka of the UIC line and groundwater beneath the site is considered a potential source of drinking water.

4.3.3.4 Surface Water

The closest surface water body to the site is the JCIP Drainage Canal adjacent to the west of the property. The location of the site in relation to the JCIP Drainage Canal is shown in Figure 1. Kalaeloa is relatively dry, with little precipitation and the soils in the area are well-drained, there are no streams or rivers in the Kalaeloa area. The Barbers Point portion of the Pacific Ocean is located approximately 1.3 miles to the south of the proposed roadways. During Navy operations, more than 250 dry wells were installed NASBP, primarily for regional stormwater drainage. Sixteen dry wells were identified within the area bounded by the proposed roadways. Dry wells are shown in Figure 3, included in Appendix A.

4.4 Historical Use Information

4.4.1 Standard Historical Sources

Historical use of the subject and adjacent properties were obtained by reviewing historical sources as listed in Table 4-6 below. A discussion of RECs and/or environmental concerns identified as a result of our review of standard historical sources is included in Section 7 of this report.

Table 4-6: Historical Sources Reviewed

Source Type	Year Reviewed	Source	Environmental Concerns/Notes:
Aerial Photograph	1944, 1951, 1965, 1968, 1977, 1985, 1992, 2001, 2004, 2006, 2008, 2013, and 2014	EDR 2017c, University of Hawaii, 2017, and Google Earth 2017	*Parcel 1* 1944: Aerial photo quality is poor. ROWs for FDR Avenue, OR&L, and Renton Road present on the north side; ROW for Copahee Avenue present on the east side; and ROW for Boxer Road extends through the interior portion of TMK: (1) 9-1-013:002; and a GTE structure located on FDR Avenue. The interior portion of TMK: (1) 9-1-013:002 has 17 structures adjacent to the west of Copahee Avenue, and was heavily vegetated on the west side. Areas to the north, south, and west are heavily vegetated. 1951: No significant changes with the exception of the following: the JCIP Drainage channel and an access road ROW are adjacent to the west; the area adjacent to the north appears to be cultivated, and the area to the south is heavily vegetated. 1965: NASBP including the subject property was blacked out. Areas to the north and east are cultivated. 1968-2000: ROW for Saratoga Avenue now constructed on the south. The interior portion of TMK: (1) 9-1-013:002 was redeveloped into housing. 2001-2014: No significant changes to the subject property; however, the interior of TMK: (1) 9-1-013:002 the buildings have been mostly removed. In 2006, the adjacent properties to the north appeared to be developed; and in 2013 the adjacent property to the south has been developed into a solar farm.
			Parcel 2

Source Type	Year Reviewed	Source	Environmental Concerns/Notes:
			1944: Aerial photo quality is poor. ROWs for FDR Avenue, OR&L, and Renton Road present on the north side; ROW for Copahee Avenue present on the west side; ROW for Hornet Avenue on the east side; and ROW for Saratoga Avenue and Boxer Road present on the south side. Building (272 Transformer Station A) present on the northeast corner of the OR&L ROW. A total of 13 structures are present within the interior portion of TMK: (1) 9-1-013:004 adjacent to the east of Copahee Avenue and Tulagi Avenue extends through the interior portion. The area to the north is heavily vegetated, and area to the south appears to be developed. 1951: Area to the north is heavily vegetated, structures are present to the south. 1965: NASBP including the subject property was blacked out. The area to the north is cultivated. 1968-2000: ROW for Saratoga Avenue now constructed on the south. The interior portion of TMK: (1) 9-1-013:004 was redeveloped into housing and TMK: (1) 9-1-013:003 the current structure 1674: Barbers Point Elementary was developed. 2001-2014: No significant changes to the subject property; however, the interior of TMK: (1) 9-1-013:004 the buildings have been mostly removed except a few on the southwest corner.
			Parcel 3 1944: Aerial photo quality is poor. ROWs for FDR Avenue, OR&L, and Renton Road present on the north side; Bennington Street bisects central portion of the site from north to south; Saratoga Avenue present on the south side; and Hornet Avenue present on the west side. The interior portion of TMK: (1) 9-1-013:129 appears to be cleared with possible structures; and the interior portion of TMK: (1) 9-1-013:128 has two "E"-shaped buildings (building numbers unknown) on the west side and one small building (building number unknown) on the east. 1951: Proposed Road A has a portion of one building (73: Paradise West Club Complex) and a portion of a roadway that leads to the east portion of the site; and within the proposed Wakea Street Extension one building (1906: Tennis Pro Shop) is present; a portion of a small building (68C) and a portion of the tennis courts (Structure 713) are present. The interior portion of TMK: (1) 9-1-013:129 has three buildings (building numbers unknown) on the west side and one large building on the east (73: Paradise West Club Complex) and three smaller structures (1692: Cold Storage, 943: Pool Bathhouse, 945: Pool Treatment Facility); and the interior portion of TMK: (1) 9-1-013:128 has the two "E"-shaped buildings (building numbers unknown) and 5 structures (building numbers unknown) adjacent to the north of Saratoga Avenue on the west side of the site and two tennis courts (Structure 713) and a small building (Building 68C) on the east side. 1965: NASBP including the subject property was blacked out. Areas to the north are cultivated.

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Source Type	Year Reviewed	Source	Environmental Concerns/Notes:
			1968-2000: No significant changes on the subject property. The interior portion of TMK: (1) 9-1-013:129 has one building (77: BOQ) on the west side and an outdoor pool (Structure 941), 1724: Transformer Station, 943: Pool Bathhouse, 945: Pool Treatment Facility, 73: Paradise West Club Complex, and 1692: Cold Storage structures on the east; and the interior portion of TMK: (1) 9-1-013:128 has been redeveloped with no structures on the west side and 713: tennis courts and 68C: Unknown use building on the east side 2001-2014: No significant changes on the subject property. The interior portion of TMK: (1) 9-1-013:128, the 68C building was removed, only the foundation remains. The area to the south is highly developed. In 2013, the area to the north was graded and appeared to be used for construction.
Fire Insurance Maps	No Coverage	EDR 2017d	No Coverage
USGS Topo Maps (Ewa and Barbers Point Quadrangles)	1928, 1953, 1962, 1968, 1970, 1983, 1985, 1998, and 2013	EDR 2017e and U.S. Army 1943	*Parcel 1* 1928: OR&L tracks on the north, a portion of access trails on the west and north. No significant features within the interior of TMK: (1) 9-1-013:002 with the exception of a possible pipeline through the southwest corner. The area labeled Honouliuli. 1943: The ROW for OR&L tracks and FDR Avenue on the north. The interior of TMK: (1) 9-1-013:002 is shown as subdivided into 7 sub-parcels and Boxer Road goes through the central portion of the parcel. 1953: The ROWs for Renton Road, OR&L tracks, and FDR Avenue on the north, ROW for Copahee Avenue on the east, and the JCIP Drainage Canal on the west. The interior of TMK: (1) 9-1-013:002 developed for housing with over 70 structures. The area labeled NASBP. 1962-1985: The ROW for Saratoga Avenue on the south side. No other significant changes. TMK: (1) 9-1-013:003 the current structure 1674: Barbers Point School now present. 1998: No significant changes on the subject property. The interior of TMK: (1) 9-1-013:002 no structures are shown. Area no longer labeled NASBP. 2013: OR&L tracks no longer present.
			Parcel 2 1928: OR&L tracks on the north and access trail on the north. No significant features within the interior of TMK: (1) 9-1-013:004. The area labeled Honouliuli. 1943: The ROW for OR&L tracks and FDR Avenue on the north, ROW for Hornet Avenue on the east, roadway for Boxer Road and Saratoga Avenue on the south. The interior of TMK: (1) 9-1-013:004 has no features.

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Source Type	Year Reviewed	Source	Environmental Concerns/Notes:
			1953: The ROWs for Renton Road, OR&L tracks, and FDR Avenue on the north, ROW for Hornet Avenue on the east, and ROW for Copahee Avenue on the west. The interior of TMK: (1) 9-1-013:004 shows two small buildings (unknown building numbers) on the north side of the site adjacent to FDR Avenue. The area labeled NASBP. 1962-1985: No significant changes to the subject property. The interior of TMK: (1) 9-1-013:004 has been developed into housing with over 40 structures on it. The ROW for Tulagi Avenue adjacent to the east of TMK: (1) 9-1-013:004 and TMK: (1) 9-1-013:003 the current structure 1674: Barbers Point School now present. 1998: No significant changes on the subject property. The interior of TMK: (1) 9-1-013:004 no structures are shown. Area no longer labeled NASBP. 2013: OR&L tracks no longer present.
			Parcel 3 1928: OR&L tracks on the north. No significant features within the interior of TMK: (1) 9-1-013:0129 and 128 except a stone wall. The area labeled Honouliuli. 1943: The ROWs for OR&L tracks and FDR Avenue on the north, ROW for Franklin Street on the east, ROW for Saratoga Avenue on the south, ROW for Hornet Avenue on the west, and a road near the proposed Wakea Extension Street. The interior of TMK: (1) 9-1-013:129 has one "L"-shaped building (unknown building number) and a small rectangular building (unknown building number) on the west side. The interior of TMK: (1) 9-1-013:128 has two "E"-shaped buildings (unknown building numbers) on the west side. 1953: The ROWs for Renton Road, OR&L tracks, and FDR Avenue on the north, ROW for Hornet Avenue on the east, ROWs for Boxer Road and Saratoga Avenue on the south, and the ROW for Copahee Avenue on the west. In addition, a portion of 73: Paradise West Club Complex is within the proposed Road A ROW for the subject property. The interior of TMK: (1) 9-1-013:129 has two additional small buildings (unknown building numbers) constructed on the west side, and the current 73: Paradise West Club Complex on the east side; and the interior of TMK: (1) 9-1-013:128 four additional structures (building numbers unknown) are shown adjacent to Saratoga Avenue. The area labeled NASBP. 1962: No significant changes to the subject property. The interior area of TMK: (1) 9-1-013:129 has 72: BOQ, and a "T" shaped building (building number unknown) on the west side and 73: Paradise West Club Complex, 943: Bathhouse, and 945: Pool Treatment Facility structures on the east side. The interior of TMK: (1) 9-1-013:128 has only one "E"-shaped building (unknown building number) and the four small structures (unknown building numbers) adjacent to Saratoga Avenue on the west side and no structures on the east side.

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Source Type	Year Reviewed	Source	Environmental Concerns/Notes:
			1968: No significant changes to the subject property. The interior area of TMK: (1) 9-1-013:129 had no changes. The interior area of TMK: (1) 9-1-013:128 no structures are shown. 1970: No significant changes to the subject property or interior areas with the exception of 943: Bathhouse structure not shown. 1983-1985: A portion of 68C: Unknown structure use is within the proposed Road A ROW for the subject property. The interior area of TMK: (1) 9-1-013:129 943: Bathhouse structure present again; and in the interior area of TMK: (1) 9-1-013:128 68C: Unknown structure use shown. 1998: No significant changes on the subject property. The interior of TMK: (1) 9-1-013:129 only has two structures 77: BOQ and 73: Paradise West Club Complex are shown; and in the interior of TMK: (1) 9-1-013:129 only 68C: Unknown structure use is shown. Area no longer labeled NASBP. 2013: No structures are shown on the subject property or within the interior of TMKs (1) 9-1-013:129 or 128. OR&L tracks no longer present.
Street Directories	1992, 1995, 1999, 2003, 2008, and 2013 (FDR Avenue, Roosevelt Avenue, and Lauwiliwili Street)	EDR 2017f	No environmental concerns or notes.
Building Permit Records	No coverage	EDR 2017g	No coverage.
Property Tax Map Report	No coverage	EDR 2017h	No coverage.
Environmental Lien and AUL Search	2017	EDR 2017b	Title records are outlined in Section 4.1.2.2. Quitclaim Deed Kalaeloa Ventures LLC to Hunt Communities Hawaii, LLC
Historical Maps	1876	State Department of Accounting and General Services (DAGS) 2017	Area labeled Coral Plain, Total area of Honouliuli including Puuloa 432 A., L.C. Award 11216
	1899	Rumsey 1899	OR&L Railway located to the north of the subject property. The area labeled "Coral Plain."
	1902	DAGS 2017 and Rumsey 1902	Area labeled "Coral Plain" and is also located "Sisal Plantation." The area labeled U.S. Coast and Geodetic Survey Magnetic Station. OR&L Railway located on north side of the site.
	1937	E2 Archives	Ft. Barrette shown approximately 0.6-mile northeast of the subject property hydraulically up/cross gradient of the subject property.
State Geographic	1900, 1920, and 1937	State Office of Planning 2015	The 1937 map identifies the subject property within sugarcane lands.

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Source Type	Year Reviewed	Source	Environmental Concerns/Notes:
Information System (GIS)			

4.4.2 Previous Environmental Reports

E2 reviewed previous environmental reports as listed in Table 4-7 below. A discussion of RECs and/or environmental concerns identified as a result of our review of the previous environmental reports is included in Section 7 of this report.

Table 4-7: Previous Environmental Reports Reviewed

Year	Report Title	Environmental Concerns/Notes:
1945	*History of Naval Air Station, Navy No. 14* (Naval Air Station 1945)	• In November 1941, field work was started for the construction of NASBP, and the station was established on 14 April 1942. • Grading and oiling of the coral strip were historically occurring on the airfield prior to being paved in 1943. • Sewage and drainage system complete. • In 1944, recreation facilities constructed. • In 1945, all major construction on the Inshore Patrol Squadron area completed, including parking mat, nose hanger, enlisted barracks, mess hall, BOQs and shop space completed.
1991	*An Archaeological Survey of the Naval Air Station, Barber's Point, O'ahu, Hawai'I* (Applied Research Group 1991)	• 1825 map indicated the site was within uncultivated plain. • In September 1877, Honouliuli was sold to James Campbell, who leased out rice lands, fishing rights at Pearl Harbor, and a lime quarry. • In 1889, Honouliuli was leased to Benjamin Dillingham for 50 years, and the Ewa Sugar Plantation was established in the lower portion of the ahupuaa, and Oahu Sugar Company's cane fields were developed in the upper portion. • In 1889, Dillingham's OR&L began constructing a railroad in Honouliuli, and by 1895 it was extended to Waianae. • In 1893, sisal was imported from Florida and planted in 1894 for cordage. Part of the NASBP was built on the old sisal plantation, including the area of the subject property. A map 1908 to 1913 shows the subject property as part of "Sisal Plantation." • During the 1930s, the Navy leased the area where a mooring mast was built (to the east of the subject property). In late 1939 or early 1940, when the original lease expired, the Navy acquired more than 3,500 acres from the same estate where the Marine Corps Air Station (MCAS) at Ewa and later, NASBP was built. • In November 1951, ceremonies were held for the opening of "the first housing unit at NASBP" and were expected to be completed by mid-April 1952. The 355 apartments were to house 278 enlisted men and 77 officers.

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Year	Report Title	Environmental Concerns/Notes:
		• In 1956, announcements were again made for additional housing units at Barbers Point. Twenty-seven units were to be for senior officers, 216 units for junior officers, and 887 for enlisted men. • In 1957, it was announced that the Navy would have trailer houses built by a contractor from the mainland. The metal trailers were 40 to 50 feet in length, and between 8 and 10 feet wide, with metal cabanas on the side. A "pilot" village of 50 trailers was to be installed within the first three months after work had begun. • In 1974, 56.7 acres of Federal land was turned over to the CCH to build the Honouliuli WWTP. • A "permanent zone" of 5,000 yards along the beach and 1,000 yards off-shore was established as a danger zone by NASBP for use by the Navy for target practice, ordnance proving, underwater demolition training, and dummy torpedo firing. • In 1902, a U.S. Coast and Geodetic Survey Magnetic Observatory, also known as the Honolulu Observatory, was established in Honouliuli.
1994	*Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract No. N62742-90-D-0019 CTO No. 0126, Environmental Baseline Survey for Naval Air Station Berbers Point, Oahu, Hawaii* (Naval Facilities Engineering Command Pacific Division [NAVFAC] 1994)	• *Adjacent property northeast of the intersection of FDR and Franklin Road.* In 1993, a contractor backhoe ran over the fill pipe of this previously unidentified UST during excavation work for a new housing development. The tank was approximately half-full of a petroleum product, and laboratory analysis showed the contents to be a mixture of water and halogenated oil. The UST was excavated on November 12, 1993, and a closure report was prepared in 1993. The original contents and purpose of the tank are unknown, but historical drawings show barracks located in the area from 1945 to 1969. • *Adjacent Property, 77: BOQ*: Diesel and fuel oil storage tanks (BP19 and BP20) were installed in 1958 to fuel boilers in Building 77. The tanks, boilers, and piping were removed in October 1991, at which time visual evidence of soil contamination was noted at the site. Analytical results and subsequent actions are not known. • *Subject Property, 272: Transformer Station A*: The site is a substation which consists of an 850 kilovolt-ampere transformer numbered 444, was constructed in the early 1940s as part of the original electrical grid for the base. Transformer 444 was retro-filled by the Public Works Center on June 28, 1988, due to the detection of polychlorinated biphenyl (PCBs) in the dielectric fluid and wipe samples collected from the concrete pad. Follow-up sampling has not been conducted.
1995	*Naval Air Station Barbers Point (Marine Corps Air Station Ewa), Franklin D. Roosevelt Street, Essex Street, Pacific Ocean, and Drainage Channel, Ewa Vicinity, Honolulu County, Hawaii, Written Historical and Descriptive Data* (Historic American Building Survey 1995)	• In 1931, the U.S. Army started to build a battery of two 16-inch guns at Puu-o-Kapolei, the only topographic rise in the Ewa plain, just north of what became NASBP. The army installation (Fort Barrette) and the gun emplacement (Battery Hatch) are now part of the Kapolei Regional Park. • In the 1930s, the Army also established training areas and built coastal defenses and a coastal highway in the Ewa Plain.

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Year	Report Title	Environmental Concerns/Notes:
		• In 1932, the Navy leased 206 acres in the Ewa Plain from the Campbell Estate. • The MCAS facilities constructed in 1941, were attacked by the Japanese in December 1941. The MCAS Ewa was a pilot training center and staging area for men and planes serving throughout the Pacific during World War II (WWII). After the war, the station was disestablished, with the land absorbed by NASBP. • During WWII, NASBP was a major supply, overhaul, and repair station for carrier aircraft.
1997	*Archaeological Inventory Survey for Construction Projects at Naval Air Station Barbers Point, O'ahu, Hawai'i,* (International Archaeological Research Institute, Inc. 1997)	• An 1825 map, shows all of the central areas of the Ewa Plain labeled as "Low uncultivated Plain" indicating that the entire area was abandoned by 1825. • None of the land records or maps indicate any nearby activity until the construction of the MCAS Ewa in the 1930s and the NASBP in 1940 and 1941.
1998	*Department of the Navy, FY 1999 Amended Budget Estimates (BRAC 93) Base Closure and Realignment, III Justification Data Submitted to Congress* (DoN 1998)	• NASBP family housing will be retained to address the existing housing shortfalls in the Pearl Harbor region. • 50 points of interests were identified within NASBP. One of the sites, 272: Transformer Station A (1947-1994), is located on the subject property.
2000	*An Archaeological Curation-Needs Assessment of Military Installations in Selected Western States, Technical Report No. 20, Volume 1* (U.S. Army Corps of Engineers 2000)	• In April 1942, the NASBP was commissioned and used to train pilots and service planes from aircraft carriers in the Pacific theater. • Following the war, it served as a rapid demobilization center and supported functions of all areas of aviation activities. • In 1949, the adjacent MCAS Ewa was incorporated into the NASBP boundary. • During the Korean War, the installation served as a cargo forwarding and personnel replacement center for United Nation forces.
2006	*Phase I Environmental Site Assessment, Vacant lot (Proposed Costco Wholesale Warehouse location), Corner Kapolei Parkway & Kamokila Boulevard, Kapolei, Oahu, Hawaii 96707, TMK: (1) 9-1-16 Parcel 1 (portion)* (Environet, Inc. 2006a)	• The entire area that is now known as Kapolei has been used for agricultural purposes (i.e., sugarcane) since the mid-1800s. • The vacant lot was leased historically by Ewa Plantation Co. and the Oahu Sugar Company. • "Black Oil" and "White Gas" pipelines located along FDR Avenue and Renton Road within the OR&L ROW.
2006	*Phase II Environmental Site Investigation Report, Vacant lot (Proposed Costco Wholesale Warehouse location), Corner Kapolei Parkway & Kamokila Boulevard, Kapolei, Oahu, Hawaii 96707, TMK: (1) 9-1-16 Parcel 1 (portion)* (Environet, Inc. 2006b)	• In 2006, Environet, Inc. collected 12 surface soil samples and groundwater samples from five temporary wells. Arsenic and selenium were detected in surface soil at concentrations that exceeded the HDOH Environmental Action Levels (EALs) at the time. Total petroleum hydrocarbons (TPH) as diesel range organics (DRO) and TPH as oil range organics (ORO) were detected in groundwater at concentrations that exceeded HDOH EALs at the time.
2006	*Rezoning Application Costco Wholesale Kapolei TMK: 9-1-016:001 (por), The City of Kapolei, Honouliuli, Ewa, West Oahu, Hawaii* (LP&D Hawaii 2006)	• Rezoning from P-2 to BMX-3 to allow for the development of a Costco warehouse and gas station facility. • In 1980 approximately 14 miles of the OR&L was transferred from the U.S. to the HDOT. Also referred to as the Pearl Harbor Historic Trail, it is used as a utility corridor with multiple easements granted

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Year	Report Title	Environmental Concerns/Notes:
		to government agencies, utility companies, and Standard Oil of California. • The regional drainage system consists of a drainage transition area from an open channel to underground box culvert and connects to the JCIP Drainage Canal. The drainage system prevents discharge into the NASBP. The JCIP Drainage Canal is a concrete engineered open channel, carrying drainage from the surrounding area.
2006	*Kalaeloa Master Plan* (HCDA 2006)	• Roads transferred to the HDOT include Franklin Street and West Perimeter Road. • Roads transferred to the CCH include Saratoga Road, Hornet Avenue, Copahee Road, Boxer Road, and several ROWs for the road extensions. • Stormwater runoff within Kalaeloa is discharged into an extensive system of more than 250 dry wells that are permitted by the HDOH; however, do not conform to City standards. • Runoff from Kapolei City is intercepted by an open channel, north of the OR&L railway alignment and parallel to the northern boundary that discharges to the JCIP Drainage Canal. • Water distribution system in Kalaeloa is currently owned and operated by the U.S. Navy. • The existing sewer system in Kalaeloa is currently owned by the U.S. Navy and operated, under license, by the CCH Department of Environmental Services. • The existing electrical distribution system in Kalaeloa is currently owned and operated by the U.S. Navy. • Telephone and communications cable system in Kalaeloa is currently owned by the U.S. Navy Computer and Telecommunications Area Master Station.
2010	*Geotechnical Engineering Exploration Kalaeloa Parcel 1 Subdivision, TMK: 9-1-13: 2, Kalaeloa, Oahu, Hawaii* (Belt Collins Hawaii Ltd. 2010)	• The site is underlain by a thin horizon of man-made fill which is underlain by interbedded coral formations and weakly cemented reef detritus-based on six borings installed at the site to depths ranging from about 11.2 to 16.5 feet below ground surface.
2014	*Development Permit Application, Building 77, 91-1245 Franklin D Roosevelt Ave, Kalaeloa, HI 96707, TMK: 91013011* (Hunt Development Group LLC 2014)	• In 1958, the Navy 77: BOQ located within Parcel 3 was constructed and was abandoned by 1999. The BOQ is located outside the boundaries of the former MCAS Ewa and the 1941 Ewa Field. • 77: BOQ qualifies for the National Register of Historic Places.
2016	*(Draft) Kalaeloa Potable Water Master Plan* (RMTC 2016)	• Kalaeloa is located in the DLNR CWRM Ewa-Kunia Aquifer System Area and Groundwater Management Area. The Kapolei Aquifer System Area and Ewa Caprock Aquifer are located in Kalaeloa. • TMK: (1) 9-1-013:002 is listed as vacant 49.68-acre lot; TMK: (1) 9-1-013:004 is listed as vacant 30.94-acre lot; and TMK: (1) 9-1-013:128 and 129 is listed as 25.05-acre lot occupied by 77: BOQ, 73: Paradise West Club Complex, 941: Outdoor Pool, 1724: Transformer Station; 943 Pool Bathhouse; 945 Pool Treatment Facility; 1692 Cold Storage; 68C: Concrete Pad; 713: Tennis Courts; and 1906: Tennis Pro Shop. Figure 2, included in Appendix A, shows the locations of the structures.

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Year	Report Title	Environmental Concerns/Notes:
		• Honouliuli WWTP was originally put into service in December 1984. • The subject property water demands were changed from mixed use to all residential.
2017	*Drainage Report for Kalaeloa for Naval Air Station Barbers Point (RMTC 2017).*	• Under a recommendation by the U.S. DoD that became an order approved by Congress in 1993, the Navy was required to follow the BRAC process to shut down NASBP and transfer federal real property. In July 1999, the Navy officially closed NASBP. • A CCH-owned makai channel was construction along the north side of FDR Avenue and conveys runoff to the JCIP channel. • The existing drainage systems consist of 253 dry wells that were located randomly around Navy facilities. The existing capacity of the dry wells is unknown, and maintenance has not been done since the closure of the base in 1999.
2017	*Final Environmental Investigation Report, Parcels 1-5, Kalaeloa Redevelopment Program, Former Naval Air Station, Barber's Point, Oahu, Hawaii* (Weston Solutions, Inc. 2017a)	*Parcel 1, TMK: (1) 9-1-013:002:* • Soil sample results indicated the presence of contaminants at levels exceeding both HDOH EALs and Hawaii soil background levels for metals as follows: - Arsenic – identified at four feet below ground surface; - Chromium (trivalent – non-toxic)- identified at various depths; and - Organochlorine pesticides (heptachlor, heptachlor epoxide, and chlordane) – identified in the surface soils (to the top two feet below ground surface). In this case, Weston Solutions, Inc. established that Chlordane was applied lawfully to the former family housing area for the purpose of termite and pest control. *Parcel 2, TMK: (1) 9-1-013:004:* • Soil sample results indicated the presence of chromium at varying depths at a concentration exceeding HDOH EALs, but below the site-specific background concentrations determined for the site. *Parcel 3, TMK: (1) 9-1-013:128 and 129:* • Soil sample results indicated the presence of chromium at varying depths at concentrations exceeding HDOH EALs, but below site-specific background concentrations. • 73: Paradise West Club Complex (partially on the subject property) and 1906: Tennis Pro Shop (on the subject property) ACM sampling results confirmed ACM at the site within the men's bathroom in the northwestern corner of 73: Paradise West Club Complex and in the office and kitchen area in the southern section of 1906: Tennis Pro Shop. • LBP was detected on the exterior of 73: Paradise West Club Complex (partially on the subject property), 945: Pool Treatment Facility; and 943: Pool Bathhouse buildings. • PCB survey in 73: Paradise West Club Complex (partially on the subject property) was conducted as there was a historical fire that occurred within the building; however, no PCB containing material was identified in the accessible areas of the building.

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Year	Report Title	Environmental Concerns/Notes:
		• A visual survey of 73: Paradise West Club Complex (partially on the subject property) had potential titanium-containing exit signs at the site. *Dry Wells:* • Samples collected and analyzed from the dry wells indicated chromium and lead above HDOH EALs. Chromium is anticipated to be the same type as that found in the soil borings.
2017	*Phase I Environmental Site Assessment Parcel 1 Between Saratoga Ave., Franklin Delano Roosevelt Ave. and Copahe'e Ave., TMK # 91013002, Kalaeloa, Hawaii* (Weston Solutions, Inc. 2017b)	• Parcel 1, TMK: (1) 9-1-013:002, samples collected from the soil at the site indicated areas of elevated pesticide concentrations that will require management during redevelopment; however, it does not indicate widespread contamination of the pesticides. • TMK: (1) 9-1-013:002 formerly contained two dry wells (K19-01 and L18-01), that have been cleaned and closed; and currently contains two dry wells K18-02 and L18-01.

4.4.3 Summary of Historical Land Use

E2 reviewed the historical use of the subject and adjacent properties from readily available standard historical sources. A brief summary of the historical use of the area and subject and adjacent properties is provided below.

In the late 1840s, when native tenants of the land were allowed to make claims for private property rights, no claims were made for the property of Kalaeloa.

In the 1880s, the lands of the Kaupea-Kalaeloa region were being turned over to cattle grazing that continued through the early 1900s.

In 1889, James Campbell leased Honouliuli to Benjamin Dillingham who used a section across the Ewa Plain to build the OR&L railroad line in 1890. The railroad line served the major sugar plantations and became the northern boundary of the NASBP.

By 1893, the vicinity including the subject property was used for sisal cultivation, for rope fibers. According to the Historic American Building Survey only ranching under lease to the Hawaiian Meat Company Ltd, and no other commercial uses were noted on the NASBP land before military construction as the entire areas were hard-crusted coral formation untillable pasture and beach.

By 1920, the lands of Honouliuli were used primarily for commercial sugarcane cultivation and ranching. Major land use changes came to western Honouliuli when the U.S. Military began development in the area when the U.S. initiated the Oahu Coast Defense Command, a series of coastal artillery batteries designed to assist in defense of Pearl Harbor and to prevent invasion of Oahu. Military installations were constructed both near the coast, as well as in the foothills and upland areas including Barbers Point Military Reservation (a.k.a. Battery Barbers Point, 1937 to 1942), located at Barbers Point Beach, was used beginning in 1921 as a training area for firing 155-millimeter guns (Payette 2003). Camp Malakole Military Reservation (a.k.a. Honouliuli Military Reservation until 1941), located south of Barbers Point Harbor, was used from 1939 as an antiaircraft artillery training firing point (Payette 2003). Gilbert Military Reservation, located east of Barbers Point Harbor, was used from 1922-1944 as a railway battery firing position (Payette 2003). Brown's Camp Military Reservation (a.k.a. Brown's Camp Battery from 1937-1944 and

Battery Awanui from 1940-1945), located near Kahe Point, was a railway battery firing position (Payette 2003). Fort Barrette (a.k.a. Kapolei Military Reservation and Battery Hatch), located atop Puu Kapolei located approximately 0.6-mile north of the subject property and may have included a portion of the subject property, was in use from 1931 to 1948 for housing four 3-inch antiaircraft batteries (Payette 2003). In the 1950s, the site was used as a NIKE missile base. Palailai Military Reservation (a.k.a. Battery Palailai from 1942-1944), located atop Puu Palailai approximately 1-mile north of the subject property, was used from the 1920s and included Fire Control Station "B" (Payette 2003).

In 1932, the U.S. Marines purchased 206 acres of land at Kalaeloa which became the NASBP. In the 1930s, the coastal highways in the Ewa Plain were constructed. Construction on the MCAS Ewa base began in November 1941; however, the Navy revised the building plans to make the buildings bombproof following the Japanese attacks on Pearl Harbor.

After the war, the MCAS Ewa was disestablished, with the land absorbed by the NASBP which was commissioned on April 15, 1942. The NASBP was the largest and most significant base built in the area and housed numerous naval and defense organizations, including maritime surveillance and antisubmarine warfare aircraft squadrons, a U.S. Coast Guard Air Station, and the U.S. Pacific Fleet. Between 1944 and 1952, recreational facilities, enlisted barracks, mess hall, and BOQs were constructed at the NASBP. By 1956, the area of the subject property was developed for Naval housing as part of Rose Manor housing. After WWII ended, NASBP became the primary Naval Air Station for Naval operations in the Pacific throughout the Cold War era until its close in 1999. In 2000 to 2001, the Rose Manor housing development was demolished.

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Section 5 Site Reconnaissance

5.1 Methodology and Limitations

A site reconnaissance was conducted by E2 personnel, including Ms. Arlene Campbell, Senior Geologist, and Mr. John Ellis, Environmental Technician, on October 12, 2017. The site reconnaissance included visual surveys of the property and brief surveys of the visible portions of the adjacent parcels. Site photographs are included in Appendix A.

5.2 General Observations

At the time of the site reconnaissance on October 12, 2017, the subject property was occupied by asphalt-paved and dirt roadways; OR&L ROW, concrete sidewalks; portions of asphalt-paved parking lots and driveways from former housing units; the GTE Building on Parcel 1; a portion of 272: Transformer Station A on the corner of FDR and Hornet Avenues within Parcel 2; the 1906: Tennis Pro Shop building, portions of 73: Paradise West Club Complex, 68C: concrete pad, and 713: tennis courts on Parcel 3, and portions of the OR&L ROW. The structures and ROW are surrounded by dense trees and bushes. The areas within the subject property have been extensively graded over the years for the development of the ROWs and housing complexes. One unknown concrete structure was identified near the intersection of Saratoga and Copahee Avenues on Parcel 1 that is possibly a WWII pillbox. The site reconnaissance was limited since access was not granted to include the interior of site structures in the site reconnaissance, including the GTE Building, 272: Transformer Station A, 73: Paradise West Club Complex, and 1906: Tennis Pro Shop. Additionally, the OR&L utility corridor was not included in the site reconnaisance.

Observations made during the site reconnaissance are summarized below.

5.2.1 Hazardous Substances and Petroleum Products in Connection with Identified Uses

E2 did not observe hazardous substances and/or petroleum products in connection with identified uses within the subject property during the site reconnaissance.

5.2.2 Hazardous Substances and Petroleum Products Containers (Not Necessarily in Connection with Identified Uses)

E2 did not observe hazardous substances and/or petroleum products that were not associated with identified uses within subject property during the site reconnaissance.

5.2.3 Storage Tanks

E2 did not observe the presence of storage tanks within the subject property during the site reconnaissance.

5.2.4 Odors

E2 did not observe strong, pungent, or noxious odor at the subject property during the site reconnaissance.

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5.2.5 Pools of Liquid

No pools of liquid were noted on the subject property during the site reconnaissance.

5.2.6 Drums

E2 did not observe the presence of drums within the subject property at the time of the site reconnaissance.

5.2.7 Polychlorinated Biphenyls

E2 did not observe PCB-containing transformers, electrical equipment, or other signs of PCBs on the subject property at the time of the site reconnaissance with the exception of the following:

- Building 272: Transformer Station within Parcel 2;

5.2.8 Pits, Ponds, or Lagoons

E2 did not observe pits, ponds, or lagoons on the subject property during the site reconnaissance.

5.2.9 Stained Soil, Concrete, and/or Pavement

E2 did not observe stained soil, concrete, and/or pavement within the subject property during the site reconnaissance.

5.2.10 Stressed Vegetation

E2 did not observe stressed vegetation on the subject property during the site reconnaissance.

5.2.11 Solid Waste

E2 observed evidence of solid waste at the site as follows:

- Illegal dumping of miscellaneous debris and litter adjacent to the ROWs including small amounts of general household trash, 1-gallon paint cans, several metal cans of brake fluid, wooden pallets, and electronics and
- Small stockpiles of vegetation.

5.2.12 Stockpiled Soil

E2 did not observe stockpiled soil from unknown sources on the subject property during the site reconnaissance.

5.2.13 Wastewater

Wastewater generation was not observed on the subject property during the site reconnaissance.

5.2.14 Stormwater

Stormwater was not observed on the subject property during the site reconnaissance.

5.2.15 Wells

E2 did not observe wells within the subject property during the site reconnaissance.

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5.2.16 Dry Cleaning Operations

There are currently no dry cleaning operations on the subject property, and historical records did not indicate the presence of a dry cleaning operation on the subject property in the past.

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Section 6 Interviews

6.1 Interviewed Parties

E2 interviewed the following people listed in Table 6-1 regarding the past and current use and activities on the subject and adjacent properties.

Table 6-1: Interviewed Parties

Summary of Parties Interviewed		
Name	**Affiliation**	**Role**
Jinny Cheung	Assistant Development Manager Hawaii Region for Hunt Communities Hawaii, LLC	Owner Representative
Mr. Bobbie Teixeria	HDOH CWB	Environmental Health Specialist
Ms. Mae Rose Domingo	HDOH HEER Office	Administrative Assistant
Mr. Jeffrey M. Eckerd	HDOH IRHB	Program Manager
Mr. Norris Uehara	HDOH SDWB Groundwater Pollution Control Section	Supervisor
Ms. Amy Susana Liana	Planning & Design Section, HDOH SHWB	Planner
Ms. Lori Morikami	Planning & Design Section, HDOH WWB	Planner
Mr. Jonas Burgon	DLNR CWRM	Engineer Technician

6.2 Interview Findings

Information obtained during interviews is included in the pertinent sections of this report.

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Section 7 Findings, Opinions, and Conclusions

RMTC retained E2 to conduct a Phase I ESA in conformance with ASTM Practice E1527-13, *Standard Practice for Environmental Site Assessments*. The subject property is located within the Kalaeloa Community Development District (Kalaeloa) on Oahu, Hawaii, designated as Tax Map Key (TMK): (1) 9-1-013: portions of parcels 002, 004, 128, and 129. The parcels are located on former NASB property and are owned by the U.S. and leased by Kalaeloa Ventures, LLC. The roadways are under various jurisdictions, including the Navy; HCDA; HDOT, and the CCH. For the purposes of this report, the subject property is discussed as three distinct areas:

- *Parcel 1* includes proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcel 002, including:
  - Capahee Avenue, West Perimeter Road and the Kamokila Boulevard Extension and
  - Portions of Saratoga Avenue, FDR Avenue, and the OR&L utility corridor (including the GTE building).
- *Parcel* includes proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcel 004, including:
  - Portions of Hornet Avenue, FDR Avenue, Saratoga Avenue, Boxer Road, and 272: Transformer Station A.
- *Parcel 3* includes proposed roadway portions including and surrounding TMK: (1) 9-1-013: parcels 128 and 129, including:
  - Road "A" and the Wakea Street Extension;
  - Portions of Hornet Avenue, FDR Avenue, Franklin Street, Saratoga Avenue, and the OR&L utility corridor;
  - 1906: Tennis Pro Shop; and
  - Portions of 73: Paradise West Club Complex, 68C: concrete pad, and 713: tennis courts.

Any exceptions to, or deletions from, this practice, are described in Section 1.5 of this report.

The assessment has revealed evidence of RECs, as defined by ASTM, associated with the site. Table 7-1 provides a summary of identified RECs and Table 7-2 provides a summary of identified CRECs. Potential environmental concerns, while not considered to be RECs, were identified as listed in Table 7-3.

Table 7-1: Recognized Environmental Conditions

Report Component	Section	Concern Noted or Reported	Description Concern
On-Site Sources and Potential Sources	4	Yes	**Site Listing on Environmental Databases:** EDR identified "Naval Air Station Barbers Point" (NASBP) on the DoD database. It is possible that historical military use has negatively impacted the soil and groundwater beneath the site.

Report Component	Section	Concern Noted or Reported	Description Concern
			EDR also identified "Barbers Point Central Office" (GTE Building) (Parcel 1) on the UST database. The UST and associated piping at the site poses a risk of future release of hazardous substances and/or petroleum products to the site.
	4	Yes	**Pipelines:** "Black oil" and "white gas" pipelines are located within the subject property ROWs on FDR Avenue and the OR&L utility corridor. It is possible that soil and groundwater beneath the site have been or may be impacted by releases associated with the pipelines.
	4	Yes	**Releases:** *272: Transformer Station A:* Transformer 444, installed in the early 1940s, was retrofilled in 1988 because PCBs were detected in the dielectric fluid and wipe samples collected from the concrete pad. No additional information was available. It is possible that historical releases from the transformer have negatively impacted surface materials in the vicinity of the transformer as well as the soil and groundwater beneath the site.
	5	Yes	**Solid Waste:** Evidence of illegal dumping of miscellaneous debris and litter adjacent to the ROWs included but was not limited to general household trash, 1-gallon paint cans, several cans of brake fluid, wooden pallets, and electronics. It is possible that illegal dumping activities have negatively impacted soil and groundwater beneath the site.
			Hazardous Substances and Petroleum Products: Hazardous and/or regulated substances (e.g., oils, gasoline, grease, petroleum-based products) may be used/stored within the GTE Building (Parcel 1) and 272: Transformer Station A (Parcel 2). The nature of the activities conducted in these two areas poses a material threat of a future release to the environment.
Off-Site Sources and Potential Sources	4	Yes	**Leaking UST:** Adjacent Structure 77 Wakea Garden Apartments (former BOQ) (interior of Parcel 3) previously had diesel and fuel oil USTs (BP19 and BP20) (installed in 1958). The tanks, boilers, and piping were removed in October 1991, at which time visual evidence of soil contamination was noted. No additional information was available. It is possible that contamination associated with the release(s) remains in the soil and groundwater beneath the site.
	4	Yes	**Releases:** Contaminated surface soil (arsenic and selenium) and groundwater (TPH-DRO and TPH-ORO) were identified on an adjacent property to the northwest of Parcel 1 hydraulically upgradient (now occupied by Costco). It is possible that contamination from this site is migrating to the subject property.

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Report Component	Section	Concern Noted or Reported	Description Concern
			Soil sampling conducted within Parcel 1 in 2016 indicated the presence of elevated pesticide concentrations in some areas, which will require management during redevelopment. It is possible that subject property is negatively impacted by historical pesticide use on Parcel 1. Soil sampling conducted within drywells located within Parcel 1 and potentially within the proposed roadway expansion indicate the presence of elevated chromium concentrations in well L18-01. It is possible that contamination from this dry well is on or migrating to the subject property.

Table 7-2: Controlled Recognized Environmental Conditions

Category	Controlled Recognized Environmental Conditions (RECs)
LUST Sites	The LUST associated with former Building 74 (exact location is unknown; approximated to be within the southwest interior portion of Parcel 3) (Facility ID 9-103191, Release ID 030039), located within the interior of Parcel 3, is listed as Site Cleanup Completed (NFA).

Table 7-3: Potential Environmental Concerns

Potential Environmental Concern Category	Potential Environmental Concern
Former Military Use	The site is part of the former NASBP and was used by the military during and after WWII, mainly as a housing and recreation area. It is possible that historical military use of the subject property has negatively impacted the site.
Former Agricultural Use	The subject property was identified by the State GIS map as being historically used for activities associated with sugarcane cultivation; however, all other reports indicate it is part of a Sisal Plantation. Typically pesticides and herbicides are not used in sisal crops. If the property was used for sugar cane cultivation, it is possible that soil and/or groundwater beneath the site has been impacted by historical sugarcane use (typically no chemical fertilizers are used for sisal cultivation).
Railroad Tracks	According to historical topographic maps and aerial photographs, portions of the railroad tracks were located within the subject property crossing the Kamokila Boulevard Extension and GTE Building on Parcel 1 and Wakea Extention on Parcel 3 from c. 1890 to c. 1970. It is possible that methyl phenols and creosote (used to treat railroad ties), metals and polychlorinated biphenyls (associated with used oil commonly applied to tracks and weeds/dusty roads), and/or pesticides (weed control) may be present in soil and groundwater in the vicinity of the former tracks.
Wells	One well (well 3-1904-003), owned by GTE Hawaiian Tel Co. Inc., is located on the subject property (Parcel 1). The well is listed as other.
	Stormwater runoff within Kalaeloa is discharged into an extensive system of more than 250 dry wells that are permitted by the HDOH. Sixteen dry wells are present within the area bounded by the proposed roadways.
UST Site	A UST fill pipe was discovered during excavation work for a housing development on the adjacent property northeast of the intersection of FDR and Franklin Street within TMK: (1) 9-1-013: parcel

Potential Environmental Concern Category	Potential Environmental Concern
	077. The UST was removed on November 12, 1993, and a closure report was prepared (the report was unavailable). No release was reported.
Residual Lead in Soil Attributable to LBP	LBP may have been used in the construction and/or maintenance and upkeep of the former/current structures at the site. It is possible that residual levels of lead are present in the soil beneath, and in the vicinity of former structures as a result of normal paint deterioration and/or demolition activities.
Residual Lead on roadways from historic use of leaded gasoline	Heavy metals (i.e., lead) may be present in soil along the roadways from the historical use of leaded gasoline in vehicles prior to January 1, 1996.
Residual Pesticides Attributable to Termite Treatment	It is possible that residual levels of termiticides (i.e., chlordane) are present in the soil beneath and in the vicinity of the former/current structures at the site.
EDR Identified Sites	EDR identified the following sites that may pose potential environmental concerns to the subject property: • One SPILLS, FTTS, and two UIC identified on the adjacent Barbers Point Elementary School and Kalaeloa Airport (DWS) (listed at the same address) property. • One Federal RCRA-LQG site, SHWS, and UST site identified on the Costco Wholesale #10 site, located adjacent to the northwest of Parcel 1 located hydraulically upgradient. • One State LUST site within ¼ mile, NEX Touch N'Go Gas. • One FUDS was identified approximately ½ mile to the northeast hydraulically upgradient of the site.
Unmappable Site	Five of the six unmappable sites listed in the EDR report were determined to be in the vicinity of the subject property: 1) Fort Barrette, 2) Barbers Point Naval Air Station, Mission Street, 3) Hawaii Army National Guard, 4) DLA Disposition Services, and 5) Former Oahu Sugar Company Pump 15 Station.

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Section 8 Additional Services

Although E2 was not contracted to conduct additional services; as a courtesy to the client, the following additional services were performed:

- E2 listed potential environmental concerns, which were not considered to be RECs due to a lack of /or limited information, for the subject and adjacent properties, based on their historical use and
- E2 addressed possible ACM and LBP at the subject property.

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Section 9 Qualifications of Environmental Professionals

Qualifications of the Environmental Professionals are included in Appendix C.

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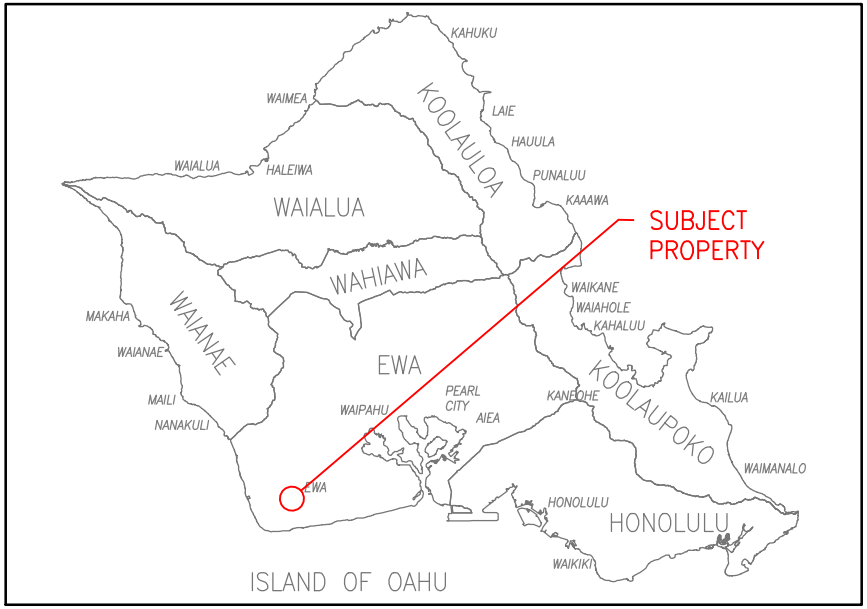
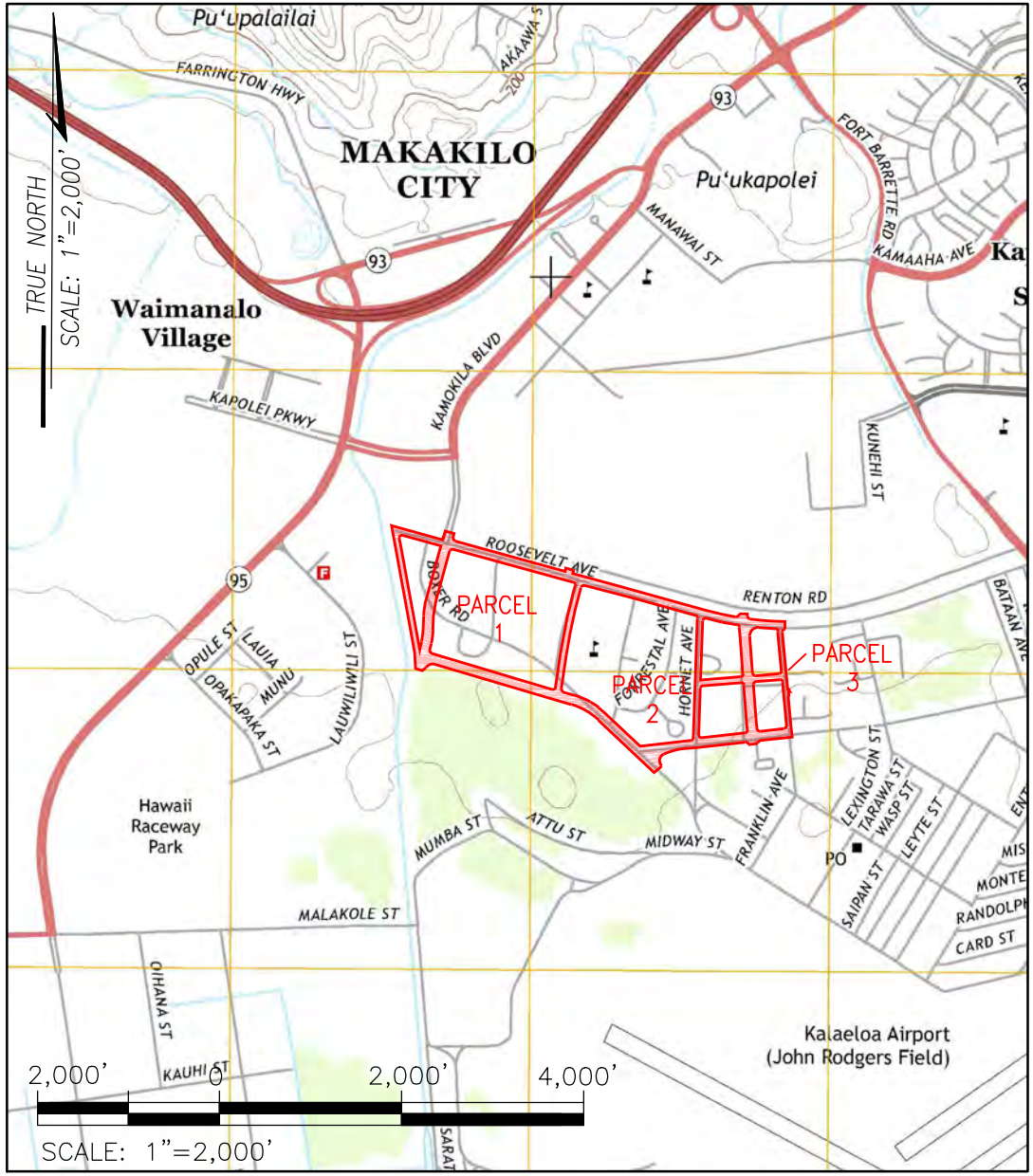
APPENDIX A

Figures and Photographs

Figures





DATE:	PROJECT TITLE:
DEC 2017	PHASE I ENVIRONMENTAL SITE ASSESSMENT INFRASTRUCTURE DESIGN FOR PARCELS 1, 2, AND 3 KALAELOA/BARBER'S POINT, OAHU, HAWAII

FIGURE TITLE:	FIGURE NO.:
SITE VICINITY AND LOCATION MAP	1-1

REFERENCES: STATE OF HAWAII 2017, USGS 2013, AND GOOGLE EARTH 2017

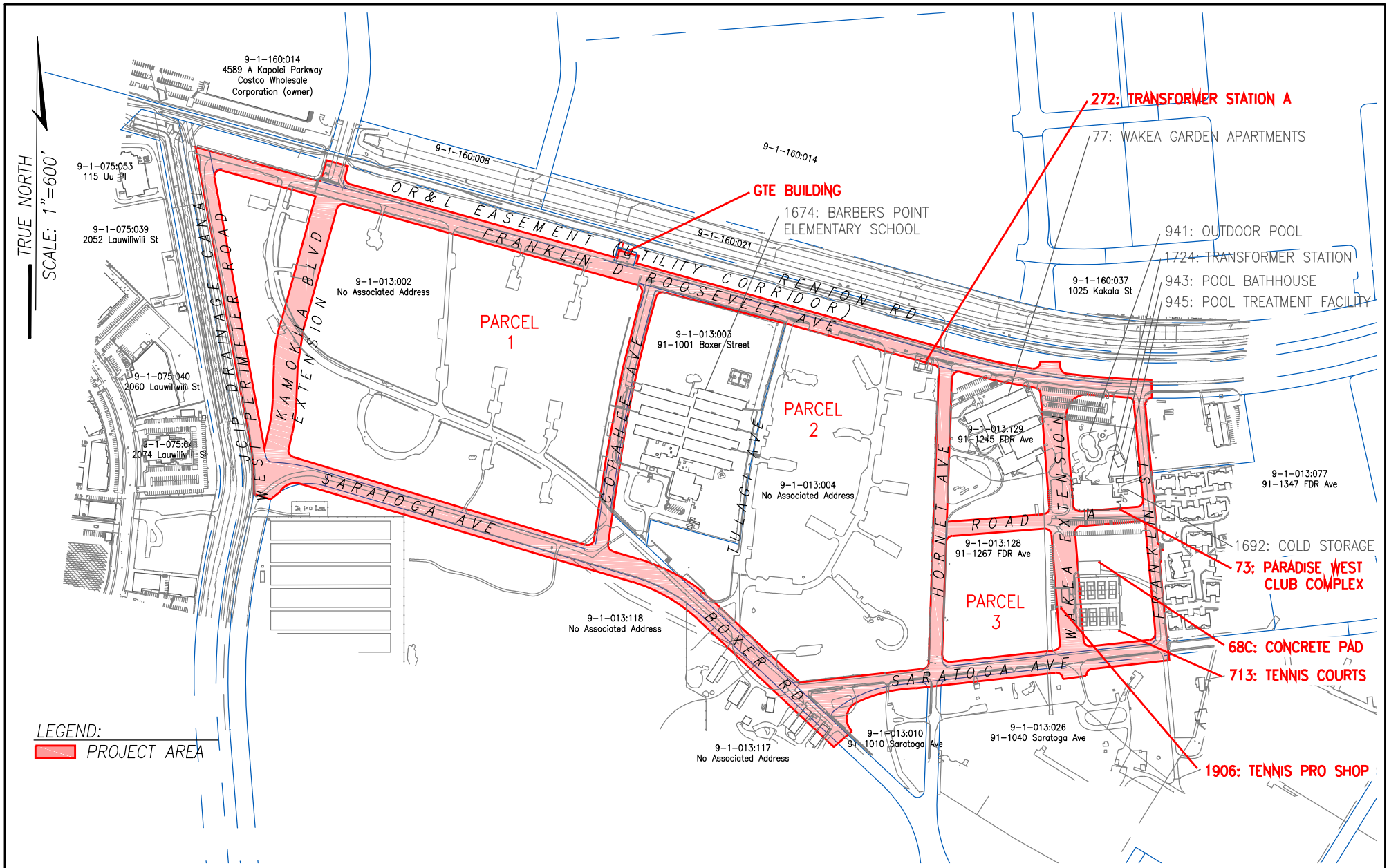


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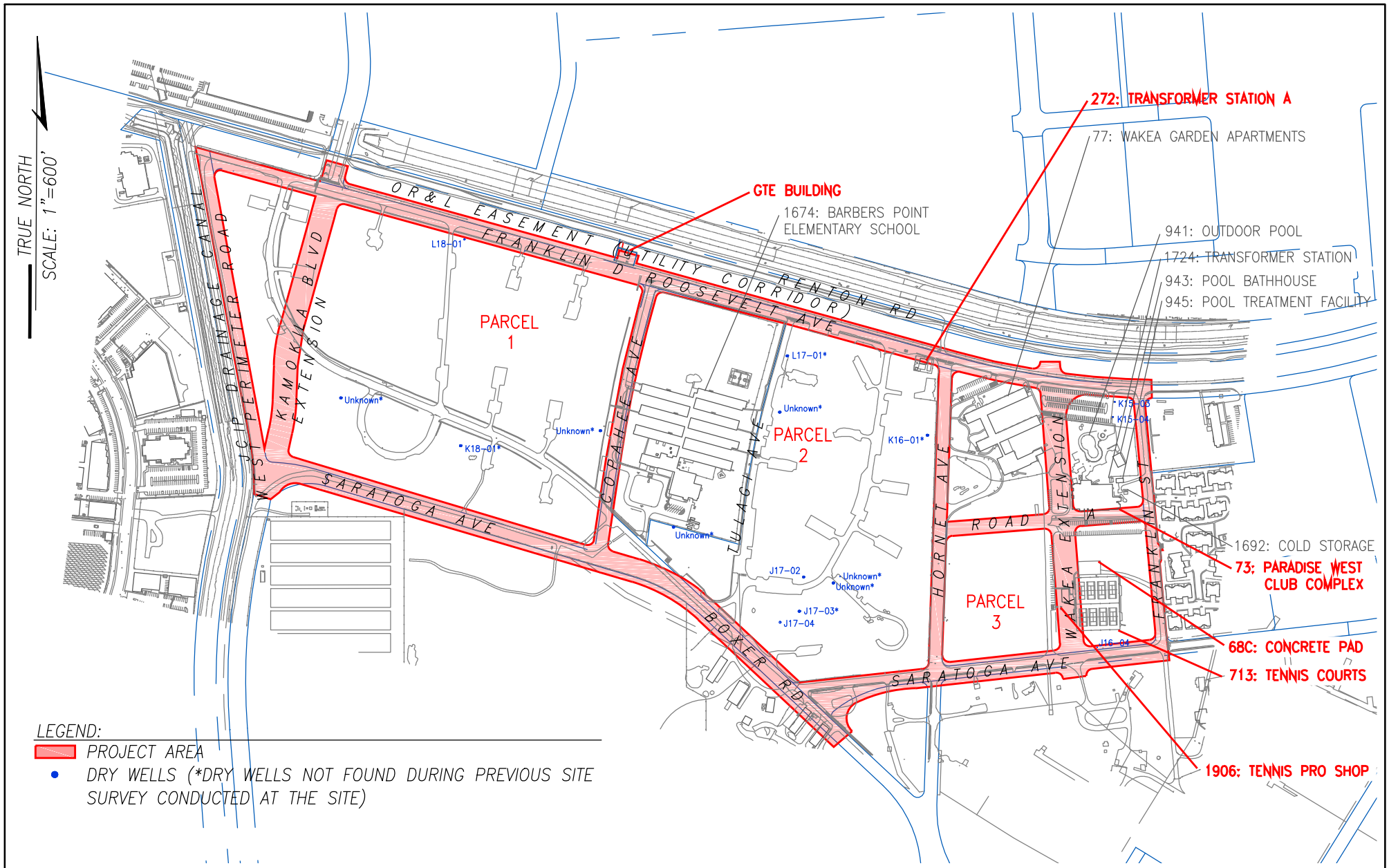
	FIGURE TITLE: SITE LAYOUT	FIGURE NO.: 2



REFERENCES: RMTC 2017 AND STATE OF HAWAII 2017

DATE: DEC 2017	PROJECT TITLE: PHASE I ENVIRONMENTAL SITE ASSESSMENT INFRASTRUCTURE DESIGN FOR PARCELS 1, 2, AND 3 KALAELOA/BARBER'S POINT, OAHU, HAWAII	
FIGURE TITLE: UNDERGROUND INJECTION CONTROL MAP		FIGURE NO.: 3

Site Reconnaissance Photographs

E2 Project No.:	**Description**	Parcel 1: Franklin D. Roosevelt (FDR) Avenue and the northern portion of Tax Map Key (TMK): (1) 9-1-013:002. View looking east.	**Photo 1**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: FDR Avenue and the northern portion of Tax Map Key (TMK): (1) 9-1-013:002. View looking east-southeast.	**Photo 2**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: Proposed location of West Perimeter Road and west portion of Tax Map Key (TMK): (1) 9-1-013:002. View looking south-southeast.	**Photo 3**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: GTE building within Oahu Railway & Land Company (OR&L) utility corridor. View looking north.	**Photo 4**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: Proposed location of Kamokila Boulevard Extension. View looking south.	**Photo 5**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: Saratoga Avenue near the intersection of the proposed West Perimeter Road. View looking northeast.	**Photo 6**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: Concrete structure located near the intersection of Saratoga and Copahee Avenues. View looking south-southwest.	**Photo 7**
170063	**Site Name**	KMRS: DOFAW Management & Research Station and Area D: Mokulana Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: Solid waste including a 1-gallon metal container or paint and several metal containers of brake fluid.	**Photo 8**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: Pallets adjacent to Saratoga Avenue. View looking west-northwest.	**Photo 9**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 1: Electronics adjacent to Saratoga Avenue. View looking south-southeast.	**Photo 10**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 2: Intersection ob Saratoga Avenue and Boxer Avenue. View looking north.	**Photo 11**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 2: General household debris adjacent to Saratoga Avenue. View looking north.	**Photo 12**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 2: Building 272: Transformer Station A located on the corner of FDR and Hornet Avenues. View looking south.	**Photo 13**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 3: Building 1906 Tennis Pro Shop. View looking southwest.	**Photo 14**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 3: View of the area of proposed Wakea Extension that will cross through Building 1906 Tennis Pro Shop and 713: tennis courts. View looking north.	**Photo 15**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

E2 Project No.:	**Description**	Parcel 3: Area adjacent to Franklin Street looking west towards Buildings 943: Pool Bathhouse, 945 Pool Treatment Facility, and 1724: Transformer Station. View looking west.	**Photo 16**
170063	**Site Name**	Infrastructure Design for Parcels 1, 2, and 3 Kalaeloa/Barbers Point, Oahu, Hawaii	**Photo Date** 10/12/2017
	Client	R. M. Towill Corporation	

APPENDIX B

EDR Reports

The EDR Radius Map with GeoCheck®

Parcels 1, 2, and 3
Franklin D Roosevelt Ave
Kapolei, HI 96707

Inquiry Number: 5070053.2s
October 05, 2017

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

FRANKLIN D ROOSEVELT AVE
KAPOLEI, HI 96707

COORDINATES

Latitude (North):	21.3219290 - 21˚ 19' 18.94''
Longitude (West):	158.0801980 - 158˚ 4' 48.71''
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	595392.0
UTM Y (Meters):	2357916.8
Elevation:	52 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5941343 EWA, HI
Version Date:	2013

MAPPED SITES SUMMARY

Target Property Address:
FRANKLIN D ROOSEVELT AVE
KAPOLEI, HI 96707

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
Reg	BARBERS POINT NAVAL		DOD	Same	1 ft.
A1	BARBER'S POINT ELEME	3001 BOXER ROAD	FINDS	Lower	1 ft.
2	BARBERS POINT ELEMEN		SPILLS 90	Lower	1 ft.
A3	BARBER'S POINT ELEME	3001 BOXER ROAD	FTTS	Lower	1 ft.
A4	BARBERS POINT ELEMEN	3001 BOXER RD.	UIC	Lower	1 ft.
A5	KALAELOA AIRPORT (DW	3001 BOXER RD. BARBE	UIC	Lower	1 ft.
6	BARBERS POINT CENTRA	ROOSEVELT & COPAHEE	UST, Financial Assurance	Higher	88, 0.017, NW
B7	COSTCO WHOLESALE #10	4589 KAPOLEI PARKWAY	RCRA-LQG	Higher	537, 0.102, NW
B8	COSTCO GASOLINE #103	4589 KAPOLEI PARKWAY	UST, Financial Assurance	Higher	537, 0.102, NW
C9	TRU TAG TECHNOLOGIES	2045 LAUWILIWILI ST.	RCRA-LQG	Lower	732, 0.139, West
C10	STATIONARY POWER SYS	2045 LAUWILIWILI PAR	RCRA NonGen / NLR	Lower	732, 0.139, West
C11	VISION ENVIRONMENTAL	2045 LAUWILIWILI ST	RCRA NonGen / NLR	Lower	732, 0.139, West
C12	INTERNATIONAL PAINT	2045 LAUWILIWILI ST	RCRA-SQG, FINDS, ECHO	Lower	732, 0.139, West
D13	KAPOLEI JUVENILE DET	287 KAMOKILA BLVD	RCRA-CESQG, FINDS, ECHO	Higher	809, 0.153, NW
D14	KAPOLEI DISTRICT AND	4675 KAPOLEI PARKWAY	RCRA-CESQG, FINDS, ECHO	Higher	983, 0.186, NW
D15	COSTCO KAPOLEI	KAMOKILA BLVD & KAPO	SHWS	Higher	1033, 0.196, NW
16	NAVAL AIR STATION BA	BLDG 1772 TANK BP97	LUST, UST	Lower	1669, 0.316, SE
17	NEX TOUCH N' GO GAS	BLDG 1928 TANK 81, 8	LUST, UST, Financial Assurance	Lower	2423, 0.459, East
18	HECO - CAMPBELL INDU	91-550 KALAELOA BLVD	SHWS, ENG CONTROLS, SPILLS	Lower	3149, 0.596, SW
19	HAWAIIAN DREDGING CO	91-063 MALAKOLE ST	SHWS, INST CONTROL, VCP, SPILLS, AIRS	Lower	3773, 0.715, SW
20	PALAILAI LANDFILL	91-402 FARRINGTON HW	SHWS, ENG CONTROLS, INST CONTROL, SPILLS	Higher	4114, 0.779, NNW
21	HONSADOR	91-151 MALAKOLE RD	SHWS, LUST, UST, ENG CONTROLS, INST CONTROL, VCP,..	Lower	4165, 0.789, WSW
22	FORT BARRETTE		FUDS	Higher	4615, 0.874, NNE
23	HAWAII RACEWAY PARK	91-201 MALAKOLE ST	SHWS, SPILLS	Lower	5097, 0.965, WSW
24	KAPOLEI PIPELINE FUE	KAMOKILA BLVD	SHWS, SPILLS	Higher	5221, 0.989, North

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ..... National Priority List
Proposed NPL ..... Proposed National Priority List Sites
NPL LIENS ..... Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ..... National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ..... Federal Facility Site Information listing
SEMS ..... Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ..... Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Treatment, Storage and Disposal

Federal institutional controls / engineering controls registries

LUCIS ..... Land Use Control Information System
US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls

Federal ERNS list

ERNS ..... Emergency Response Notification System

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ..... Permitted Landfills in the State of Hawaii

EXECUTIVE SUMMARY

State and tribal leaking storage tank lists

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

FEMA UST ---------- Underground Storage Tank Listing
INDIAN UST ---------- Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

ENG CONTROLS ---------- Engineering Control Sites
INST CONTROL ---------- Sites with Institutional Controls

State and tribal voluntary cleanup sites

VCP ---------- Voluntary Response Program Sites
INDIAN VCP ---------- Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ---------- Brownfields Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands
ODI ---------- Open Dump Inventory
DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
IHS OPEN DUMPS ---------- Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ---------- Delisted National Clandestine Laboratory Register
CDL ---------- Clandestine Drug Lab Listing
US CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---------- CERCLA Lien Information

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
SPILLS ---------- Release Notifications

Other Ascertainable Records

SCRD DRYCLEANERS ---------- State Coalition for Remediation of Drycleaners Listing

EXECUTIVE SUMMARY

US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
DOCKET HWC	Hazardous Waste Compliance Docket Listing
UXO	Unexploded Ordnance Sites
ECHO	Enforcement & Compliance History Information
FUELS PROGRAM	EPA Fuels Program Registered Listing
AIRS	List of Permitted Facilities
DRYCLEANERS	Permitted Drycleaner Facility Listing
Financial Assurance	Financial Assurance Information Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	EDR Proprietary Manufactured Gas Plants
EDR Hist Auto	EDR Exclusive Historic Gas Stations
EDR Hist Cleaner	EDR Exclusive Historic Dry Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS	Recovered Government Archive State Hazardous Waste Facilities List
RGA LF	Recovered Government Archive Solid Waste Facilities List
RGA LUST	Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

EXECUTIVE SUMMARY

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA generators list

RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 12/12/2016 has revealed that there are 2 RCRA-LQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
COSTCO WHOLESALE #10	4589 KAPOLEI PARKWAY	NW 0 - 1/8 (0.102 mi.)	B7	11

Lower Elevation	Address	Direction / Distance	Map ID	Page
TRU TAG TECHNOLOGIES	2045 LAUWILIWILI ST.	W 1/8 - 1/4 (0.139 mi.)	C9	16

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 12/12/2016 has revealed that there is 1 RCRA-SQG site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
INTERNATIONAL PAINT	***2045 LAUWILIWILI ST***	***W 1/8 - 1/4 (0.139 mi.)***	***C12***	***22***

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 12/12/2016 has revealed that there are

2 RCRA-CESQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
KAPOLEI JUVENILE DET	***287 KAMOKILA BLVD***	***NW 1/8 - 1/4 (0.153 mi.)***	***D13***	***24***
KAPOLEI DISTRICT AND	***4675 KAPOLEI PARKWAY***	***NW 1/8 - 1/4 (0.186 mi.)***	***D14***	***26***

State- and tribal - equivalent CERCLIS

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Health.

A review of the SHWS list, as provided by EDR, and dated 03/16/2017 has revealed that there are 7 SHWS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
COSTCO KAPOLEI	KAMOKILA BLVD & KAPO	NW 1/8 - 1/4 (0.196 mi.)	D15	28
PALAILAI LANDFILL	***91-402 FARRINGTON HW***	***NNW 1/2 - 1 (0.779 mi.)***	***20***	***35***
KAPOLEI PIPELINE FUE	***KAMOKILA BLVD***	***N 1/2 - 1 (0.989 mi.)***	***24***	***45***

Lower Elevation	Address	Direction / Distance	Map ID	Page
HECO - CAMPBELL INDU	***91-550 KALAELOA BLVD***	***SW 1/2 - 1 (0.596 mi.)***	***18***	***31***
HAWAIIAN DREDGING CO	***91-063 MALAKOLE ST***	***SW 1/2 - 1 (0.715 mi.)***	***19***	***33***
HONSADOR	***91-151 MALAKOLE RD***	***WSW 1/2 - 1 (0.789 mi.)***	***21***	***37***
HAWAII RACEWAY PARK	***91-201 MALAKOLE ST***	***WSW 1/2 - 1 (0.965 mi.)***	***23***	***41***

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Health's Active Leaking Underground Storage Tank Log Listing.

A review of the LUST list, as provided by EDR, and dated 08/01/2017 has revealed that there are 2 LUST sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
NAVAL AIR STATION BA	***BLDG 1772 TANK BP97***	***SE 1/4 - 1/2 (0.316 mi.)***	***16***	***29***
Release ID: 990048				
Facility Id: 9-103337				
Facility Status: Site Cleanup Completed (NFA)				
NEX TOUCH N' GO GAS	***BLDG 1928 TANK 81, 8***	***E 1/4 - 1/2 (0.459 mi.)***	***17***	***29***
Release ID: 130008				
Release ID: 070005				
Release ID: 940200				
Facility Id: 9-102001				
Facility Status: Soil Vapor Sampling				
Facility Status: Monitored Natural Attenuation				

EXECUTIVE SUMMARY

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Health's Listing of Underground Storage Tanks.

A review of the UST list, as provided by EDR, and dated 08/01/2017 has revealed that there are 2 UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BARBERS POINT CENTRA Tank Status: Currently In Use Facility Id: 9-203295	***ROOSEVELT & COPAHEE***	***NW 0 - 1/8 (0.017 mi.)***	***6***	***11***
COSTCO GASOLINE #103 Tank Status: Currently in Use Facility Id: 9-203850	***4589 KAPOLEI PARKWAY***	***NW 0 - 1/8 (0.102 mi.)***	***B8***	***15***

ADDITIONAL ENVIRONMENTAL RECORDS

Records of Emergency Release Reports

SPILLS 90: Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

A review of the SPILLS 90 list, as provided by EDR, and dated 03/10/2012 has revealed that there is 1 SPILLS 90 site within approximately 0.001 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
BARBERS POINT ELEMEN Status: NOT REPORTED Site Id: HIHR19960130-1555		0 - 1/8 (0.000 mi.)	2	8

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 12/12/2016 has revealed that there are 2 RCRA NonGen / NLR sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
STATIONARY POWER SYS	2045 LAUWILIWILI PAR	W 1/8 - 1/4 (0.139 mi.)	C10	19
VISION ENVIRONMENTAL	2045 LAUWILIWILI ST	W 1/8 - 1/4 (0.139 mi.)	C11	21

EXECUTIVE SUMMARY

FUDS: The Listing includes locations of Formerly Used Defense Sites Properties where the US Army Corps Of Engineers is actively working or will take necessary cleanup actions.

A review of the FUDS list, as provided by EDR, and dated 01/31/2015 has revealed that there is 1 FUDS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FORT BARRETTE		NNE 1/2 - 1 (0.874 mi.)	22	40

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BARBERS POINT NAVAL		0 - 1/8 (0.000 mi.)	0	8

FTTS: FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

A review of the FTTS list, as provided by EDR, has revealed that there is 1 FTTS site within approximately 0.001 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
BARBER'S POINT ELEME	3001 BOXER ROAD	0 - 1/8 (0.000 mi.)	A3	9

Database: FTTS INSP, Date of Government Version: 04/09/2009

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 07/23/2017 has revealed that there is 1 FINDS site within approximately 0.001 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
BARBER'S POINT ELEME	3001 BOXER ROAD	0 - 1/8 (0.000 mi.)	A1	8

EXECUTIVE SUMMARY

UIC: A listing of underground injection well locations.

A review of the UIC list, as provided by EDR, and dated 02/07/2013 has revealed that there are 2 UIC sites within approximately 0.001 miles of the target property.

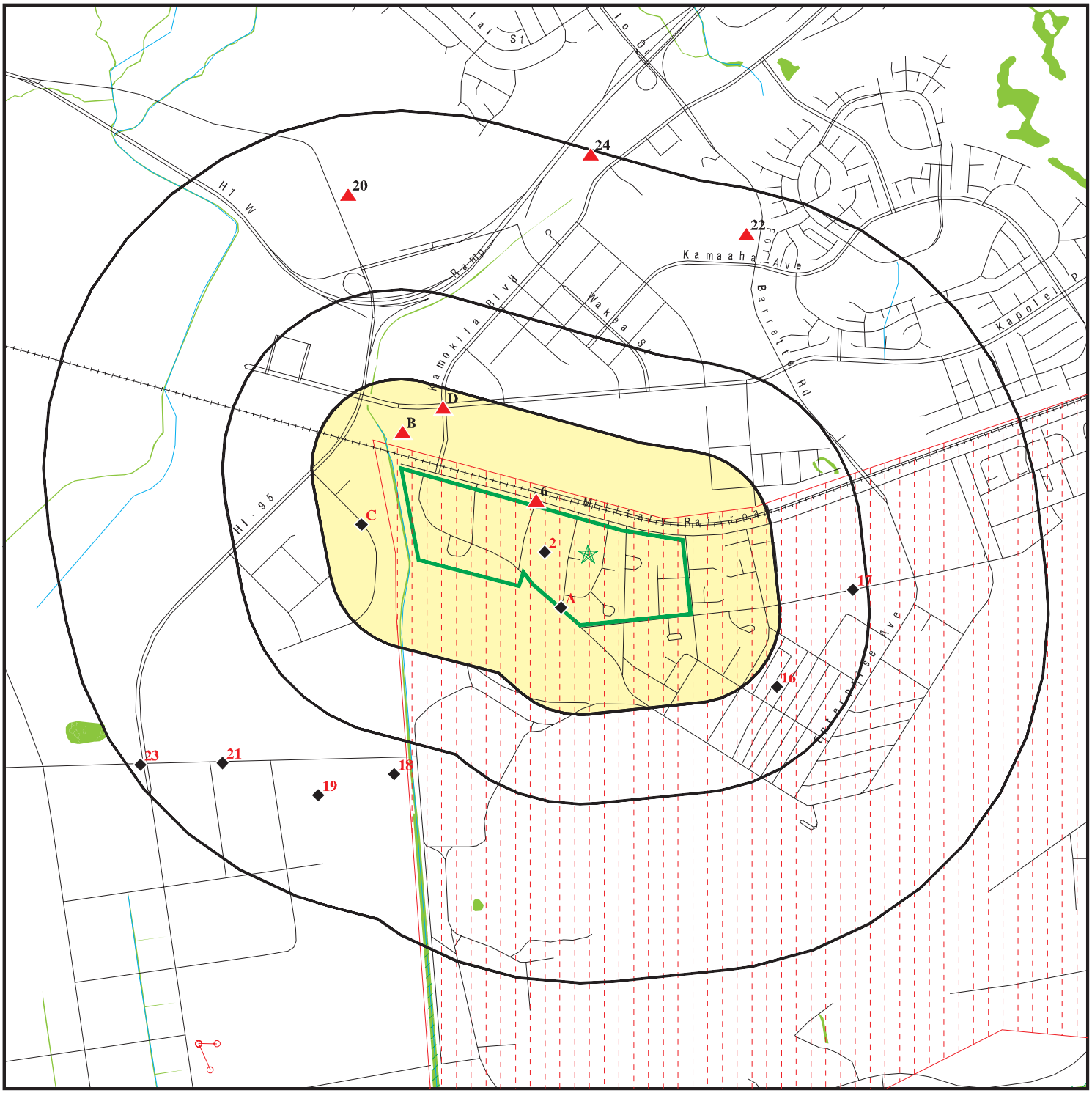
Lower Elevation	Address	Direction / Distance	Map ID	Page
BARBERS POINT ELEMEN	3001 BOXER RD.	0 - 1/8 (0.000 mi.)	A4	9
Facility Id/Lat Long Min Coord: 3-1905.01.1-3				
UIC Permit Number: UO-2071				
KALAELOA AIRPORT (DW	3001 BOXER RD. BARBE	0 - 1/8 (0.000 mi.)	A5	10
Facility Id/Lat Long Min Coord: 3-1804.02.1-38				
UIC Permit Number: UO-2072				

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 6 records.

Site Name	Database(s)
FORT	SHWS, ENG CONTROLS, INST CONTROL
BARBERS POINT NAS STATION P	SHWS
GRACE PACIFIC KALAELOA HMA PLANT D	SHWS
HAWAII ARMY NATIONAL GUARD AT KALA	SHWS, INST CONTROL
PUMP 15 STATION, FORMER OAHU SUGAR	SHWS
DLA DISPOSITION SERVICES	SEMS-ARCHIVE, RCRA NonGen / NLR

OVERVIEW MAP - 5070053.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA

Power transmission lines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

Upgradient Area

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Parcels 1, 2, and 3	CLIENT: Element Environmental , LLC
ADDRESS: Franklin D Roosevelt Ave Kapolei HI 96707	CONTACT: Angie Peltier
LAT/LONG: 21.321929 / 158.080198	INQUIRY #: 5070053.2s
	DATE: October 05, 2017 7:25 pm

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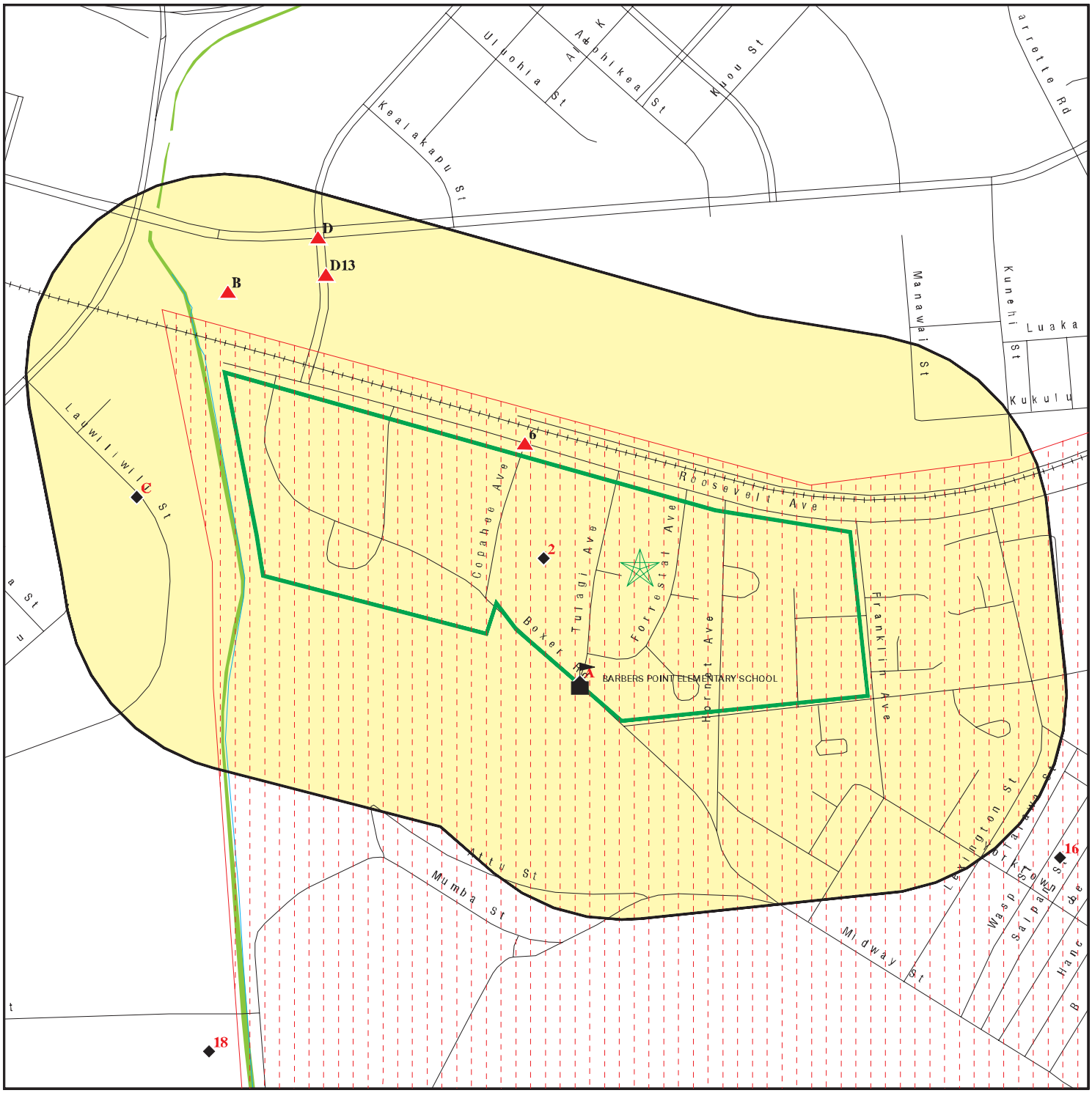
DETAIL MAP - 5070053.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

0 1/8 1/4 1/2 Miles

Indian Reservations BIA

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Parcels 1, 2, and 3	CLIENT:	Element Environmental , LLC
ADDRESS:	Franklin D Roosevelt Ave Kapolei HI 96707	CONTACT:	Angie Peltier
		INQUIRY #:	5070053.2s
LAT/LONG:	21.321929 / 158.080198	DATE:	October 05, 2017 7:26 pm

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		1	1	NR	NR	NR	2
RCRA-SQG	0.250		0	1	NR	NR	NR	1
RCRA-CESQG	0.250		0	2	NR	NR	NR	2
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	1.000		0	1	0	6	NR	7
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	2	NR	NR	2
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
UST	0.250		2	0	NR	NR	NR	2
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS	0.500		0	0	0	NR	NR	0
INST CONTROL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
CDL	0.001		0	NR	NR	NR	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	0.001		0	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
SPILLS	0.001		0	NR	NR	NR	NR	0
SPILLS 90	0.001		1	NR	NR	NR	NR	1
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	2	NR	NR	NR	2
FUDS	1.000		0	0	0	1	NR	1
DOD	1.000		1	0	0	0	NR	1
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		1	NR	NR	NR	NR	1
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.001		0	NR	NR	NR	NR	0
FINDS	0.001		1	NR	NR	NR	NR	1
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
AIRS	0.001		0	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
UIC	0.001		2	NR	NR	NR	NR	2
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	0.001		0	NR	NR	NR	NR	0
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		0	9	7	2	7	0	25

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

DOD **BARBERS POINT NAVAL AIR STATION (CLOSED)** **DOD** **CUSA147755**
Region **N/A**
BARBERS POINT NAVAL AIR S (County), HI
< 1/8
1 ft.

DOD:

Feature 1:	Navy DOD
Feature 2:	Not reported
Feature 3:	Not reported
URL:	Not reported
Name 1:	Barbers Point Naval Air Station (Closed)
Name 2:	Not reported
Name 3:	Not reported
State:	HI
DOD Site:	Yes
Tile name:	HIHONOLULU

A1 **BARBER'S POINT ELEMENTARY SCHOOL** **FINDS** **1009737248**
3001 BOXER ROAD **N/A**
< 1/8 **KAPOLEI, HI 96707**
1 ft.
Site 1 of 4 in cluster A

Relative:
Lower

Actual:
46 ft.

FINDS:

Registry ID: 110026427356

Environmental Interest/Information System
ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

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2 **BARBERS POINT ELEMENTARY SCHOOL PRINCIPAL S OFFICE** **SPILLS 90** **S112375374**
N/A
< 1/8 **KAPOLEI, HI 96707**
1 ft.

Spills:

Relative:
Lower

Actual:
49 ft.

Status:	NOT REPORTED
Contact Name:	Not reported
Contact Phone:	Not reported
Site ID:	HIHR19960130-1555

BARBERS POINT ELEMENTARY SCHOOL PRINCIPAL S OFFICE (Continued) **S112375374**

Secondary ID:	Not reported
Cross Street:	Not reported
County:	HONOLULU
Longitude:	-158082077
Latitude:	21322076
Elevation:	N/A
	The Hawaii Department Of Health Office Of Hazard Evaluation And Emergency Response (Heer) Release List
Island:	Oahu
Filed Under:	Not reported
Unit:	Barbers Point Elementary School Principal s Office
Case Number:	19960130-1555
Secondary Location Address:	Not reported
Supplemental Location:	Not reported
Activity Type:	Response
Lead And Program:	HEER EP&R
Activity Lead:	Bill Perry
Emergency Response:	Not reported
Substances:	Not reported
Amount (Less Or Greater Than):	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA

A3 **BARBER'S POINT ELEMENTARY SCHOOL** **FTTS** **1010781965**
3001 BOXER ROAD **N/A**
< 1/8 **KAPOLEI, HI 96707**
1 ft.

Site 2 of 4 in cluster A

Relative: Lower
Actual: 46 ft.

FTTS INSP:

Inspection Number:	20070905HI-08 1
Region:	09
Inspection Date:	09/05/07
Inspector:	KATHY VON GELDERN
Violation occurred:	Yes
Investigation Type:	AHERA, Enforcement, State Conducted
Investigation Reason:	Neutral Scheme, State
Legislation Code:	TSCA
Facility Function:	User

A4 **BARBERS POINT ELEMENTARY SCHOOL (DWS)** **UIC** **S109953148**
3001 BOXER RD. **N/A**
< 1/8 **KAPOLEI, HI 96707**
1 ft.

Site 3 of 4 in cluster A

Relative: Lower
Actual: 46 ft.

UIC:

UIC Permit Number:	UO-2071
Facility Id/Lat Long Minute Coordinates:	3-1905.01.1-3
Central Latitude Of The Site:	21 19 27
Central Longitude Of The Site:	158 05 01
Flow In Gallons Per Day:	8,600 gpm
Total Number Of Inj. Well(S) On Permit:	3
Island:	Oahu
Location In Relation To UIC Line:	Not reported

BARBERS POINT ELEMENTARY SCHOOL (DWS) (Continued) **S109953148**

Facility Type:	DW
Subclass:	C
Facility Operator, Not Contract Opr:	State of Hawaii - DOE
Operator Address:	PO Box 2360 HON, HI 96804
Facility Owner:	State of Hawaii - DOE
Owner Address:	PO Box 2360 HON, HI 96804
Tax Map Key Number:	1:
Owner Of Land Property On Leasehold:	none
Consultant Serving The Application:	Prepared in-house
Receipt Of Initial Application:	9/14/1999
Public Notice Date:	Not reported
Approval-To-Construct Issuance Date:	10/19/1999
Exemption Issuance Date:	Not reported
1st Issuance Of Permit:	10/31/1999
Last Issuance Of Permit:	Not reported
Type:	Not reported
Permit Expiration Date:	10/30/2004
Date When File Is Closed:	Not reported
UIC Project Geologist:	NU
Remarks:	Not reported

A5 **KALAELOA AIRPORT (DWS)** **UIC** **S109953149**
3001 BOXER RD. BARBERS POINT KAPOLEI **N/A**
< 1/8 **OAHU, HI**
1 ft.

Site 4 of 4 in cluster A

Relative:
Lower

Actual:
46 ft.

UIC:

UIC Permit Number:	UO-2072
Facility Id/Lat Long Minute Coordinates:	3-1804.02.1-38
Central Latitude Of The Site:	Not reported
Central Longitude Of The Site:	Not reported
Flow In Gallons Per Day:	Not reported
Total Number Of Inj. Well(S) On Permit:	38
Island:	Oahu
Location In Relation To UIC Line:	Not reported
Facility Type:	DW
Subclass:	C
Facility Operator, Not Contract Opr:	State of Hawaii - DOT/Airport Div.
Operator Address:	400 Rodgers Blvd. Suite 700, HON, HI 96819-1880
Facility Owner:	Airports Div. Department of Transportation State of HI
Owner Address:	400 Rodgers Blvd. Suite 700, HON, HI 96819-1880
Tax Map Key Number:	1:
Owner Of Land Property On Leasehold:	none
Consultant Serving The Application:	none
Receipt Of Initial Application:	9/20/1999
Public Notice Date:	Not reported
Approval-To-Construct Issuance Date:	2/4/2000
Exemption Issuance Date:	Not reported
1st Issuance Of Permit:	2/4/2000
Last Issuance Of Permit:	5/31/2012
Type:	Not reported
Permit Expiration Date:	2/14/2016
Date When File Is Closed:	Not reported
UIC Project Geologist:	NU
Remarks:	Not reported

6 NW < 1/8 0.017 mi. 88 ft. | **BARBERS POINT CENTRAL OFFICE**
ROOSEVELT & COPAHEE
KAPOLEI, HI 96707 | **UST** | **U003222143**
Financial Assurance | **N/A**

Relative: Higher

Actual: 53 ft.

UST:

Facility ID:	9-203295
Owner:	Hawaiian Telcom
Owner Address:	P.O. Box 2200
Owner City,St,Zip:	Kapolei, 96707 96707
Latitude:	21.324334
Longitude:	-158.082764
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	M-1
Date Installed:	05/01/1987
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	550
Substance:	Diesel

HI Financial Assurance:

Alt Facility ID:	9-203295
Tank Id:	M-1
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported
Alt Facility ID:	9-203295
Tank Id:	M-1
Tank Status:	Currently In Use
FRTYPE:	Self Insured
Expiration Date:	05/02/2010
Alt Facility ID:	9-203295
Tank Id:	M-1
Tank Status:	Currently In Use
FRTYPE:	Insurance
Expiration Date:	05/02/2015

B7 NW < 1/8 0.102 mi. 537 ft. | **COSTCO WHOLESALE #1038**
4589 KAPOLEI PARKWAY
KAPOLEI, HI 96707 | **RCRA-LQG** | **1012178246**
HIR000139006

Site 1 of 2 in cluster B

Relative: Higher

Actual: 65 ft.

RCRA-LQG:

Date form received by agency:	03/04/2016
Facility name:	COSTCO WHOLESALE #1038
Facility address:	4589 KAPOLEI PARKWAY KAPOLEI, HI 96707
EPA ID:	HIR000139006
Mailing address:	GREYHAWK CT, SUITE200 CARLSBAD, CA 92010
Contact:	ERIC ENSMINGER
Contact address:	GREYHAWK CT, SUITE200 CARLSBAD, CA 92010

COSTCO WHOLESALE #1038 (Continued) **1012178246**

Contact country:	Not reported
Contact telephone:	(760) 602-8616
Contact email:	EENSMINGER@3ECOMPANY.COM
EPA Region:	09
Land type:	Private
Classification:	Large Quantity Generator
Description:	Handler: generates 1,000 kg or more of hazardous waste during any calendar month; or generates more than 1 kg of acutely hazardous waste during any calendar month; or generates more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month; or generates 1 kg or less of acutely hazardous waste during any calendar month, and accumulates more than 1 kg of acutely hazardous waste at any time; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates more than 100 kg of that material at any time

Owner/Operator Summary:

Owner/operator name:	COSTCO WHOLESALE CORPORATION
Owner/operator address:	Not reported Not reported
Owner/operator country:	Not reported
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	04/30/2008
Owner/Op end date:	Not reported

Owner/operator name:	MAX RAMOS
Owner/operator address:	Not reported Not reported
Owner/operator country:	Not reported
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	11/07/2008
Owner/Op end date:	Not reported

Owner/operator name:	COSTCO WHOLESALE CORPORATION
Owner/operator address:	LAKE DR ISSAQUAH, WA 98027
Owner/operator country:	Not reported
Owner/operator telephone:	(425) 313-8100
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	04/30/2008
Owner/Op end date:	Not reported

Owner/operator name:	COSTCO WHOLESALE CORPORATION
Owner/operator address:	999 LAKE DR ISSAQUAH, WA 98027
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner

COSTCO WHOLESALE #1038 (Continued) **1012178246**

Owner/Op start date: 01/01/2008
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D009
. Waste name: MERCURY

. Waste code: D010
. Waste name: SELENIUM

. Waste code: D011
. Waste name: SILVER

. Waste code: D016
. Waste name: 2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)

. Waste code: D018
. Waste name: BENZENE

. Waste code: D024
. Waste name: M-CRESOL

. Waste code: D026
. Waste name: CRESOL

. Waste code: P001
. Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

. Waste code: P075
. Waste name: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

COSTCO WHOLESALE #1038 (Continued) **1012178246**

Historical Generators:
Date form received by agency: 05/05/2014
Site name: COSTCO WHOLESALE # 1038
Classification: Large Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D003
. Waste name: REACTIVE WASTE

. Waste code: D006
. Waste name: CADMIUM

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: D010
. Waste name: SELENIUM

. Waste code: D011
. Waste name: SILVER

. Waste code: D018
. Waste name: BENZENE

. Waste code: D024
. Waste name: M-CRESOL

. Waste code: D026
. Waste name: CRESOL

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: P001

COSTCO WHOLESALE #1038 (Continued) **1012178246**

. Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

. Waste code: P075
. Waste name: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

. Waste code: U034
. Waste name: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

Date form received by agency: 01/05/2009
Site name: COSTCO WHOLESALE NO 1038
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D011
. Waste name: SILVER

. Waste code: D018
. Waste name: BENZENE

Violation Status: No violations found

Evaluation Action Summary:
Evaluation date: 03/16/2015
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

B8 **COSTCO GASOLINE #1038** **UST** **U004155572**
NW **4589 KAPOLEI PARKWAY** **Financial Assurance** **N/A**
< 1/8 **KAPOLEI, HI 96707**
0.102 mi.
537 ft. **Site 2 of 2 in cluster B**

Relative:
Higher

Actual:
65 ft.

UST:
Facility ID: 9-203850
Owner: Costco Wholesale Corporation
Owner Address: P.O. Box 35005
Owner City,St,Zip: Kapolei, 96707 96707
Latitude: 21.326840
Longitude: -158.089950
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1
Date Installed: 11/12/2009
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 30000
Substance: Gasoline

Tank ID: 2

COSTCO GASOLINE #1038 (Continued) **U004155572**

Date Installed:	11/12/2009
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	30000
Substance:	Gasoline

Tank ID:	3
Date Installed:	11/12/2009
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	30000
Substance:	Gasoline

HI Financial Assurance:

Alt Facility ID:	9-203850
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	07/01/2016

Alt Facility ID:	9-203850
Tank Id:	2
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	07/01/2016

Alt Facility ID:	9-203850
Tank Id:	3
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	07/01/2016

C9 **TRU TAG TECHNOLOGIES, INC.** **RCRA-LQG** **1016168562**
West **2045 LAUWILIWILI ST., UNITS 301-305** **HIR000141630**
1/8-1/4 **KAPOLEI, HI 96707**
0.139 mi.
732 ft. **Site 1 of 4 in cluster C**

Relative:
Lower

Actual:
49 ft.

RCRA-LQG:

Date form received by agency:	09/30/2016
Facility name:	TRU TAG TECHNOLOGIES, INC.
Facility address:	2045 LAUWILIWILI ST., UNITS 301-305 KAPOLEI, HI 96707
EPA ID:	HIR000141630
Mailing address:	LAUWILIWILI ST., UNITS 301-305 KAPOLEI, HI 96707
Contact:	DAVE BROWN
Contact address:	LAUWILIWILI ST., UNITS 301-305 KAPOLEI, HI 96707
Contact country:	US
Contact telephone:	808-380-2214
Contact email:	DBROWN@TRUTAGS.COM
EPA Region:	09
Land type:	Private
Classification:	Large Quantity Generator
Description:	Handler: generates 1,000 kg or more of hazardous waste during any

TRU TAG TECHNOLOGIES, INC. (Continued) **1016168562**

calendar month; or generates more than 1 kg of acutely hazardous waste during any calendar month; or generates more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month; or generates 1 kg or less of acutely hazardous waste during any calendar month, and accumulates more than 1 kg of acutely hazardous waste at any time; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates more than 100 kg of that material at any time

Owner/Operator Summary:

Owner/operator name:	SFI CAPITAL C/O ISTAR FINANCIAL
Owner/operator address:	E. ORANGETHORPE AVE., #200 FULLERTON, CA 92831
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	08/01/2013
Owner/Op end date:	Not reported

Owner/operator name:	TRUTAG TECHNOLOGIES, INC.
Owner/operator address:	Not reported Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	08/01/2013
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

TRU TAG TECHNOLOGIES, INC. (Continued) **1016168562**

. Waste code: U134
. Waste name: HYDROFLUORIC ACID (C,T) (OR) HYDROGEN FLUORIDE (C,T)

Historical Generators:
Date form received by agency: 08/09/2013
Site name: TRU TAG TECHNOLOGIES, INC.
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: U134
. Waste name: HYDROFLUORIC ACID (C,T) (OR) HYDROGEN FLUORIDE (C,T)

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Permits - General Information
Date violation determined: 07/11/2014
Date achieved compliance: 08/19/2014
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/11/2014
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: Generators - Pre-transport
Date violation determined: 07/11/2014
Date achieved compliance: 08/19/2014
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/11/2014
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: Not reported
Area of violation: TSD IS-Preparedness and Prevention
Date violation determined: 07/11/2014
Date achieved compliance: 08/19/2014
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/11/2014
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State

TRU TAG TECHNOLOGIES, INC. (Continued) **1016168562**

Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:

Evaluation date: 05/22/2014
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport
Date achieved compliance: 08/19/2014
Evaluation lead agency: State

Evaluation date: 05/22/2014
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Permits - General Information
Date achieved compliance: 08/19/2014
Evaluation lead agency: State

Evaluation date: 05/22/2014
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Preparedness and Prevention
Date achieved compliance: 08/19/2014
Evaluation lead agency: State

C10 West 1/8-1/4 0.139 mi. 732 ft. | **STATIONARY POWER SYSTEMS INC.** | **RCRA NonGen / NLR** | **1016956270**
2045 LAUWILIWILI PARKWAY UNIT 1506 | **HIR000142422**
KAPOLEI, HI 96707

Site 2 of 4 in cluster C

Relative: Lower

Actual: 49 ft.

RCRA NonGen / NLR:

Date form received by agency: 06/24/2014
Facility name: STATIONARY POWER SYSTEMS INC.
Facility address: 2045 LAUWILIWILI PARKWAY UNIT 1506
KAPOLEI, HI 96707
EPA ID: HIR000142422
Mailing address: LAUWILIWILI PARKWAY UNIT 1506
KAPOLEI, HI 96707
Contact: GARY TERPSTRA
Contact address: LAUWILIWILI PARKWAY UNIT 1506
KAPOLEI, HI 96707
Contact country: US
Contact telephone: (808) 348-3722
Contact email: GTERPSTRA@SPSYSTEMS.NET
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name: STAIONARY POWER SYSTEMS INC
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 06/01/2012
Owner/Op end date: Not reported

STATIONARY POWER SYSTEMS INC. (Continued) **1016956270**

Owner/operator name: SFI KAPOLEI LLC
Owner/operator address: P.O. BOX 100689
PASADENA, CA 91189
Owner/operator country: US
Owner/operator telephone: (415) 394-4300
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 06/01/2012
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Universal Waste Summary:
Waste type: Batteries
Accumulated waste on-site: Yes
Generated waste on-site: Not reported

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D008
. Waste name: LEAD

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Universal Waste - Large Quantity Handlers
Date violation determined: 06/05/2014
Date achieved compliance: 07/11/2014
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 06/05/2014
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 05/14/2014

STATIONARY POWER SYSTEMS INC. (Continued) **1016956270**

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Universal Waste - Large Quantity Handlers
Date achieved compliance: 07/11/2014
Evaluation lead agency: State

C11 West 1/8-1/4 0.139 mi. 732 ft.

VISION ENVIRONMENTAL SERVICES, INC. **RCRA NonGen / NLR** **1014389679**
2045 LAUWILIWILI ST **HIT000140244**
KAPOLEI, HI 96707

Site 3 of 4 in cluster C

Relative: Lower

Actual: 49 ft.

RCRA NonGen / NLR:
Date form received by agency: 06/22/2016
Facility name: VISION ENVIRONMENTAL SERVICES, INC.
Facility address: 2045 LAUWILIWILI ST
#710
KAPOLEI, HI 96707
EPA ID: HIT000140244
Contact: CANA M ULUFALE
Contact address: PMB 318 590 590 FARRINGTON HWY #21
KAPOLEI, HI 96707
Contact country: US
Contact telephone: (808) 306-1878
Contact email: VISION.CANA@GMAIL.COM
EPA Region: 09
Land type: Private
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: CANA ULUFALE
Owner/operator address: 2045 LAUWILIWILI ST #710
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: (808) 306-1878
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 12/01/2010
Owner/Op end date: Not reported

Owner/operator name: ASOTAU ULUFALE
Owner/operator address: 2045 LAUWILIWILI ST #710
KAPOLEI, HI 96707
Owner/operator country: US
Owner/operator telephone: (808) 306-1878
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 12/01/2010
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No

VISION ENVIRONMENTAL SERVICES, INC. (Continued) **1014389679**

Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency:	02/07/2011
Site name:	VISION ENVIRONMENTAL SERVICES, INC.
Classification:	Not a generator, verified
Violation Status:	No violations found

Evaluation Action Summary:

Evaluation date:	12/04/2012
Evaluation:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation:	Not reported
Date achieved compliance:	Not reported
Evaluation lead agency:	State

C12 West 1/8-1/4 0.139 mi. 732 ft. **INTERNATIONAL PAINT LLC** **RCRA-SQG** **1018274566**
2045 LAUWILIWILI ST SUITE 1202 **FINDS** **HIR000143743**
KAPOLEI, HI 96707 **ECHO**

Site 4 of 4 in cluster C

Relative: Lower

Actual: 49 ft.

RCRA-SQG:

Date form received by agency:	05/03/2016
Facility name:	INTERNATIONAL PAINT LLC
Facility address:	2045 LAUWILIWILI ST SUITE 1202 KAPOLEI, HI 96707
EPA ID:	HIR000143743
Mailing address:	LAUWILIWILI ST SUITE 1202 KAPOLEI, HI 96707
Contact:	ASHLEY LINCOLN
Contact address:	LAUWILIWILI ST SUITE 1202 KAPOLEI, HI 96707
Contact country:	US
Contact telephone:	808-682-1042
Contact email:	ASHLEY.LINCOLN@AKZONOBEL.COM
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	INTERNATIONAL PAINT LLC
Owner/operator address:	6001 ANTOINE DR HOUSTON, TX 77091
Owner/operator country:	US
Owner/operator telephone:	713-682-1711

INTERNATIONAL PAINT LLC (Continued) **1018274566**

Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: INTERNATIONAL PAINT LLC
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D005
. Waste name: BARIUM

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005

INTERNATIONAL PAINT LLC (Continued) **1018274566**

. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110067675368

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1018274566
Registry ID: 110067675368
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110067675368

D13 **KAPOLEI JUVENILE DETENTION FACILITY** **RCRA-CESQG** **1019323205**
NW **287 KAMOKILA BLVD** **FINDS** **HIR000143966**
1/8-1/4 **KAPOLEI, HI 96707** **ECHO**
0.153 mi.
809 ft. **Site 1 of 3 in cluster D**

Relative:
Higher

Actual:
66 ft.

RCRA-CESQG:
Date form received by agency: 08/26/2016
Facility name: KAPOLEI JUVENILE DETENTION FACILITY
Facility address: 287 KAMOKILA BLVD
KAPOLEI, HI 96707
EPA ID: HIR000143966
Mailing address: KAMOKILA BLVD
KAPOLEI, HI 96707
Contact: WAYNE S TANIGUCHI
Contact address: PUNCHBOWL STREET
HONOLULU, HI 96813
Contact country: US
Contact telephone: 808-539-4348
Contact email: WAYNE.S.TANIGUCHI@COURTS.HAWAII.GOV
EPA Region: 09
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar

KAPOLEI JUVENILE DETENTION FACILITY (Continued) **1019323205**

month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	DEPT OF LAND AND NATURAL RESOURCES
Owner/operator address:	1151 PUNCHBOWL STREET
	HONOLULU, HI 96813
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	State
Owner/Operator Type:	Owner
Owner/Op start date:	08/01/1959
Owner/Op end date:	Not reported

Owner/operator name:	THE JUDICIARY - STATE OF HAWAII
Owner/operator address:	Not reported
	Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	State
Owner/Operator Type:	Operator
Owner/Op start date:	08/04/2008
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

KAPOLEI JUVENILE DETENTION FACILITY (Continued) **1019323205**

Violation Status: No violations found

FINDS:

Registry ID: 110069517259

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1019323205
Registry ID: 110069517259
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110069517259

D14 NW 1/8-1/4 0.186 mi. 983 ft. **KAPOLEI DISTRICT AND FAMILY COURT** **RCRA-CESQG** **1019323204**
4675 KAPOLEI PARKWAY **FINDS** **HIR000143958**
KAPOLEI, HI 96707 **ECHO**

Site 2 of 3 in cluster D

Relative: Higher

Actual: 69 ft.

RCRA-CESQG:
Date form received by agency: 08/26/2016
Facility name: KAPOLEI DISTRICT AND FAMILY COURT
Facility address: 4675 KAPOLEI PARKWAY
KAPOLEI, HI 96707
EPA ID: HIR000143958
Mailing address: KAPOLEI PARKWAY
KAPOLEI, HI 96707
Contact: WAYNE S TANIGUCHI
Contact address: PUNCHBOWL STREET
HONOLULU, HI 96813
Contact country: US
Contact telephone: 808-539-4348
Contact email: WAYNE.S.TANIGUCHI@COURTS.HAWAII.GOV
EPA Region: 09
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of

KAPOLEI DISTRICT AND FAMILY COURT (Continued) **1019323204**

any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	DEPT OF LAND AND NATURAL RESOURCES
Owner/operator address:	1151 PUNCHBOWL STREET HONOLULU, HI 96813
Owner/operator country:	US
Owner/operator telephone:	808-587-0400
Legal status:	State
Owner/Operator Type:	Owner
Owner/Op start date:	08/01/1959
Owner/Op end date:	Not reported

Owner/operator name:	THE JUDICIARY - STATE OF HAWAII
Owner/operator address:	Not reported Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	State
Owner/Operator Type:	Operator
Owner/Op start date:	09/10/2007
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

Violation Status: No violations found

FINDS:

Registry ID: 110069517240

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of

KAPOLEI DISTRICT AND FAMILY COURT (Continued) **1019323204**

events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1019323204
Registry ID:	110069517240
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110069517240

D15 **COSTCO KAPOLEI** **SHWS** **S108859895**
NW **KAMOKILA BLVD & KAPOLEI PKWY** **N/A**
1/8-1/4 **KAPOLEI, HI 96825**
0.196 mi.
1033 ft. **Site 3 of 3 in cluster D**

Relative:
Higher

Actual:
69 ft.

SHWS:

Organization:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Costco Kapolei
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Program:	State
Project Manager:	Richard Palmer
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Costco Kapolei
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No HEER Environmental Interest
Document Date:	09/30/2006
Document Number:	Not reported
Document Subject:	Rezoning Application Costco Wholesale Kapolei, TMK 1-9-1-016-001 (por) the City of Kapolei, Honouliuli, Ewa, West, Oahu HI
Project Manager:	Richard Palmer
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

16 SE 1/4-1/2 0.316 mi. 1669 ft.

NAVAL AIR STATION BARBERS POINT
BLDG 1772 TANK BP97
BARBERS POINT NAVAL AIR STATIO, HI 96862

LUST **U004109525**
UST **N/A**

Relative: Lower

Actual: 39 ft.

LUST:

Facility ID:	9-103337
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/26/2001
Release ID:	990048
Project Officer:	Mark Sutterfield

UST:

Facility ID:	9-103337
Owner:	U.S. DEPT OF THE NAVY
Owner Address:	Not reported
Owner City,St,Zip:	Barbers Point Naval Air Station, 96862 96862
Latitude:	21.316618
Longitude:	158.071772
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Map
Tank ID:	R-M-BP97
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	10/01/1996
Tank Capacity:	Not reported
Substance:	Not Listed

---

17 East 1/4-1/2 0.459 mi. 2423 ft.

NEX TOUCH N' GO GAS STATION
BLDG 1928 TANK 81, 82, 83 SARATOGA AVE
KAPOLEI, HI 96707

LUST **U003221711**
UST **N/A**
Financial Assurance

Relative: Lower

Actual: 45 ft.

LUST:

Facility ID:	9-102001
Facility Status:	Soil Vapor Sampling
Facility Status Date:	01/28/2015
Release ID:	130008
Project Officer:	Shaobin Li
Facility ID:	9-102001
Facility Status:	Monitored Natural Attenuation
Facility Status Date:	08/24/2010
Release ID:	070005
Project Officer:	Shaobin Li
Facility ID:	9-102001
Facility Status:	Monitored Natural Attenuation
Facility Status Date:	08/24/2010
Release ID:	940200
Project Officer:	Shaobin Li

UST:

Facility ID:	9-102001
Owner:	US Navy - Commandar Navy Region Hawaii
Owner Address:	850 Ticonderoga Street, Suite 110

NEX TOUCH N' GO GAS STATION (Continued) **U003221711**

Owner City,St,Zip:	Kapolei, 96707 96707
Latitude:	21.321355
Longitude:	-158.068387
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	1 (83)
Date Installed:	02/28/1988
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasoline

Tank ID:	2 Master (82)
Date Installed:	02/28/1988
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasoline

Tank ID:	3 Slave (81)
Date Installed:	02/28/1988
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasoline

HI Financial Assurance:

Alt Facility ID:	9-102001
Tank Id:	1 (83)
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported

Alt Facility ID:	9-102001
Tank Id:	2 Master (82)
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported

Alt Facility ID:	9-102001
Tank Id:	3 Slave (81)
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported

18 SW 1/2-1 0.596 mi. 3149 ft. | **HECO - CAMPBELL INDUSTRIAL PARK SUBSTATION**
91-550 KALAELOA BLVD
KAPOLEI, HI 96707 | **SHWS**
ENG CONTROLS
SPILLS | **S108859678**
N/A

Relative: Lower

Actual: 19 ft.

SHWS:

Organization:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	HECO - Campbell Industrial Park Substation
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Program:	State
Project Manager:	Jordan Nakayama
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	HECO - Campbell Industrial Park Substation
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Diesel fuel impacted soil was excavated and disposed of at Wamanalo Gulch. Impacted area is capped wth HDPE liner to prohibit mobilization of petroleum away from the release area.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	ISST NFA - No Letter
Document Date:	07/10/2012
Document Number:	2012-413-AH
Document Subject:	Concurrence with Hawaiian Electric Company Inc, Campbell Estate Industrial Park Substation, 91-550 Kalaeloa Blvd, Kapolei HI, DOH Release ID 20070625-0700, Jul 7, 2011
Project Manager:	Jordan Nakayama
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20070625-0700
HID Number:	Not reported
Facility Registry Id:	Not reported

HECO - CAMPBELL INDUSTRIAL PARK SUBSTATION (Continued) **S108859678**

Lead and Program:	HEER EP&R
ER:	Site Visit
Units:	HECO - Campbell Industrial Park Substation Diesel Release
Substances:	Diesel Fuel
Less Or Greater Than:	Not reported
Numerical Quantity:	5900
Units:	Gallons
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2008-05-06 00:00:00
Result:	SOSC concurrence
File Under:	Hawaiian Electric Co., Inc. (HECO)
Latitude:	21.3269
Longitude:	-158.0966

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20070625-0700
HID Number:	Not reported
Facility Registry Id:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Units:	HECO - Campbell Industrial Park Substation Diesel Release
Substances:	Diesel Fuel
Less Or Greater Than:	Not reported
Numerical Quantity:	5900
Units:	Gallons
Activity Type:	SDAR Referral
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Hawaiian Electric Co., Inc. (HECO)
Latitude:	21.3269
Longitude:	-158.0966

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20121003-1401
HID Number:	Not reported
Facility Registry Id:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Units:	HECO Pad-Mounted Transformer 59489 Release
Substances:	Transformer Oil
Less Or Greater Than:	>
Numerical Quantity:	6
Units:	Gallons
Activity Type:	Response
Activity Lead:	Curtis Martin
Assignment End Date:	2012-10-10 00:00:00
Result:	SOSC NFA
File Under:	Hawaiian Electric Co., Inc. (HECO)
Latitude:	21.3269
Longitude:	-158.0966

19 SW 1/2-1 0.715 mi. 3773 ft.

HAWAIIAN DREDGING CONSTRUCTION COMPANY, INCORPORAT
91-063 MALAKOLE ST
KAPOLEI, HI 96707

SHWS **1006819223**
INST CONTROL **N/A**
VCP
SPILLS
AIRS

Relative: Lower

Actual: 10 ft.

SHWS:

Organization:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Hawaiian Dredging
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Program:	State
Project Manager:	Not reported
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Hawaiian Dredging
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No HEER Environmental Interest
Document Date:	12/08/2006
Document Number:	Not reported
Document Subject:	Former Navy UST NSFI-90 Pearl Harbor Naval Complex, Oahu, Facility ID 9-103299 / Release ID 990250
Project Manager:	Not reported
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

Organization:	Not reported
Supplemental Location:	Komohana Park Komohana St & Malakole St
Island:	Oahu
Environmental Interest:	Bank of Hawaii Campbell Industrial Park Site
HID Number:	Not reported
Facility Registry Identifier:	110013769993
Lead Agency:	HEER
Program:	Voluntary Response Program
Project Manager:	John Peard
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Bank of Hawaii Campbell Industrial Park Site
HID Number:	Not reported
Facility Registry Identifier:	110013769993
Lead Agency:	HEER
Potential Hazard And Controls:	Hazard Managed With Controls

HAWAIIAN DREDGING CONSTRUCTION COMPANY, INCORPORATED (Continued) **1006819223**

Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Petroleum, PAHs, VOCs, lead in soil and groundwater.
Nature of Residual Contamination:	Petroleum, PAHs, lead in soil and groundwater.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	No Engineering Control Required
Description of Restrictions:	Former Hydraulic Shear Area Commercial or Industrial use only. Former 1,000 gallon Waste Oil tank area a) No Groundwater use and no building, digging, or subsurface work.without DOH approval.
Institutional Control:	Proprietary - Environmental Covenant
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Letter of Completion - Restricted Use
Document Date:	06/23/2008
Document Number:	2008-417-JP
Document Subject:	Letter of Completion pursuant to the VRP Agreement, Dec 20, 2001 and revised Jun 11, 2007, TMK 1-9-1-032-092
Project Manager:	John Peard
Contact Information:	(808) 933-9921 Environmental Health Bldg, 1582 Kamehameha Ave, Hilo, HI 96720

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Komohana Park Komohana St & Malakole St
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Proprietary - Environmental Covenant

VCP:

Program:	Voluntary Response Program
Zip Suffix:	Not reported
Supplemental Location:	Komohana Park Komohana St & Malakole St
Island:	Oahu

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Komohana St and Malakole St
Case Number:	20100123-1132
HID Number:	Not reported
Facility Registry Id:	110013789962
Lead and Program:	HEER EP&R
ER:	None
Units:	GPRM Prestress diesel fuel release
Substances:	Diesel Fuel
Less Or Greater Than:	>
Numerical Quantity:	300
Units:	Gallons
Activity Type:	Response
Activity Lead:	CURTIS MARTIN
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Grace Pacific Corporation
Latitude:	21.312321
Longitude:	-158.090738

Island:	Oahu

HAWAIIAN DREDGING CONSTRUCTION COMPANY, INCORPORATED (Continued) **1006819223**

Supplemental Loc. Text:	Komohana St and Malakole St
Case Number:	20100123-1132
HID Number:	Not reported
Facility Registry Id:	110013789962
Lead and Program:	HEER EP&R
ER:	None
Units:	GPRM Prestress diesel fuel release
Substances:	Diesel Fuel
Less Or Greater Than:	>
Numerical Quantity:	300
Units:	Gallons
Activity Type:	Response
Activity Lead:	CURTIS MARTIN
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Grace Pacific Corporation
Latitude:	21.312908
Longitude:	-158.093207

AIRS:

Facility ID:	0346-01-N
Island:	Oahu
Mailing Address:	91-063 Malakole Street
Locale:	Not reported
Business Phone:	808-682-6000
Mailing City,St,Zip:	Kapolei, Hawaii 96707
Contact Name:	Jim Beaton
Contact Title:	Operations Manager
Date Permit Issue:	02/21/2013
Date Permit Expire:	02/20/2018
Description:	66-83 yd3/hr Concrete Batch Plant1.Attachment II of this permit encompasses the following equipment and associated appurtenances for the 66-83 yd3/hr concrete batch plant:a.1-1/2 yd3 concrete mixer, model no. 150, serial no. C-2125-88;b.4 yd3 concrete mixer, model no. PM4.0, serial no. 3756-08;c.4 ton cement loading silo;d.30 ton cement loading silo with baghouse;e.Cement screw conveyors;f.Rock and sand storage bins; andg.Rock and sand conveyor.

20
NNW
1/2-1
0.779 mi.
4114 ft.

PALAILAI LANDFILL
91-402 FARRINGTON HWY
EWA BEACH, HI 96706

SHWS **1006821165**
ENG CONTROLS **N/A**
INST CONTROL
SPILLS

Relative:
Higher

Actual:
144 ft.

SHWS:

Organization:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Pacific Concrete & Rock LDFL
HID Number:	Not reported
Facility Registry Identifier:	110013792529
Lead Agency:	HEER
Program:	State
Project Manager:	Melody Calisay
Hazard Priority:	High
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu

PALAILAI LANDFILL (Continued) **1006821165**

SDAR Environmental Interest Name:	Pacific Concrete & Rock LDFL
HID Number:	Not reported
Facility Registry Identifier:	110013792529
Lead Agency:	HEER
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	High
Assessment:	Assessment Ongoing
Response:	Response Ongoing
Nature of Contamination:	Presumed: Additional groundwater monitoring wells and soil vapor probe were installed.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Prohibit Any Activity That May Disturb the Integrity of the Soil Vapor Extraction System
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Melody Calisay
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19911121-7
HID Number:	Not reported
Facility Registry Id:	110013792529
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	GRACE PACIFIC CORPORATION, OLD PALAILAI QUARRY
Substances:	SEE INCIDENT DESCRIPTION
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Grace Pacific Corporation

PALAILAI LANDFILL (Continued) **1006821165**

Latitude:	21.336313
Longitude:	-158.086678
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19911121-7
HID Number:	Not reported
Facility Registry Id:	110013792529
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	GRACE PACIFIC CORPORATION, OLD PALAILAI QUARRY
Substances:	SEE INCIDENT DESCRIPTION
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Grace Pacific Corporation
Latitude:	21.336314
Longitude:	-158.022425

21
WSW
1/2-1
0.789 mi.
4165 ft.

Relative:
Lower

Actual:
19 ft.

HONSADOR
91-151 MALAKOLE RD
KAPOLEI, HI 96707

SHWS **U003221988**
LUST **N/A**
UST
ENG CONTROLS
INST CONTROL
VCP
Financial Assurance
UIC

SHWS:

Organization:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Honsador Lumber Corp
HID Number:	Not reported
Facility Registry Identifier:	110013785957
Lead Agency:	HEER
Program:	Voluntary Response Program
Project Manager:	Steve Mow
Hazard Priority:	Medium
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Honsador Lumber Corp
HID Number:	Not reported
Facility Registry Identifier:	110013785957
Lead Agency:	HEER
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	Medium
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Arsenic
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported

HONSADOR (Continued) **U003221988**

Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	RAM LUC
Document Date:	11/30/2010
Document Number:	2010-721-SPM
Document Subject:	Review of Voluntary Response Program Draft Response Action Memorandum, Honsador Lumber Facility (Kapolei) (Nov 4, 2010) by Kevin S. Kennedy Consulting, LLC
Project Manager:	Steve Mow
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

LUST:

Facility ID:	9-200822
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	04/04/2003
Release ID:	980244
Project Officer:	Richard Takaba

UST:

Facility ID:	9-200822
Owner:	HONSADOR
Owner Address:	91-151 MALAKOLE RD
Owner City,St,Zip:	Kapolei, 96707 96707
Latitude:	21.312578
Longitude:	-158.096226
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	R-1
Date Installed:	03/21/1974
Tank Status:	**Permanently Out of Use**
Date Closed:	03/02/1992
Tank Capacity:	2000
Substance:	Gasoline

Tank ID:	R-2
Date Installed:	03/21/1974
Tank Status:	**Permanently Out of Use**
Date Closed:	03/02/1992
Tank Capacity:	4000
Substance:	Gasoline

Tank ID:	R-3
Date Installed:	03/22/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	08/22/1998
Tank Capacity:	10000
Substance:	Diesel

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls

HONSADOR (Continued) **U003221988**

Engineering Control: Engineering Control Required

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

VCP:
Program: Voluntary Response Program
Zip Suffix: Not reported
Supplemental Location: Not reported
Island: Oahu

HI Financial Assurance:
Alt Facility ID: 9-200822
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported

Alt Facility ID: 9-200822
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported

Alt Facility ID: 9-200822
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported

UIC:
UIC Permit Number: UO-2510
Facility Id/Lat Long Minute Coordinates: 3-1805.10.1
Central Latitude Of The Site: 21 18 58
Central Longitude Of The Site: 158 05 56
Flow In Gallons Per Day: 1640 gpd
Total Number Of Inj. Well(S) On Permit: 1
Island: Oahu
Location In Relation To UIC Line: Not reported
Facility Type: SEW
Subclass: B
Facility Operator, Not Contract Opr: Honsador Lumber LLC
Operator Address: 91-151 Malakole St, Kapolei, Oahu, HI 96707
Facility Owner: Honsador Lumber LLC
Owner Address: Not reported
Tax Map Key Number: 1:9-1-032:62
Owner Of Land Property On Leasehold: Not reported
Consultant Serving The Application: Clayton Group Services
Receipt Of Initial Application: 10/14/2005
Public Notice Date: Not reported
Approval-To-Construct Issuance Date: Not reported

HONSADOR (Continued) **U003221988**

Exemption Issuance Date:	Not reported
1st Issuance Of Permit:	5/31/2007
Last Issuance Of Permit:	8/15/2012
Type:	Not reported
Permit Expiration Date:	8/14/2017
Date When File Is Closed:	Not reported
UIC Project Geologist:	Not reported
Remarks:	Not reported

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22 NNE 1/2-1 0.874 mi. 4615 ft. **FORT BARRETTE** **FUDS** **1012129405** **N/A**

OTHER, HI

Relative: Higher

Actual: 98 ft.

FUDS:

EPA Region:	09
Congressional District:	01
FUDS Number:	H09HI0087
State:	HI
Facility Name:	FORT BARRETTE
Fiscal Year:	2013
City:	OTHER
Federal Facility ID:	HI9799F3828
Telephone:	808-835-4004
INST ID:	54583
County:	HONOLULU
RAB:	Not reported
CORPS_DIST:	Honolulu District (POH)
NPL Status:	Not Listed
CTC:	1352.7
Current Owner:	Other Federal Government; Private Sector
Future Prog:	Not reported
Description:	THE SITE CONTAINS EXPOSED CESS POOLS, EXPOSED MANHOLES, UNDERGROUND CONCRETE BOXES, SEPTIC TANKS AND FUEL TANK VAULTS, AN UNDERGROUND RESERVOIR. THESE STRUCTURES POSE POTENTIAL SAFETY HAZARDS TO FUTUR E PARK VISITORS.
Current Program:	Not reported
History:	THE PROJECT SITE CONSISTED OF 38.53 ACRES PURCHASED BY THE US GOVERNMENT ON NOVEMBER 1931. ON APRIL 23, 1956 THE 38.53 ACRE INSTALLATION WAS DECLARED EXCESS TO THE NEEDS OF THE ARMY AND WAS TRANSFERRE D TO THE NAVY.
Latitude Degree:	21
Latitude Minute:	20
Latitude Second:	6
Latitude Direction:	N
Longitude Degree:	-158
Longitude Minute:	4
Longitude Second:	24
Longitude Direction:	E

23 WSW 1/2-1 0.965 mi. 5097 ft. | **HAWAII RACEWAY PARK**
91-201 MALAKOLE ST
KAPOLEI, HI 96707 | **SHWS SPILLS** | **S106817374 N/A**

Relative: Lower

Actual: 10 ft.

SHWS:

Organization:	Not reported
Supplemental Location:	Kalaeloa Blvd & Malakole St
Island:	Oahu
Environmental Interest:	Hawaii Raceway Park
HID Number:	HID984467779
Facility Registry Identifier:	110013789061
Lead Agency:	HEER
Program:	State
Project Manager:	Diane England
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Hawaii Raceway Park
HID Number:	HID984467779
Facility Registry Identifier:	110013789061
Lead Agency:	HEER
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Found: Petroleum, metals, and PCBs in soil
Nature of Residual Contamination:	No (petroleum, metals, and PCBs in soil) contamination left on site is above EALs.
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	11/09/2006
Document Number:	2006-673-DE
Document Subject:	No Further Action Determination
Project Manager:	Diane England
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	19910618-4
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	HAWAII RACEWAY PARK intential dumping of oil/sulfuric acid
Substances:	Oil, Sulfuric Acid
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA

HAWAII RACEWAY PARK (Continued) **S106817374**

File Under:	Hawaii Raceway Park
Latitude:	21.371298
Longitude:	-158.083048

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	19910618-4
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	HAWAII RACEWAY PARK intential dumping of oil/sulfuric acid
Substances:	Oil, Sulfuric Acid
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Hawaii Raceway Park
Latitude:	21.315397
Longitude:	-158.094784

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	19910618-4
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	HAWAII RACEWAY PARK intential dumping of oil/sulfuric acid
Substances:	Oil, Sulfuric Acid
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Hawaii Raceway Park
Latitude:	21.315183
Longitude:	-158.094434

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	20040924-1600
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	None
Units:	Hawaii Raceway Park fire
Substances:	Not reported
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response

HAWAII RACEWAY PARK (Continued) **S106817374**

Activity Lead:	Curtis Martin
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Hawaii Raceway Park
Latitude:	21.315183
Longitude:	-158.094434

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	20040924-1600
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	None
Units:	Hawaii Raceway Park fire
Substances:	Not reported
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Curtis Martin
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Hawaii Raceway Park
Latitude:	21.371298
Longitude:	-158.083048

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	20040924-1600
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	None
Units:	Hawaii Raceway Park fire
Substances:	Not reported
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Curtis Martin
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Hawaii Raceway Park
Latitude:	21.315397
Longitude:	-158.094784

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	19920423-2
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Hawaii Raceway Park potential dumping and storage of hazardous material
Substances:	Various
Less Or Greater Than:	Not reported

HAWAII RACEWAY PARK (Continued) **S106817374**

Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Bryce Hataoka
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Hawaii Raceway Park
Latitude:	21.315397
Longitude:	-158.094784

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	19920423-2
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Hawaii Raceway Park potential dumping and storage of hazardous material
Substances:	Various
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Bryce Hataoka
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Hawaii Raceway Park
Latitude:	21.315183
Longitude:	-158.094434

Island:	Oahu
Supplemental Loc. Text:	Kalaeloa Blvd & Malakole St
Case Number:	19920423-2
HID Number:	HID984467779
Facility Registry Id:	110013789061
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	Hawaii Raceway Park potential dumping and storage of hazardous material
Substances:	Various
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Bryce Hataoka
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Hawaii Raceway Park
Latitude:	21.371298
Longitude:	-158.083048

24 North 1/2-1 0.989 mi. 5221 ft. | **KAPOLEI PIPELINE FUEL SPILL**
KAMOKILA BLVD
EWA BEACH, HI 96707 | **SHWS SPILLS** | **1006819246 N/A**

Relative: Higher

Actual: 96 ft.

SHWS:

Organization:	Not reported
Supplemental Location:	Kamokila Blvd b/w Makakilo Rd and Road I
Island:	Oahu
Environmental Interest:	Kapolei Fuel Spill
HID Number:	Not reported
Facility Registry Identifier:	110013770222
Lead Agency:	HEER
Program:	State
Project Manager:	Not reported
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Kapolei Fuel Spill
HID Number:	Not reported
Facility Registry Identifier:	110013770222
Lead Agency:	HEER
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	08/02/1993
Document Number:	Not reported
Document Subject:	Response to Report of Cleanup Activities, Jet Fuel Pipeline Rupture, Kapolei Pkwy
Project Manager:	Not reported
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

HI SPILLS:

Island:	Oahu
Supplemental Loc. Text:	Kamokila Blvd b/w Makakilo Rd and Road I
Case Number:	19930114
HID Number:	Not reported
Facility Registry Id:	110013770222
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	HIRI Pipeline Underground At Kapolei
Substances:	Jet Fuel
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	1993-08-02 00:00:00
Result:	SOSC NFA

KAPOLEI PIPELINE FUEL SPILL (Continued) **1006819246**

File Under:	Tesoro Hawaii Corporation
Latitude:	21.338245
Longitude:	-158.080089

Island:	Oahu
Supplemental Loc. Text:	Kamokila Blvd b/w Makakilo Rd and Road I
Case Number:	19930114
HID Number:	Not reported
Facility Registry Id:	110013770222
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	HIRI Pipeline Underground At Kapolei
Substances:	Jet Fuel
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	1993-08-02 00:00:00
Result:	SOSC NFA
File Under:	Tesoro Hawaii Corporation
Latitude:	21.371298
Longitude:	-158.083048

Island:	Oahu
Supplemental Loc. Text:	Kamokila Blvd b/w Makakilo Rd and Road I
Case Number:	19930114
HID Number:	Not reported
Facility Registry Id:	110013770222
Lead and Program:	HEER EP&R
ER:	Not reported
Units:	HIRI Pipeline Underground At Kapolei
Substances:	Jet Fuel
Less Or Greater Than:	Not reported
Numerical Quantity:	Not reported
Units:	Not reported
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	1993-08-02 00:00:00
Result:	SOSC NFA
File Under:	Tesoro Hawaii Corporation
Latitude:	21.331941
Longitude:	-158.083929

Count: 6 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
BARBERS POINT NAS	S111704672	BARBERS POINT NAS STATION P	MISSION ST	96707	SHWS
KAPOLEI	1001112113	DLA DISPOSITION SERVICES	BLDG. 140 MIDWAY STREET (KALAE	96707	SEMS-ARCHIVE, RCRA NonGen / NL
KAPOLEI	S115488695	FORT	KALAELOA BLVD		SHWS, ENG CONTROLS, INST CONT
KAPOLEI	S120822095	GRACE PACIFIC KALAELOA HMA PLANT D	91-500 MALAKOLE ST		SHWS
KAPOLEI	S118422808	HAWAII ARMY NATIONAL GUARD AT KALA	MIDWAY STREET		SHWS, INST CONTROL
KAPOLEI	S106820144	PUMP 15 STATION, FORMER OAHU SUGAR	OLD FARRINGTON HWY	96707	SHWS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 05/30/2017
Date Data Arrived at EDR: 06/08/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 99

Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 05/30/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 98

Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 05/30/2017	Source: EPA
Date Data Arrived at EDR: 06/09/2017	Telephone: N/A
Date Made Active in Reports: 09/15/2017	Last EDR Contact: 07/07/2017
Number of Days to Update: 98	Next Scheduled EDR Contact: 10/16/2017
	Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/07/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/05/2017	Telephone: 703-603-8704
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 07/07/2017
Number of Days to Update: 92	Next Scheduled EDR Contact: 10/16/2017
	Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/07/2017	Source: EPA
Date Data Arrived at EDR: 04/19/2017	Telephone: 800-424-9346
Date Made Active in Reports: 05/05/2017	Last EDR Contact: 07/21/2017
Number of Days to Update: 16	Next Scheduled EDR Contact: 10/30/2017
	Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 02/07/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 16

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 10/30/2017
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/22/2017
Date Data Arrived at EDR: 06/13/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 94

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/10/2017
Next Scheduled EDR Contact: 11/27/2017
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 02/13/2017
Date Data Arrived at EDR: 02/28/2017
Date Made Active in Reports: 06/09/2017
Number of Days to Update: 101

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 02/13/2017
Date Data Arrived at EDR: 02/28/2017
Date Made Active in Reports: 06/09/2017
Number of Days to Update: 101

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/26/2016
Date Data Arrived at EDR: 09/29/2016
Date Made Active in Reports: 11/11/2016
Number of Days to Update: 43

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: Sites List

Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Semi-Annually

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Permitted Landfills in the State of Hawaii

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/17/2012
Date Data Arrived at EDR: 04/03/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 37

Source: Department of Health
Telephone: 808-586-4245
Last EDR Contact: 09/29/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/01/2017
Date Data Arrived at EDR: 08/30/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 16

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Semi-Annually

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/17/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 10/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/07/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 10/06/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 09/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/14/2017
Next Scheduled EDR Contact: 10/23/2017
Data Release Frequency: Varies

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/01/2017
Date Data Arrived at EDR: 08/30/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 16

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 11/14/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 01/14/2017
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 10/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/01/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 10/17/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 10/06/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 10/07/2016
Date Data Arrived at EDR: 01/26/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 99

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Quarterly

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Control Sites
A listing of sites with engineering controls in place.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182

Source: Department of Health
Telephone: 404-586-4249
Last EDR Contact: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

INST CONTROL: Sites with Institutional Controls
Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

VCP: Voluntary Response Program Sites
Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 09/25/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27
Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites
With certain legal exclusions and additions, the term ‘brownfield site’ means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 06/19/2017
Date Data Arrived at EDR: 06/20/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 87
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/20/2017
Next Scheduled EDR Contact: 01/01/2018
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 08/01/2017
Next Scheduled EDR Contact: 11/13/2017
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 07/24/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 08/29/2017
Next Scheduled EDR Contact: 11/13/2017
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 02/09/2017
Date Data Arrived at EDR: 03/08/2017
Date Made Active in Reports: 06/09/2017
Number of Days to Update: 93

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Lab Listing
A listing of clandestine drug lab site locations.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/10/2010
Date Made Active in Reports: 10/22/2010
Number of Days to Update: 42

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/24/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/09/2017
Date Data Arrived at EDR: 03/08/2017
Date Made Active in Reports: 06/09/2017
Number of Days to Update: 93

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 07/26/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/28/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 37

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

SPILLS: Release Notifications

Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 03/16/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 182

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 03/10/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/11/2013
Number of Days to Update: 39

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 12/12/2016
Date Data Arrived at EDR: 12/28/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 08/25/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 07/12/2017
Next Scheduled EDR Contact: 10/23/2017
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 07/14/2017
Next Scheduled EDR Contact: 10/23/2017
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 11/27/2017
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 05/10/2017
Date Data Arrived at EDR: 05/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 121

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 08/07/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 08/24/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 09/22/2017
Next Scheduled EDR Contact: 01/01/2018
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 133

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 08/23/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/08/2017
Next Scheduled EDR Contact: 12/18/2017
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 02/01/2017
Date Data Arrived at EDR: 02/09/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/24/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 08/08/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2016
Date Data Arrived at EDR: 04/28/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 127

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/10/2017
Next Scheduled EDR Contact: 07/24/2017
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 10/23/2017
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 08/01/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 10/03/2017
Next Scheduled EDR Contact: 12/18/2017
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 09/08/2017
Next Scheduled EDR Contact: 12/18/2017
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 07/28/2017
Next Scheduled EDR Contact: 11/08/2017
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/04/2017
Date Data Arrived at EDR: 01/06/2017
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 35

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/12/2017
Next Scheduled EDR Contact: 10/16/2017
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/01/2017
Next Scheduled EDR Contact: 11/13/2017
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/30/2016
Date Data Arrived at EDR: 11/18/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 77

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 09/25/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/11/2017
Next Scheduled EDR Contact: 10/23/2017
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016
Date Data Arrived at EDR: 12/27/2016
Date Made Active in Reports: 02/17/2017
Number of Days to Update: 52

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 08/03/2017
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 08/22/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 05/30/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 98

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 07/07/2017
Next Scheduled EDR Contact: 10/16/2017
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/08/2017
Date Data Arrived at EDR: 02/28/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 38

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 08/30/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 09/01/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 09/01/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 03/14/2017
Date Data Arrived at EDR: 03/17/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 21

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 09/25/2017
Next Scheduled EDR Contact: 12/25/2017
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/23/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 9

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 09/06/2017
Next Scheduled EDR Contact: 12/18/2017
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 03/19/2017
Date Data Arrived at EDR: 03/21/2017
Date Made Active in Reports: 05/12/2017
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 09/06/2017
Next Scheduled EDR Contact: 12/18/2017
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 09/02/2016
Number of Days to Update: 91

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 09/21/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 10/25/2015
Date Data Arrived at EDR: 01/29/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 67

Source: Department of Defense
Telephone: 571-373-0407
Last EDR Contact: 07/17/2017
Next Scheduled EDR Contact: 10/30/2017
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 08/17/2017
Date Data Arrived at EDR: 08/17/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 29

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 08/17/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

AIRS: List of Permitted Facilities
A listing of permitted facilities in the state.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 01/04/2017
Date Made Active in Reports: 03/02/2017
Number of Days to Update: 57

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 09/27/2017
Next Scheduled EDR Contact: 01/15/2018
Data Release Frequency: Varies

DRYCLEANERS: Permitted Drycleaner Facility Listing
A listing of permitted drycleaner facilities in the state.

Date of Government Version: 07/07/2017
Date Data Arrived at EDR: 07/11/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 66

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 09/27/2017
Next Scheduled EDR Contact: 01/15/2018
Data Release Frequency: Varies

Financial Assurance: Financial Assurance Information Listing
A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 06/15/2017
Date Data Arrived at EDR: 06/19/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 88

Source: Department of Health
Telephone: 808-586-4226
Last EDR Contact: 09/25/2017
Next Scheduled EDR Contact: 12/25/2017
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing
A listing of underground injection well locations.

Date of Government Version: 02/07/2013
Date Data Arrived at EDR: 02/12/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 56

Source: Department of Health
Telephone: 808-586-4258
Last EDR Contact: 08/24/2017
Next Scheduled EDR Contact: 12/11/2017
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/08/2014
Number of Days to Update: 191

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/17/2014
Number of Days to Update: 200

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/03/2014
Number of Days to Update: 186

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines
Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory
Source: Office of Planning
Telephone: 808-587-2895

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

PARCELS 1, 2, AND 3
FRANKLIN D ROOSEVELT AVE
KAPOLEI, HI 96707

TARGET PROPERTY COORDINATES

Latitude (North):	21.321929 - 21˚ 19' 18.94''
Longitude (West):	158.080198 - 158˚ 4' 48.71''
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	595392.0
UTM Y (Meters):	2357916.8
Elevation:	52 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5941343 EWA, HI
Version Date:	2013

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

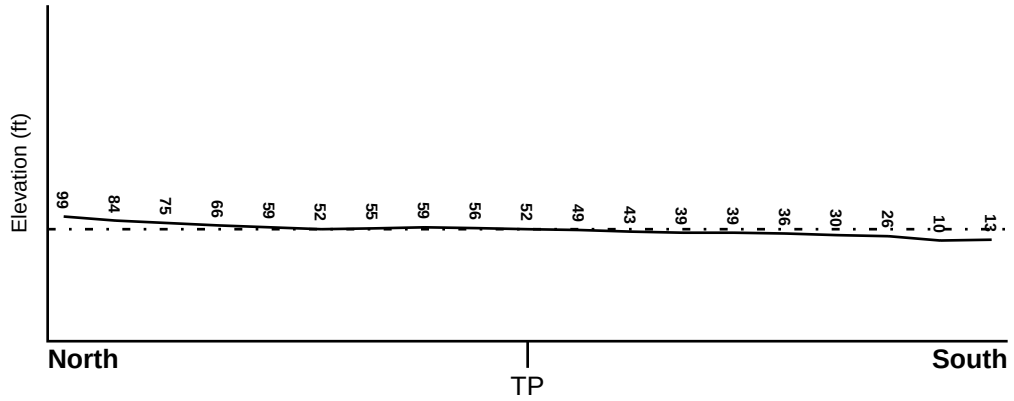
TOPOGRAPHIC INFORMATION

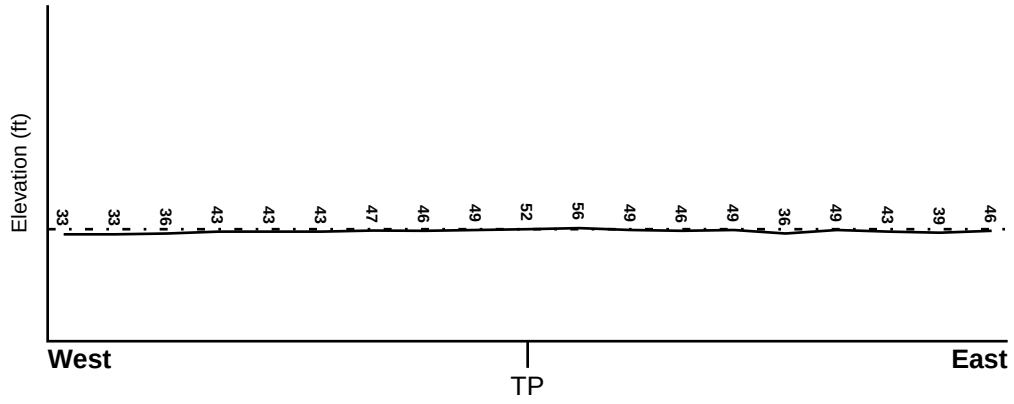
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

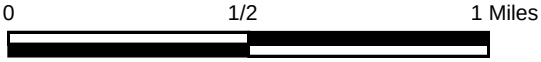
General Topographic Gradient: General South

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 52 ft.



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
15003C0310G	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
15003C0304G	FEMA FIRM Flood data
15003C0312G	FEMA FIRM Flood data
15003C0316H	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EWA	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

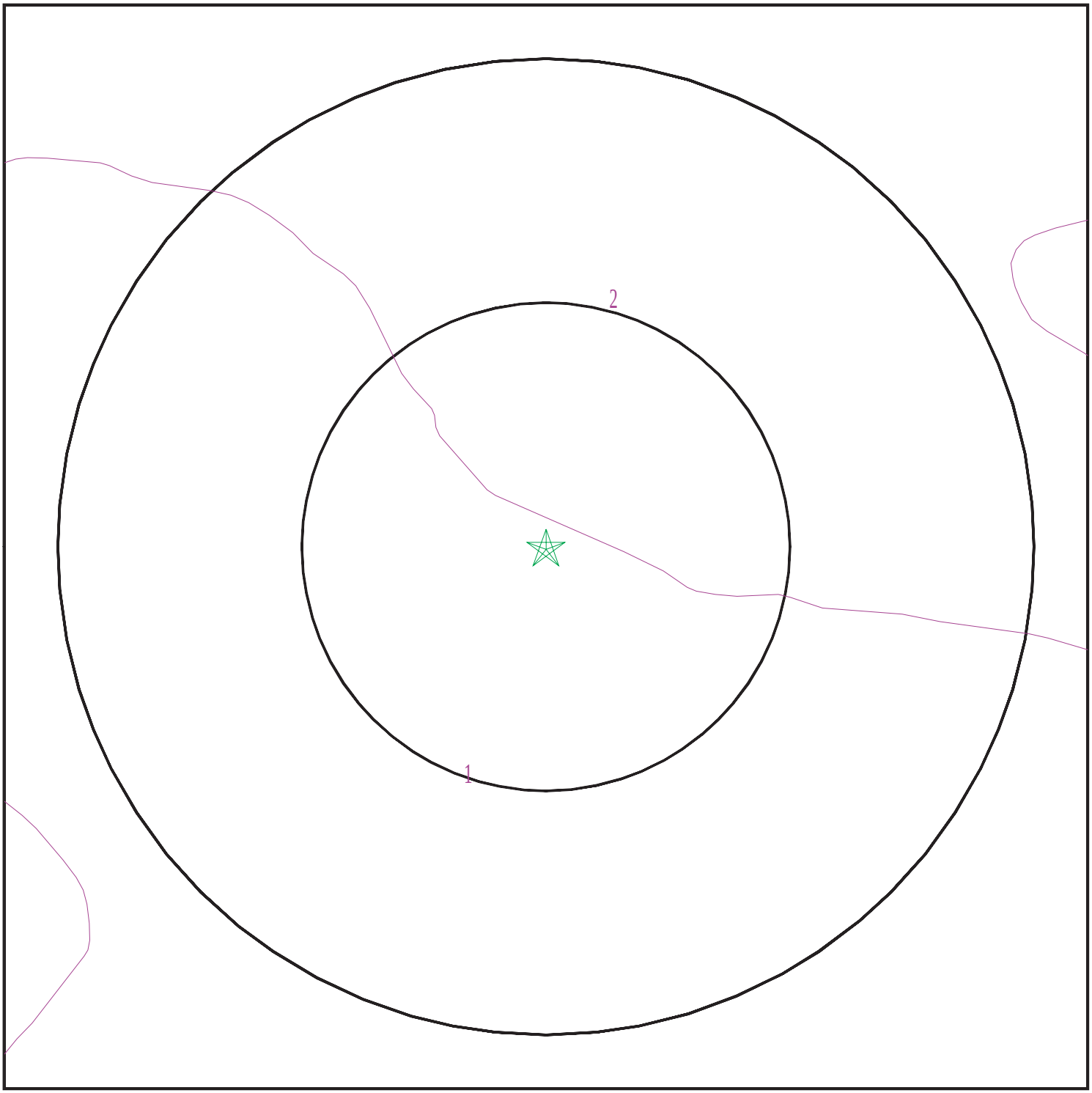
Era:	-
System:	-
Series:	-
Code:	N/A *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: -

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 5070053.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Parcels 1, 2, and 3	CLIENT:	Element Environmental , LLC
ADDRESS:	Franklin D Roosevelt Ave Kapolei HI 96707	CONTACT:	Angie Peltier
		INQUIRY #:	5070053.2s
LAT/LONG:	21.321929 / 158.080198	DATE:	October 05, 2017 7:26 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Coral outcrop

Soil Surface Texture: bedrock

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	59 inches	bedrock	Not reported	Not reported	Max: 42 Min: 1.41	Max: Min:

Soil Map ID: 2

Soil Component Name: Mamala

Soil Surface Texture: stony silty clay loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 48 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	stony silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	CL-K (proposed)	Max: 14 Min: 4.23	Max: 7.3 Min: 6.6
2	7 inches	18 inches	stony silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	CL-K (proposed)	Max: 14 Min: 4.23	Max: 7.8 Min: 7.4
3	18 inches	29 inches	bedrock	Not reported	Not reported	Max: 0.42 Min: 0.02	Max: Min:

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 0.001 miles
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A1	USGS40000269831	1/8 - 1/4 Mile NW
B3	USGS40000269847	1/4 - 1/2 Mile NNW
C7	USGS40000269827	1/2 - 1 Mile WNW
C9	USGS40000269829	1/2 - 1 Mile WNW
D15	USGS40000269841	1/2 - 1 Mile WNW
E16	USGS40000269873	1/2 - 1 Mile NE
D18	USGS40000269842	1/2 - 1 Mile WNW
F19	USGS40000269840	1/2 - 1 Mile ENE
G21	USGS40000269750	1/2 - 1 Mile SW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
H23	USGS40000269839	1/2 - 1 Mile WNW

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

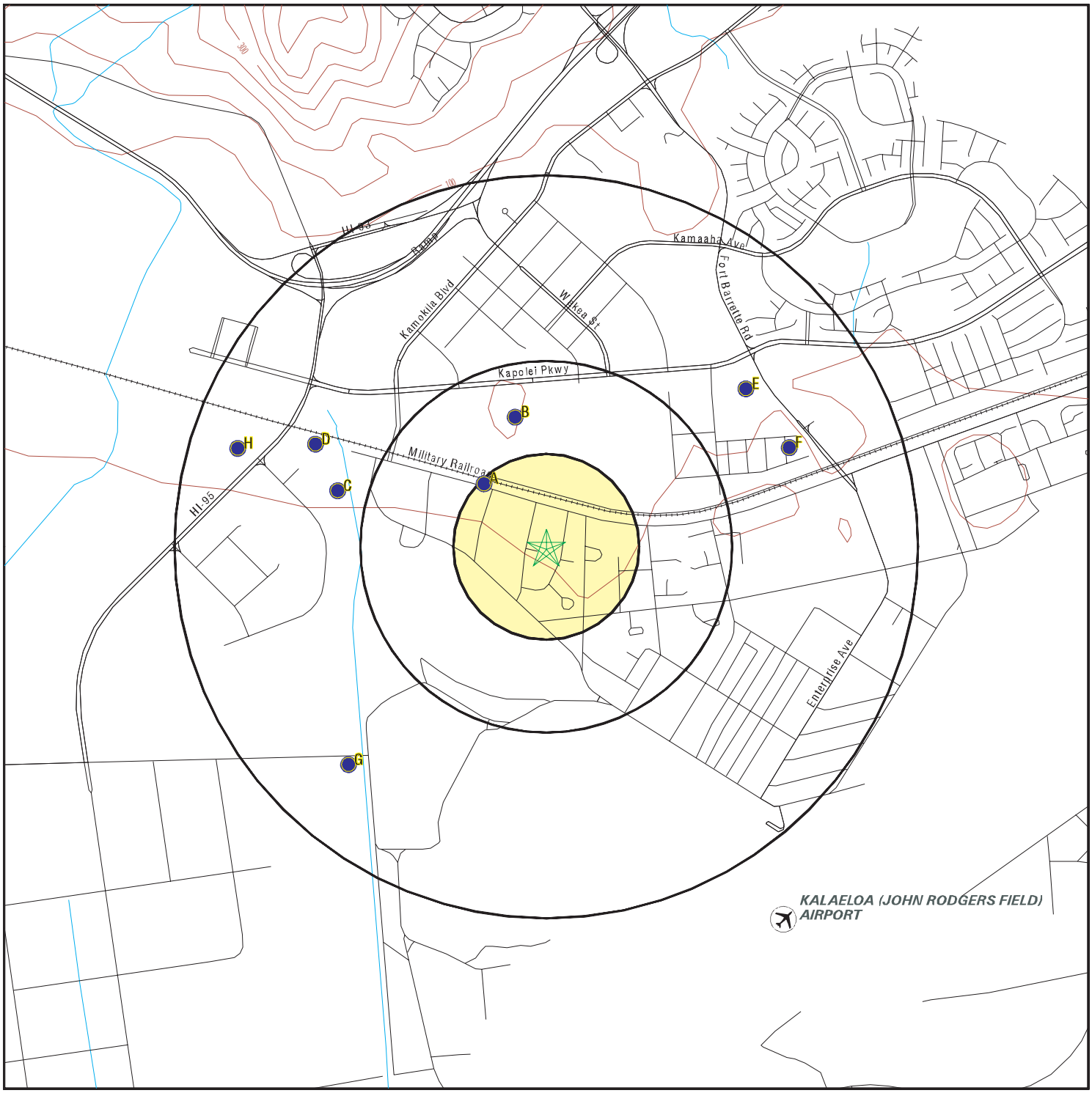
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A2	HI9000000000867	1/8 - 1/4 Mile NW
B4	HI9000000000872	1/4 - 1/2 Mile North
B5	HI9000000000874	1/4 - 1/2 Mile NNW
C6	HI9000000000870	1/2 - 1 Mile WNW
C8	HI9000000000871	1/2 - 1 Mile WNW
C10	HI9000000000873	1/2 - 1 Mile WNW
D11	HI9000000000868	1/2 - 1 Mile WNW
D12	HI9000000000869	1/2 - 1 Mile WNW
E13	HI9000000000864	1/2 - 1 Mile NE
E14	HI9000000000865	1/2 - 1 Mile NE
F17	HI9000000000863	1/2 - 1 Mile ENE
G20	HI9000000000635	1/2 - 1 Mile SW
G22	HI9000000000650	1/2 - 1 Mile SW
H24	HI9000000000866	1/2 - 1 Mile WNW

PHYSICAL SETTING SOURCE MAP - 5070053.2s



County Boundary
Major Roads
Contour Lines
Airports
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

0 1/4 1/2 1 Miles

Groundwater Flow Direction
GI Indeterminate Groundwater Flow at Location
GV Groundwater Flow Varies at Location

N

SITE NAME: Parcels 1, 2, and 3 ADDRESS: Franklin D Roosevelt Ave Kapolei HI 96707 LAT/LONG: 21.321929 / 158.080198	CLIENT: Element Environmental , LLC CONTACT: Angie Peltier INQUIRY #: 5070053.2s DATE: October 05, 2017 7:26 pm

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Map ID Direction Distance Elevation	Database	EDR ID Number
A1 **NW** **1/8 - 1/4 Mile** **Higher**	**FED USGS**	**USGS40000269831**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211939158050801		
Monloc name:	3-1905.01 -03/W275-4		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.324343
Longitude:	-158.0828113	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	56.00
Vert measure units:	feet	Vertacc measure val:	2
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19660718	Welldepth:	70
Welldepth units:	ft	Wellholedepth:	70
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1966-08-05	53.30	

A2 **NW** **1/8 - 1/4 Mile** **Higher**	**HI WELLS**	**HI9000000000867**

Wid:	3-1905-003	Island:	Oahu
Well name:	Barbers Point	Old name:	Not Reported
Yr drilled:	1966		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.082778		
Lat83dd:	21.324444		
Gps:	0	Utm:	-1
Owner user:	Hawaiian Telephone Co.		
Land owner:	Not Reported		
Pump insta:	Not Reported		
Old number:	275-4	Well type:	PER
Casing dia:	8	Ground el:	56
Well depth:	70		
Solid case:	Not Reported	Perf case:	Not Reported
Use:	Other		
Use year:	Not Reported		
Init head:	2.3	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	288		
Test date:	Not Reported	Test gpm:	Not Reported

Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	-14
Bot solid:	Not Reported	Bot perf:	Not Reported
Spec capac:	Not Reported		
Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-016:011
Aqui code:	30208		
Latest hd:	Not Reported	Wcr:	01-JAN-66
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000867

B3
NNW **FED USGS** **USGS40000269847**
1/4 - 1/2 Mile
Lower

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211947158050401		
Monloc name:	3-1905.04		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3265649
Longitude:	-158.0817	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	55.00
Vert measure units:	feet	Vertacc measure val:	4
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19800901	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	35
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

B4
North **HI WELLS** **HI9000000000872**
1/4 - 1/2 Mile
Lower

Wid:	3-1905-008	Island:	Oahu
Well name:	Kapolei Irr 1	Old name:	Not Reported
Yr drilled:	1991		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.081111		
Lat83dd:	21.327222		
Gps:	0	Utm:	-1
Owner user:	Board of Water Supply, BWS		
Land owner:	D.R. Horton - Schuler Homes LLC		
Pump insta:	Beylik Drilling & Pump Service Inc.		
Old number:	Not Reported	Well type:	PER
Casing dia:	12	Ground el:	65
Well depth:	84		
Solid case:	64	Perf case:	84
Use:	IRR - Landscape/Water Features		
Use year:	Not Reported		
Init head:	Not Reported	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	0		
Test date:	4/10/1991	Test gpm:	750
Test ddown:	6.4	Test chlor:	545
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	550		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	2007		
Draft yr:	Not Reported	Bot hole:	-19
Bot solid:	1	Bot perf:	-19
Spec capac:	117		
Pump mgd:	.792		
Draft mgd:	Not Reported	Pump elev:	-10
Pump depth:	75	Tmk:	(1) 9-1-160:037
Aqui code:	30208		
Latest hd:	Not Reported	Wcr:	01-JAN-91
Pir:	11/14/2007		
Surveyor:	Alden Kajioka		
T:	Not Reported	Site id:	HI9000000000872

B5
NNW
1/4 - 1/2 Mile
Lower

HI WELLS **HI9000000000874**

Wid:	3-1905-010	Island:	Oahu
Well name:	Kapolei Irr 2	Old name:	Not Reported
Yr drilled:	1993		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.081667		
Lat83dd:	21.327222		
Gps:	0	Utm:	-1
Owner user:	Board of Water Supply, BWS		
Land owner:	D.R. Horton - Schuler Homes LLC		

Pump insta:	Not Reported		
Old number:	Not Reported	Well type:	ROT
Casing dia:	14	Ground el:	65
Well depth:	94		
Solid case:	54	Perf case:	94
Use:	IRR - Landscape/Water Features		
Use year:	Not Reported		
Init head:	1.25	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	450		
Test date:	8/5/1993	Test gpm:	600
Test ddown:	9.7	Test chlor:	470
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	550		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	1994		
Draft yr:	Not Reported	Bot hole:	-29
Bot solid:	9	Bot perf:	-29
Spec capac:	62		
Pump mgd:	.792		
Draft mgd:	Not Reported	Pump elev:	-10
Pump depth:	75	Tmk:	(1) 9-1-160:037
Aqui code:	30208		
Latest hd:	Not Reported	Wcr:	20-AUG-93
Pir:	4/1/1994		
Surveyor:	Alden Kajioka		
T:	Not Reported	Site id:	HI9000000000874

C6
WNW
1/2 - 1 Mile
Lower

HI WELLS **HI9000000000870**

Wid:	3-1905-006	Island:	Oahu
Well name:	Caprock 1	Old name:	Not Reported
Yr drilled:	1990		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.088889		
Lat83dd:	21.323889		
Gps:	0	Utm:	-1
Owner user:	Board of Water Supply, BWS		
Land owner:	Board of Water Supply, BWS		
Pump insta:	Not Reported		
Old number:	Not Reported	Well type:	PER
Casing dia:	12	Ground el:	47
Well depth:	72		
Solid case:	44	Perf case:	72
Use:	ABN - Sealed		
Use year:	Not Reported		
Init head:	0.4	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	0		
Test date:	12/3/1990	Test gpm:	500

Test ddown:	5.3	Test chlor:	630
Test temp:	24.4	Test unit:	C
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	-25
Bot solid:	-3	Bot perf:	-25
Spec capac:	94		
Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-075:039
Aqui code:	30207		
Latest hd:	Not Reported	Wcr:	01-DEC-90
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000870

C7
WNW
1/2 - 1 Mile
Lower

FED USGS **USGS40000269827**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211937158053006		
Monloc name:	3-1905-06 EWA DESALT PLANT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3237869
Longitude:	-158.088922	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19901105	Welldepth:	72
Welldepth units:	ft	Wellholedepth:	73
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1990-11-05	46	

C8
WNW
1/2 - 1 Mile
Higher

HI WELLS **HI9000000000871**

Wid:	3-1905-007	Island:	Oahu
Well name:	Caprock 2	Old name:	Not Reported
Yr drilled:	1991		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.088889		
Lat83dd:	21.324167		
Gps:	0	Utm:	-1
Owner user:	Board of Water Supply, BWS		
Land owner:	Board of Water Supply, BWS		
Pump insta:	Not Reported		
Old number:	Not Reported	Well type:	PER
Casing dia:	12	Ground el:	49
Well depth:	78		
Solid case:	48	Perf case:	78
Use:	UNU - Unused		
Use year:	Not Reported		
Init head:	0.5	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	0		
Test date:	2/19/1991	Test gpm:	625
Test ddown:	1.1	Test chlor:	690
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	-29
Bot solid:	-1	Bot perf:	-29
Spec capac:	568		
Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-075:039
Aqui code:	30207		
Latest hd:	Not Reported	Wcr:	01-FEB-91
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000871

C9
WNW
1/2 - 1 Mile
Higher

FED USGS **USGS40000269829**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211938158053007		
Monloc name:	3-1905-07 EWA DESALT PLANT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3240646
Longitude:	-158.088922	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	49
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19910119	Welldepth:	78
Welldepth units:	ft	Wellholedepth:	78
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1991-01-19	48.5	

C10
WNW
1/2 - 1 Mile
Higher

HI WELLS **HI9000000000873**

Wid:	3-1905-009	Island:	Oahu
Well name:	Caprock 3	Old name:	Not Reported
Yr drilled:	1992		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.088889		
Lat83dd:	21.324722		
Gps:	0	Utm:	-1
Owner user:	Land Division Oahu, DLNR-LD		
Land owner:	Not Reported		
Pump insta:	Not Reported		
Old number:	Not Reported	Well type:	PER
Casing dia:	12	Ground el:	54
Well depth:	80		
Solid case:	60	Perf case:	80
Use:	UNU - Unused		
Use year:	Not Reported		
Init head:	2.25	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	0		
Test date:	10/5/1992	Test gpm:	600
Test ddown:	5.6	Test chlor:	900
Test temp:	24.5	Test unit:	C
Pump gpm:	780		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	1992		
Draft yr:	Not Reported	Bot hole:	-26
Bot solid:	-6	Bot perf:	-26
Spec capac:	107		

Pump mgd:	1.123		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	Not Reported
Aqui code:	30207		
Latest hd:	Not Reported	Wcr:	01-SEP-92
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000873

D11
WNW **HI WELLS** **HI9000000000868**
1/2 - 1 Mile
Higher

Wid:	3-1905-004	Island:	Oahu
Well name:	Ewa Desalt Basal	Old name:	Not Reported
Yr drilled:	1988		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.089417		
Lat83dd:	21.325861		
Gps:	0	Utm:	-1
Owner user:	Engineering Division, DLNR		
Land owner:	Board of Water Supply, BWS		
Pump insta:	Not Reported		
Old number:	Not Reported	Well type:	PER
Casing dia:	12	Ground el:	Not Reported
Well depth:	380		
Solid case:	275	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	Not Reported		
Init head:	Not Reported	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	0		
Test date:	1/19/1988	Test gpm:	500
Test ddown:	1	Test chlor:	510
Test temp:	23.3	Test unit:	C
Pump gpm:	780		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	TWB		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	Not Reported
Bot solid:	Not Reported	Bot perf:	Not Reported
Spec capac:	500		
Pump mgd:	1.123		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-075:053
Aqui code:	30204		
Latest hd:	Not Reported	Wcr:	01-FEB-88
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000868

Map ID Direction Distance Elevation		Database	EDR ID Number
D12 **WNW** **1/2 - 1 Mile** **Higher**		**HI WELLS**	**HI9000000000869**

Wid:	3-1905-005	Island:	Oahu
Well name:	Caprock 1	Old name:	Not Reported
Yr drilled:	1988		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.089556		
Lat83dd:	21.325917		
Gps:	0	Utm:	-1
Owner user:	Engineering Division, DLNR		
Land owner:	Board of Water Supply, BWS		
Pump insta:	Not Reported		
Old number:	Not Reported	Well type:	PER
Casing dia:	14	Ground el:	Not Reported
Well depth:	80		
Solid case:	52	Perf case:	80
Use:	UNU - Unused		
Use year:	Not Reported		
Init head:	Not Reported	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	0		
Test date:	2/17/1988	Test gpm:	100
Test ddown:	15.1	Test chlor:	970
Test temp:	24.4	Test unit:	C
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	Not Reported
Bot solid:	Not Reported	Bot perf:	Not Reported
Spec capac:	7		
Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-075:053
Aqui code:	30207		
Latest hd:	Not Reported	Wcr:	01-FEB-88
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000869

E13 **NE** **1/2 - 1 Mile** **Higher**		**HI WELLS**	**HI9000000000864**

Wid:	3-1904-002	Island:	Oahu
Well name:	Makakilo G C 1	Old name:	Not Reported
Yr drilled:	1991		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.071944		
Lat83dd:	21.328056		
Gps:	0	Utm:	-1
Owner user:	Puu Makakilo Inc.		
Land owner:	Not Reported		

Pump insta:	Not Reported		
Old number:	Not Reported	Well type:	PER
Casing dia:	12	Ground el:	Not Reported
Well depth:	77		
Solid case:	57	Perf case:	77
Use:	ABN - Sealed		
Use year:	Not Reported		
Init head:	Not Reported	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	0		
Test date:	11/22/1991	Test gpm:	450
Test ddown:	4.5	Test chlor:	860
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	Not Reported
Bot solid:	Not Reported	Bot perf:	Not Reported
Spec capac:	100		
Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-016:001
Aqui code:	30208		
Latest hd:	Not Reported	Wcr:	25-NOV-91
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000864

E14
NE
1/2 - 1 Mile
Higher

HI WELLS **HI9000000000865**

Wid:	3-1904-003	Island:	Oahu
Well name:	Makakilo G C 2	Old name:	Not Reported
Yr drilled:	1992		
Driller:	Roscoe Moss Hawaii Inc		
Quad map:	6		
Long83dd:	-158.071944		
Lat83dd:	21.328056		
Gps:	0	Utm:	-1
Owner user:	Puu Makakilo Inc.		
Land owner:	Not Reported		
Pump insta:	Not Reported		
Old number:	Not Reported	Well type:	PER
Casing dia:	12	Ground el:	Not Reported
Well depth:	70		
Solid case:	50	Perf case:	70
Use:	ABN - Sealed		
Use year:	Not Reported		
Init head:	Not Reported	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	0		
Test date:	1/7/1992	Test gpm:	425

Test ddown:	3.5	Test chlor:	910
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	Not Reported
Bot solid:	Not Reported	Bot perf:	Not Reported
Spec capac:	121		
Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-016:001
Aqui code:	30208		
Latest hd:	Not Reported	Wcr:	10-JAN-92
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000865

D15
WNW
1/2 - 1 Mile
Higher

FED USGS **USGS40000269841**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211945158053401		
Monloc name:	3-1905-04 EWA DESALT PLANT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3260087
Longitude:	-158.090033	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	60.
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	198712	Welldepth:	380
Welldepth units:	ft	Wellholedepth:	380
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

E16
NE
1/2 - 1 Mile
Higher

FED USGS **USGS40000269873**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211953158042801		
Monloc name:	3-1904-02 MAKAKILO		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3282319
Longitude:	-158.0717003	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	30.
Vert measure units:	feet	Vertacc measure val:	.5
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19891026	Welldepth:	80
Welldepth units:	ft	Wellholedepth:	80
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1989-10-26	50.	

F17
ENE
1/2 - 1 Mile
Lower

HI WELLS **HI9000000000863**

Wid:	3-1904-001	Island:	Oahu
Well name:	EP 31&32	Old name:	Kekona's Pit
Yr drilled:	1965		
Driller:	Royal Contracting		
Quad map:	6		
Long83dd:	-158.070068		
Lat83dd:	21.325618		
Gps:	0	Utm:	-1
Owner user:	D.R. Horton - Schuler Homes LLC		
Land owner:	D.R. Horton - Schuler Homes LLC		
Pump insta:	Not Reported		
Old number:	DW42-	Well type:	DUG
Casing dia:	Not Reported	Ground el:	5
Well depth:	8		
Solid case:	Not Reported	Perf case:	Not Reported
Use:	ABN - Sealed		
Use year:	Not Reported		
Init head:	2.2	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	405		
Test date:	Not Reported	Test gpm:	790

Test ddown:	2.1	Test chlor:	415
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	-3
Bot solid:	Not Reported	Bot perf:	Not Reported
Spec capac:	376		
Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-016:124
Aqui code:	30208		
Latest hd:	Not Reported	Wcr:	01-JAN-65
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000863

D18
WNW
1/2 - 1 Mile
Higher

FED USGS **USGS40000269842**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211945158053501		
Monloc name:	3-1905-05 EWA DESALT PLANT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3260087
Longitude:	-158.0903108	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	60.
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	198712	Welldepth:	79
Welldepth units:	ft	Wellholedepth:	79
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

F19
ENE
1/2 - 1 Mile
Lower

FED USGS **USGS40000269840**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211945158042201		
Monloc name:	3-1904-01 D 42 BRB P		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.32601
Longitude:	-158.0700338	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5.00
Vert measure units:	feet	Vertacc measure val:	2
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19650101	Welldepth:	8
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

G20
SW
1/2 - 1 Mile
Lower

HI WELLS **HI9000000000635**

Wid:	3-1805-001	Island:	Oahu
Well name:	Barbers Point	Old name:	Not Reported
Yr drilled:	1957		
Driller:	Samson/Smock		
Quad map:	6		
Long83dd:	-158.088056		
Lat83dd:	21.313333		
Gps:	0	Utm:	-1
Owner user:	ABP KOMOHANA LLC		
Land owner:	ABP KOMOHANA LLC		
Pump insta:	Not Reported		
Old number:	T81-	Well type:	Not Reported
Casing dia:	7	Ground el:	22
Well depth:	50		
Solid case:	2	Perf case:	Not Reported
Use:	UNU - Unused		
Use year:	Not Reported		
Init head:	1.1	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	932		
Test date:	Not Reported	Test gpm:	375
Test ddown:	1	Test chlor:	958
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	-28
Bot solid:	20	Bot perf:	Not Reported
Spec capac:	375		

Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	(1) 9-1-032:001
Aqui code:	30207		
Latest hd:	Not Reported	Wcr:	01-JAN-57
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000635

G21
SW **FED USGS** **USGS40000269750**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211859158052701		
Monloc name:	3-1805-01 T81 BAR PT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3132311
Longitude:	-158.0880889	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	22.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19571105	Welldepth:	50
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

G22
SW **HI WELLS** **HI9000000000650**
1/2 - 1 Mile
Lower

Wid:	3-1805-016	Island:	Oahu
Well name:	VIP Sanitation	Old name:	Not Reported
Yr drilled:	2006		
Driller:	Tracy Runnells (Tracy Runnells Well Service Inc.)		
Quad map:	6		
Long83dd:	-158.089194		
Lat83dd:	21.313667		
Gps:	-1	Utm:	0
Owner user:	Bert Ito (VIP Sanitation, Inc.)		
Land owner:	Department of Hawaiian Home Lands, Oahu (Main), DHHL		

Pump insta:	Tracy Runnells (Tracy Runnells Well Service Inc.)		
Old number:	Not Reported	Well type:	PER
Casing dia:	10	Ground el:	Not Reported
Well depth:	25		
Solid case:	18	Perf case:	25
Use:	IND - Industrial Other		
Use year:	Not Reported		
Init head:	Not Reported	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	194		
Test date:	Not Reported	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	15		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	QLS		
Pump yr:	2008		
Draft yr:	Not Reported	Bot hole:	Not Reported
Bot solid:	Not Reported	Bot perf:	Not Reported
Spec capac:	Not Reported		
Pump mgd:	.021		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	23	Tmk:	(1) 9-1-013:009
Aqui code:	30207		
Latest hd:	Not Reported	Wcr:	30-DEC-99
Pir:	5/30/2008		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000650

H23
WNW
1/2 - 1 Mile
Higher

FED USGS **USGS40000269839**

Org. Identifier:	USGS-HI		
Formal name:	USGS Hawaii Water Science Center		
Monloc Identifier:	USGS-211944158054501		
Monloc name:	3-1905-02 T84 BRB PT		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	20060000	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	21.3257307
Longitude:	-158.0930885	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	62.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	HILOCAL	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19571125	Welldepth:	90
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

H24
WNW
1/2 - 1 Mile
Higher

HI WELLS **HI9000000000866**

Wid:	3-1905-002	Island:	Oahu
Well name:	Campbell Ind Pk	Old name:	Not Reported
Yr drilled:	1957		
Driller:	Samson/Smock		
Quad map:	6		
Long83dd:	-158.093056		
Lat83dd:	21.325833		
Gps:	0	Utm:	-1
Owner user:	James Campbell Company LLC		
Land owner:	Not Reported		
Pump insta:	Not Reported		
Old number:	T84-	Well type:	Not Reported
Casing dia:	10	Ground el:	62
Well depth:	90		
Solid case:	3	Perf case:	Not Reported
Use:	Other		
Use year:	Not Reported		
Init head:	2.1	Init head2:	Not Reported
Init head3:	Not Reported		
Init cl:	795		
Test date:	Not Reported	Test gpm:	Not Reported
Test ddown:	Not Reported	Test chlor:	Not Reported
Test temp:	Not Reported	Test unit:	Not Reported
Pump gpm:	0		
Draft mgy:	Not Reported	Head feet:	Not Reported
Max chlor:	Not Reported	Min chlor:	Not Reported
Geology:	PLS		
Pump yr:	0		
Draft yr:	Not Reported	Bot hole:	-28
Bot solid:	59	Bot perf:	Not Reported
Spec capac:	Not Reported		
Pump mgd:	0		
Draft mgd:	Not Reported	Pump elev:	Not Reported
Pump depth:	Not Reported	Tmk:	Not Reported
Aqui code:	30207		
Latest hd:	Not Reported	Wcr:	01-JAN-57
Pir:	Not Reported		
Surveyor:	Not Reported		
T:	Not Reported	Site id:	HI9000000000866

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for HONOLULU County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 96707

Number of sites tested: 7

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.143 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory
Source: Office of Planning
Telephone: 808-587-2895

HYDROGEOLOGIC INFORMATION

AQUIFLOW[R] Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Well Index Database
Source: Commission on Water Resource Management
Telephone: 808-587-0214
CWRM maintains a Well Index Database to track specific information pertaining to the construction and installation of production wells in Hawaii

OTHER STATE DATABASE INFORMATION

RADON

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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DLA DISPOSITION SERVICES
BLDG. 140 MIDWAY STREET (KALAELOA)
KAPOLEI, HI 96707

Inquiry Number:
December 4, 2017

EDR Site Report™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Summary of facility filings including a review of the following areas: waste management, waste disposal, multi-media issues, and Superfund liability.

Section 2: Facility Detail Reports . . . . . Page 4

All available detailed information from databases where sites are identified.

Section 3: Databases and Update Information. . . . . Page 10

Name, source, update dates, contact phone number and description of each of the databases for this report.

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SECTION 1: FACILITY SUMMARY

FACILITY AREA	FACILITY 1 **DLA DISPOSITION SERVICES** BLDG. 140 MIDWAY STREET (KALAELOA) KAPOLEI, HI 96707 EDR ID #1001112113 EPA #HIR000000851
WASTE MANAGEMENT Facility generates hazardous waste (RCRA)	**YES - p4**
Facility treats, stores, or disposes of hazardous waste on-site (RCRA/TSDF)	NO
Facility has received Notices of Violations (RCRA/VIOL)	**YES - p8**
Facility has been subject to RCRA administrative actions (RAATS)	NO
Facility has been subject to corrective actions (CORRACTS)	NO
Facility handles PCBs (PADS)	NO
Facility uses radioactive materials (MLTS)	NO
Facility is a FUSRAP Site	NO
Facility is a UXO Site	NO
Facility is a FUELS Site	NO
Facility is an DockHWC/ECHO Site	NO
Facility manages registered aboveground storage tanks (AST)	NO
Facility manages registered underground storage tanks (UST)	NO
Facility has reported leaking underground storage tank incidents (LUST)	NO
Facility has reported emergency releases to the soil (ERNS)	NO
Facility has reported hazardous material incidents to DOT (HMIRS)	NO
WASTE DISPOSAL Facility is a Superfund Site (NPL)	NO
Facility has a known or suspect abandoned, inactive or uncontrolled hazardous waste site (SEMS)	**YES - p9 (ARCHIVE)**
Facility has a reported Superfund Lien on it (LIENS)	NO
Facility is listed as a state hazardous waste site (SHWS)	NO
Facility has disposed of solid waste on-site (SWF/LF)	NO
MULTIMEDIA Facility uses toxic chemicals and has notified EPA under SARA Title III, Section 313 (TRIS)	NO
Facility produces pesticides and has notified EPA under Section 7 of FIFRA (SSTS)	NO
Facility manufactures or imports toxic chemicals on the TSCA list (TSCA)	NO
Facility has inspections under FIFRA, TSCA or EPCRA (FTTS)	NO
Facility is listed in EPA's index system (FINDS)	NO
Facility is listed in other database records (OTHER)	NO
POTENTIAL SUPERFUND LIABILITY Facility has a list of potentially responsible parties PRP	NO
TOTAL (YES)	3

SECTION 2: FACILITY DETAIL REPORTS

WASTE MANAGEMENT

Facility generates hazardous waste

DATABASE: Resource Conservation and Recovery Information (RCRAInfo)

DLA DISPOSITION SERVICES
BLDG. 140 MIDWAY STREET (KALAELOA)
KAPOLEI, HI 96707
EDR ID #1001112113

RCRA NonGen / NLR:

Date form received by agency:	02/08/2016
Facility name:	DRMO KALAELOA
Facility address:	MIDWAY STREET KAPOLEI, HI 96707
EPA ID:	HIR000000851
Mailing address:	1025 QUINCY AVE SUITE 2000 JOINT BASE PEARL HARBOR H, HI 96860
Contact:	KIRK BUCKNER
Contact address:	1025 QUINCY AVE SUITE 2000 JOINT BASE PEARL HARBOR H, HI 96860
Contact country:	US
Contact telephone:	808-473-9535
Contact email:	KIRK.BUCKNER@DLA.MIL
EPA Region:	09
Land type:	Federal
Classification:	Non-Generator
Description:	Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name:	DRMO KALAELOA
Owner/operator address:	P.O. BOX 75298 KAPOLEI, HI 96707
Owner/operator country:	US
Owner/operator telephone:	Not reported
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Federal
Owner/Operator Type:	Operator
Owner/Op start date:	07/02/1999
Owner/Op end date:	Not reported
Owner/operator name:	NAVY REGION HAWAII
Owner/operator address:	400 MARSHALL ROAD PEARL HARBOR, HI 96860
Owner/operator country:	US
Owner/operator telephone:	Not reported
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Federal
Owner/Operator Type:	Owner
Owner/Op start date:	07/02/1999
Owner/Op end date:	Not reported
Owner/operator name:	NAVY REGION HAWAII
Owner/operator address:	COMMANDER NAVY REGION HAWAII 850 TICONDEROGA STREET, SUITE PEARL HARBOR (ENV. DEPT), HI 96860
Owner/operator country:	US
Owner/operator telephone:	808-471-1171
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Federal
Owner/Operator Type:	Owner
Owner/Op start date:	07/02/1999
Owner/Op end date:	Not reported
Owner/operator name:	DRMO KALAELOA
Owner/operator address:	Not reported Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Federal
Owner/Operator Type:	Operator

Owner/Op start date: 07/02/1999
Owner/Op end date: Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency: 03/29/2010
Site name: DRMO KALAELOA
Classification: Large Quantity Generator

. Waste code: D005
. Waste name: BARIUM

. Waste code: D008
. Waste name: LEAD

Date form received by agency: 12/18/2007
Site name: US NAVY DRMO HAWAII KALAELOA
Classification: Large Quantity Generator

. Waste code: D005
. Waste name: BARIUM

Date form received by agency: 02/22/2002
Site name: USNAVY DRMO HAWAII KALAELOA
Classification: Large Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D003
. Waste name: REACTIVE WASTE

. Waste code: D005
. Waste name: BARIUM

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: D018
. Waste name: BENZENE

. Waste code: D021
. Waste name: CHLOROBENZENE

. Waste code: D023
. Waste name: O-CRESOL

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: D039
. Waste name: TETRACHLOROETHYLENE

. Waste code: D040
. Waste name: TRICHLORETHYLENE

. Waste code: U151
. Waste name: MERCURY

Date form received by agency: 05/15/1996
Site name: USNAVY DRMO HAWAII
Classification: Large Quantity Generator

Facility Has Received Notices of Violations:

Regulation violated: FR - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 12/27/1996
Date achieved compliance: 01/24/1997
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 12/27/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.20-23.B
Area of violation: Generators - General
Date violation determined: 12/27/1996
Date achieved compliance: 01/24/1997
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 12/27/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268.7
Area of violation: LDR - General
Date violation determined: 12/27/1996
Date achieved compliance: 01/24/1997
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: 12/27/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:

Evaluation date: 09/16/2015
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 12/15/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/06/2003
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 10/05/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/24/1997
Evaluation: NOT A SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 12/27/1996
Evaluation: SIGNIFICANT NON-COMPLIER
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date:	10/24/1996
Evaluation:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation:	LDR - General
Date achieved compliance:	01/24/1997
Evaluation lead agency:	EPA

Evaluation date:	10/24/1996
Evaluation:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation:	Generators - General
Date achieved compliance:	01/24/1997
Evaluation lead agency:	EPA

WASTE MANAGEMENT

Facility Has Received Notices of Violations

DATABASE: Resource Conservation and Recovery Information (RCRAInfo)

DLA DISPOSITION SERVICES
BLDG. 140 MIDWAY STREET (KALAELOA)
KAPOLEI, HI 96707
EDR ID #1001112113

Regulation Violated:	FR - 262.30-34.C
Area of Violation:	Generators - General
Date Violation Determined:	12/27/1996
Actual Date Achieved Compliance:	01/24/1997
Enforcement Action:	Not reported
Enforcement Action Date:	12/27/1996

Regulation Violated:	FR - 262.20-23.B
Area of Violation:	Generators - General
Date Violation Determined:	12/27/1996
Actual Date Achieved Compliance:	01/24/1997
Enforcement Action:	Not reported
Enforcement Action Date:	12/27/1996

Regulation Violated:	FR - 268.7
Area of Violation:	LDR - General
Date Violation Determined:	12/27/1996
Actual Date Achieved Compliance:	01/24/1997
Enforcement Action:	Not reported
Enforcement Action Date:	12/27/1996

WASTE DISPOSAL

DATABASE: Superfund Enterprise Management System Archive (SEMS-ARCHIVE)

DLA DISPOSITION SERVICES
BLDG. 140 MIDWAY STREET (KALAELOA)
KAPOLEI, HI 96707
EDR ID #1001112113

SEMS-ARCHIVE:

Site ID:	900294
EPA ID:	HIR000000851
Federal Facility:	Y
NPL:	Not on the NPL
Non NPL Status:	NFRAP-Site does not qualify for the NPL based on existing information

SECTION 3: DATABASES AND UPDATE DATES

To maintain currency of the following federal, state and local databases, EDR contacts the appropriate government agency on a monthly or quarterly basis as required.

Elapsed ASTM days: Provides confirmation that this report meets or exceeds the 90-day updating requirement of the ASTM standard.

DATABASES FOUND IN THIS REPORT

SEMS-ARCHIVE: Superfund Enterprise Management System Archive
Source: EPA
Telephone: 800-424-9346
SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 07/11/2017
Database Release Frequency: Quarterly
Date of Last EDR Contact: 11/03/2017
Date of Next Scheduled Update: 01/29/2018

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated
Source: Environmental Protection Agency
Telephone: 703-308-8895
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 09/13/2017
Database Release Frequency: Quarterly
Date of Last EDR Contact: 09/26/2017
Date of Next Scheduled Update: 01/08/2018

BARBER'S POINT ELEMENTARY SCHOOL
3001 BOXER ROAD
KAPOLEI, HI 96707

Inquiry Number:
December 4, 2017

EDR Site Report™

6 Armstrong Road, 4th floor
Shelton, CT 06484
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All available detailed information from databases where sites are identified.

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SECTION 1: FACILITY SUMMARY

FACILITY AREA	FACILITY 1 **BARBER'S POINT ELEMENTARY SCHOOL** 3001 BOXER ROAD KAPOLEI, HI 96707 EDR ID #1009737248 EPA #110026427356
WASTE MANAGEMENT Facility generates hazardous waste (RCRA)	NO
Facility treats, stores, or disposes of hazardous waste on-site (RCRA/TSDF)	NO
Facility has received Notices of Violations (RCRA/VIOL)	NO
Facility has been subject to RCRA administrative actions (RAATS)	NO
Facility has been subject to corrective actions (CORRACTS)	NO
Facility handles PCBs (PADS)	NO
Facility uses radioactive materials (MLTS)	NO
Facility is a FUSRAP Site	NO
Facility is a UXO Site	NO
Facility is a FUELS Site	NO
Facility is an DockHWC/ECHO Site	NO
Facility manages registered aboveground storage tanks (AST)	NO
Facility manages registered underground storage tanks (UST)	NO
Facility has reported leaking underground storage tank incidents (LUST)	NO
Facility has reported emergency releases to the soil (ERNS)	NO
Facility has reported hazardous material incidents to DOT (HMIRS)	NO
WASTE DISPOSAL Facility is a Superfund Site (NPL)	NO
Facility has a known or suspect abandoned, inactive or uncontrolled hazardous waste site (SEMS)	NO
Facility has a reported Superfund Lien on it (LIENS)	NO
Facility is listed as a state hazardous waste site (SHWS)	NO
Facility has disposed of solid waste on-site (SWF/LF)	NO
MULTIMEDIA Facility uses toxic chemicals and has notified EPA under SARA Title III, Section 313 (TRIS)	NO
Facility produces pesticides and has notified EPA under Section 7 of FIFRA (SSTS)	NO
Facility manufactures or imports toxic chemicals on the TSCA list (TSCA)	NO
Facility has inspections under FIFRA, TSCA or EPCRA (FTTS)	NO
Facility is listed in EPA's index system (FINDS)	**YES - p4**
Facility is listed in other database records (OTHER)	NO
POTENTIAL SUPERFUND LIABILITY Facility has a list of potentially responsible parties PRP	NO
TOTAL (YES)	1

SECTION 2: FACILITY DETAIL REPORTS

MULTIMEDIA

Facility is listed in EPA's index system

DATABASE: Facility Index System (FINDS)

BARBER'S POINT ELEMENTARY SCHOOL
3001 BOXER ROAD
KAPOLEI, HI 96707
EDR ID #1009737248

This site is listed in the Federal FINDS database. The FINDS database may contain references to records from government databases included elsewhere in the report.
Please note: the FINDS database may also contain references to out of date records formerly associated with the site.

Registry ID:	110026427356
Facility Name:	BARBER'S POINT ELEMENTARY SCHOOL
Facility Address:	3001 BOXER ROAD KAPOLEI, HI 96707
Facility URL:	http://ofmpub.epa.gov/enviro/fii_query_detail.disp_program_facility?p_registry_id=110026427356
FIPS:	Not reported
Fed Facility:	Not reported
Tribal Land:	Not reported
Tribal Name:	Not reported
Congressional District:	02
Hydrologic Unit Code:	20060000
EPA Region:	09
Site Type:	STATIONARY
Date Created:	23-OCT-2006 22:22:28
Date Updated:	03-MAY-2015 09:49:10
U.S-Mexico Border:	Not reported
Latitude:	21.32128
Longitude:	-158.08305
Horizontal Collection:	ADDRESS MATCHING-HOUSE NUMBER
Horizontal Accuracy:	50
Reference Point:	ENTRANCE POINT OF A FACILITY OR STATION
Horizontal Datum:	NAD83
Coordinates Source:	Not reported

Environmental Interest/Information System

ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

Program System ID:	600033710
Program Sys. Name:	ICIS
Env. Interest Type:	ENFORCEMENT/COMPLIANCE ACTIVITY
Env. Interest Start Dt.:	05-SEP-2007 00:00:00
Start Date Qualifier:	ACTUAL ACTIVITY DATE
Env. Interest End Dt.:	Not reported
End Date Qualifier:	Not reported
Data Source:	ICIS
Active Code:	Not reported

Alternative Name:	BARBER'S POINT ELEMENTARY SCHOOL

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DATABASES FOUND IN THIS REPORT

FINDS: Facility Index System/Facility Registry System
Source: EPA
Telephone: Not reported
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/23/2017
Database Release Frequency: Quarterly
Date of Last EDR Contact: 09/06/2017
Date of Next Scheduled Update: 12/18/2017

PUMP 15 STATION, FORMER OAHU SUG
OLD FARRINGTON HWY
KAPOLEI, HI 96707

Inquiry Number:
December 4, 2017

EDR Site Report™

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Shelton, CT 06484
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SECTION 1: FACILITY SUMMARY

FACILITY AREA	FACILITY 1 **PUMP 15 STATION, FORMER OAHU SUGAR COMPAI** OLD FARRINGTON HWY KAPOLEI, HI 96707 EDR ID #S106820144
WASTE MANAGEMENT Facility generates hazardous waste (RCRA)	NO
Facility treats, stores, or disposes of hazardous waste on-site (RCRA/TSDF)	NO
Facility has received Notices of Violations (RCRA/VIOL)	NO
Facility has been subject to RCRA administrative actions (RAATS)	NO
Facility has been subject to corrective actions (CORRACTS)	NO
Facility handles PCBs (PADS)	NO
Facility uses radioactive materials (MLTS)	NO
Facility is a FUSRAP Site	NO
Facility is a UXO Site	NO
Facility is a FUELS Site	NO
Facility is an DockHWC/ECHO Site	NO
Facility manages registered aboveground storage tanks (AST)	NO
Facility manages registered underground storage tanks (UST)	NO
Facility has reported leaking underground storage tank incidents (LUST)	NO
Facility has reported emergency releases to the soil (ERNS)	NO
Facility has reported hazardous material incidents to DOT (HMIRS)	NO
WASTE DISPOSAL Facility is a Superfund Site (NPL)	NO
Facility has a known or suspect abandoned, inactive or uncontrolled hazardous waste site (SEMS)	NO
Facility has a reported Superfund Lien on it (LIENS)	NO
Facility is listed as a state hazardous waste site (SHWS)	**YES - p4**
Facility has disposed of solid waste on-site (SWF/LF)	NO
MULTIMEDIA Facility uses toxic chemicals and has notified EPA under SARA Title III, Section 313 (TRIS)	NO
Facility produces pesticides and has notified EPA under Section 7 of FIFRA (SSTS)	NO
Facility manufactures or imports toxic chemicals on the TSCA list (TSCA)	NO
Facility has inspections under FIFRA, TSCA or EPCRA (FTTS)	NO
Facility is listed in EPA's index system (FINDS)	NO
Facility is listed in other database records (OTHER)	NO
POTENTIAL SUPERFUND LIABILITY Facility has a list of potentially responsible parties PRP	NO
TOTAL (YES)	1

SECTION 2: FACILITY DETAIL REPORTS

WASTE DISPOSAL

Facility is listed as a state hazardous waste site

DATABASE: State Hazardous Waste Sites (SHWS)

PUMP 15 STATION, FORMER OAHU SUGAR COMPANY
OLD FARRINGTON HWY
KAPOLEI, HI 96707
EDR ID #S106820144

SHWS:

Organization:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Pump 15 Station, Former Oahu Sugar Company
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	Not reported
Program:	State
Project Manager:	Unassigned
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Pump 15 Station, Former Oahu Sugar Company
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	Not reported
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action - Type Undetermined
Document Date:	02/22/2001
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Unassigned
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

SECTION 3: DATABASES AND UPDATE DATES

To maintain currency of the following federal, state and local databases, EDR contacts the appropriate government agency on a monthly or quarterly basis as required.

Elapsed ASTM days: Provides confirmation that this report meets or exceeds the 90-day updating requirement of the ASTM standard.

DATABASES FOUND IN THIS REPORT

HI HWS: Sites List
Source: Department of Health
Telephone: 808-586-4249
Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 03/16/2017
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 11/22/2017
Date of Next Scheduled Update: 03/05/2018

BARBERS POINT NAS STATION P
MISSION ST
BARBERS POINT NAS, HI 96707

Inquiry Number:
December 4, 2017

EDR Site Report™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

The EDR-Site Report™ is a comprehensive presentation of government filings on a facility identified in a search of federal, state and local environmental databases. The report is divided into three sections:

Section 1: Facility Summary . . . . . Page 3

Summary of facility filings including a review of the following areas: waste management, waste disposal, multi-media issues, and Superfund liability.

Section 2: Facility Detail Reports . . . . . Page 4

All available detailed information from databases where sites are identified.

Section 3: Databases and Update Information. . . . . Page 5

Name, source, update dates, contact phone number and description of each of the databases for this report.

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with any questions or comments.

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SECTION 1: FACILITY SUMMARY

FACILITY AREA	FACILITY 1 **BARBERS POINT NAS STATION P** MISSION ST BARBERS POINT NAS, HI 96707 EDR ID #S111704672
WASTE MANAGEMENT Facility generates hazardous waste (RCRA)	NO
Facility treats, stores, or disposes of hazardous waste on-site (RCRA/TSDF)	NO
Facility has received Notices of Violations (RCRA/VIOL)	NO
Facility has been subject to RCRA administrative actions (RAATS)	NO
Facility has been subject to corrective actions (CORRACTS)	NO
Facility handles PCBs (PADS)	NO
Facility uses radioactive materials (MLTS)	NO
Facility is a FUSRAP Site	NO
Facility is a UXO Site	NO
Facility is a FUELS Site	NO
Facility is an DockHWC/ECHO Site	NO
Facility manages registered aboveground storage tanks (AST)	NO
Facility manages registered underground storage tanks (UST)	NO
Facility has reported leaking underground storage tank incidents (LUST)	NO
Facility has reported emergency releases to the soil (ERNS)	NO
Facility has reported hazardous material incidents to DOT (HMIRS)	NO
WASTE DISPOSAL Facility is a Superfund Site (NPL)	NO
Facility has a known or suspect abandoned, inactive or uncontrolled hazardous waste site (SEMS)	NO
Facility has a reported Superfund Lien on it (LIENS)	NO
Facility is listed as a state hazardous waste site (SHWS)	**YES - p4**
Facility has disposed of solid waste on-site (SWF/LF)	NO
MULTIMEDIA Facility uses toxic chemicals and has notified EPA under SARA Title III, Section 313 (TRIS)	NO
Facility produces pesticides and has notified EPA under Section 7 of FIFRA (SSTS)	NO
Facility manufactures or imports toxic chemicals on the TSCA list (TSCA)	NO
Facility has inspections under FIFRA, TSCA or EPCRA (FTTS)	NO
Facility is listed in EPA's index system (FINDS)	NO
Facility is listed in other database records (OTHER)	NO
POTENTIAL SUPERFUND LIABILITY Facility has a list of potentially responsible parties PRP	NO
TOTAL (YES)	1

SECTION 2: FACILITY DETAIL REPORTS

WASTE DISPOSAL

Facility is listed as a state hazardous waste site

DATABASE: State Hazardous Waste Sites (SHWS)

BARBERS POINT NAS STATION P
MISSION ST
BARBERS POINT NAS, HI 96707
EDR ID #S111704672

SHWS:

Organization:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Barbers Point NAS Station P
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Program:	Installation Restoration Program
Project Manager:	Eric Sadoyama
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Barbers Point NAS Station P
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: PCB in soil
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	11/19/2014
Document Number:	2014-577-ES
Document Subject:	No Further Action Determination for Barbers Point NAS Station P based on review of Final Removal Verification Report, Removal Action at Station P (Oct 2014)
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

SECTION 3: DATABASES AND UPDATE DATES

To maintain currency of the following federal, state and local databases, EDR contacts the appropriate government agency on a monthly or quarterly basis as required.

Elapsed ASTM days: Provides confirmation that this report meets or exceeds the 90-day updating requirement of the ASTM standard.

DATABASES FOUND IN THIS REPORT

HI HWS: Sites List
Source: Department of Health
Telephone: 808-586-4249
Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 03/16/2017
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 11/22/2017
Date of Next Scheduled Update: 03/05/2018

HAWAII ARMY NATIONAL GUARD AT KA
MIDWAY STREET
KAPOLEI, HI

Inquiry Number:
December 4, 2017

EDR Site Report™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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All available detailed information from databases where sites are identified.

Section 3: Databases and Update Information. . . . . Page 6

Name, source, update dates, contact phone number and description of each of the databases for this report.

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SECTION 1: FACILITY SUMMARY

FACILITY AREA	FACILITY 1 **HAWAII ARMY NATIONAL GUARD AT KALAELOA AII** MIDWAY STREET KAPOLEI, HI EDR ID #S118422808
WASTE MANAGEMENT Facility generates hazardous waste (RCRA)	NO
Facility treats, stores, or disposes of hazardous waste on-site (RCRA/TSDF)	NO
Facility has received Notices of Violations (RCRA/VIOL)	NO
Facility has been subject to RCRA administrative actions (RAATS)	NO
Facility has been subject to corrective actions (CORRACTS)	NO
Facility handles PCBs (PADS)	NO
Facility uses radioactive materials (MLTS)	NO
Facility is a FUSRAP Site	NO
Facility is a UXO Site	NO
Facility is a FUELS Site	NO
Facility is an DockHWC/ECHO Site	NO
Facility manages registered aboveground storage tanks (AST)	NO
Facility manages registered underground storage tanks (UST)	NO
Facility has reported leaking underground storage tank incidents (LUST)	NO
Facility has reported emergency releases to the soil (ERNS)	NO
Facility has reported hazardous material incidents to DOT (HMIRS)	NO
WASTE DISPOSAL Facility is a Superfund Site (NPL)	NO
Facility has a known or suspect abandoned, inactive or uncontrolled hazardous waste site (SEMS)	NO
Facility has a reported Superfund Lien on it (LIENS)	NO
Facility is listed as a state hazardous waste site (SHWS)	**YES - p4**
Facility has disposed of solid waste on-site (SWF/LF)	NO
MULTIMEDIA Facility uses toxic chemicals and has notified EPA under SARA Title III, Section 313 (TRIS)	NO
Facility produces pesticides and has notified EPA under Section 7 of FIFRA (SSTS)	NO
Facility manufactures or imports toxic chemicals on the TSCA list (TSCA)	NO
Facility has inspections under FIFRA, TSCA or EPCRA (FTTS)	NO
Facility is listed in EPA's index system (FINDS)	NO
Facility is listed in other database records (OTHER)	**YES - p5**
POTENTIAL SUPERFUND LIABILITY Facility has a list of potentially responsible parties PRP	NO
TOTAL (YES)	2

SECTION 2: FACILITY DETAIL REPORTS

WASTE DISPOSAL

Facility is listed as a state hazardous waste site

DATABASE: State Hazardous Waste Sites (SHWS)

HAWAII ARMY NATIONAL GUARD AT KALAELOA AIRPORT ABANDON PIPEL
MIDWAY STREET
KAPOLEI, HI
EDR ID #S118422808

SHWS:

Organization:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Hawaii Army National Guard at Kalaeloa Airport abandon pipeline incident
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Program:	State
Project Manager:	Jordan Nakayama
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Hawaii Army National Guard at Kalaeloa Airport abandon pipeline incident
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: petroleum in soil from historic pieline
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	08/26/2015
Document Number:	2015-513-JQN
Document Subject:	No Further Action determination for the above mentioned Site based on review of: Release Investigation Follow Up Reporting on Hawaii Army National Guard (HIARNG) Sewer Replacement Project, Kalaeloa, Oahu
Project Manager:	Jordan Nakayama
Contact Information:	(808) 586-4249 919 Ala Moana Blvd, Honolulu, HI 96814

MULTIMEDIA

Facility is listed in other database records

DATABASE: Other Database Records (OTHER)

HAWAII ARMY NATIONAL GUARD AT KALAELOA AIRPORT ABANDON PIPEL
MIDWAY STREET
KAPOLEI, HI
EDR ID #S118422808

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SECTION 3: DATABASES AND UPDATE DATES

To maintain currency of the following federal, state and local databases, EDR contacts the appropriate government agency on a monthly or quarterly basis as required.

Elapsed ASTM days: Provides confirmation that this report meets or exceeds the 90-day updating requirement of the ASTM standard.

DATABASES FOUND IN THIS REPORT

HI HWS: Sites List
Source: Department of Health
Telephone: 808-586-4249
Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 03/16/2017
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 11/22/2017
Date of Next Scheduled Update: 03/05/2018

HI INST CONTROL: Sites with Institutional Controls
Source: Department of Health
Telephone: 808-586-4249
Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 03/16/2017
Database Release Frequency: Varies
Date of Last EDR Contact: 11/22/2017
Date of Next Scheduled Update: 03/05/2018

EDR Environmental Lien and AUL Search

PARCELS 1, 2, AND 3
FRANKLIN D ROOSEVELT AVE
KAPOLEI, HI 96707

Inquiry Number: 5070053.7S
OCTOBER 17, 2017

EDR Environmental Lien and AUL Search

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Environmental Lien and AUL Search

The EDR Environmental Lien Search Report provides results from a search of available current land title records for environmental cleanup liens and other activity and use limitations, such as engineering controls and institutional controls.

A network of professional, trained researchers, following established procedures, uses client supplied address information to:

- search for parcel information and/or legal description;
- search for ownership information;
- research official land title documents recorded at jurisdictional agencies such as recorders' offices, registries of deeds, county clerks' offices, etc.;
- access a copy of the deed;
- search for environmental encumbering instrument(s) associated with the deed;
- provide a copy of any environmental encumbrance(s) based upon a review of key words in the instrument(s) (title, parties involved, and description); and
- provide a copy of the deed or cite documents reviewed.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EDR Environmental Lien and AUL Search

TARGET PROPERTY INFORMATION

ADDRESS

PARCELS 1, 2, AND 3
FRANKLIN D ROOSEVELT AVE
KAPOLEI, HI 96707

RESEARCH SOURCE

Source 1: HONOLULU COUNTY RECORDER OF DEEDS

Source 2: HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES

Source 3: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PROPERTY INFORMATION

Deed 1

Type of Deed:	QUITCLAIM DEED
Title is vested in:	KALAELOA VENTURES LLC
Title received from:	HUNT COMMUNITIES HAWAII LLC
Date Executed:	02/02/2017
Date Recorded:	02/07/2017
Book:	NA
Page:	NA
Volume:	NA
Instrument#:	NA
Docket:	NA
Land Record Comments:	NA
Miscellaneous Comments:	NA

Legal Description: LOT 13049

Current Owner: KALAELOA VENTURES LLC

Property Identifiers: 1-9-1-013-004-0000

Comments: NA

ENVIRONMENTAL LIEN

Environmental Lien: Found ☐ Not Found ☒

If Found:

1st Party:	NA
2nd Party:	NA
Dated:	NA
Recorded:	NA
Book:	NA
Page:	NA
Docket:	NA

Volume: NA
Instrument #: NA
Comments:
Miscellaneous:

OTHER ACTIVITY AND USE LIMITATIONS (AULS)

Other AUL's: Found ☐ Not Found ☒

If Found:

1st Party: NA
2nd Party: NA
Dated: NA
Recorded: NA
Book: NA
Page: NA
Docket: NA
Volume: NA
Instrument #: NA
Comments:
Miscellaneous:

1st Party: NA
2nd Party: NA
Dated:
Recorded: NA
Book: NA
Page: NA
Docket: NA
Volume: NA
Instrument #: NA
Comments:
Miscellaneous:

EDR Environmental Lien and AUL Search

MISCELLANEOUS

Type of Instrument: NONE IDENTIFIED
1st Party:
2nd Party:
Date Recorded:
Instrument #:
Book:
Page:
Comments:

DEED EXHIBIT

.26AL
C

STATE OF HAWAII
OFFICE OF ASSISTANT REGISTRAR
RECORDED
February 07, 2017 3:29 PM
Doc No(s) T-9899274
on Cert(s) 529664
Issuance of Cert(s)

/s/ LESLIE T. KOBATA
ASSISTANT REGISTRAR

1 2/2 ZMA Conveyance Tax: $1.00
B-32944837

LAND COURT | REGULAR SYSTEM

AFTER RECORDATION, RETURN BY: Mail (X) Pickup ( )
Kalaeloa Ventures, LLC
737 Bishop Street, Suite 2750
Honolulu, HI 96813
Attn.: Steve Colón

This document contains 7 pages

L

QUITCLAIM RECONVEYANCE OF INTERESTS

THIS Quitclaim Reconveyance of Interests is made this 2nd day of February, 2017, by HUNT COMMUNITIES HAWAII, LLC, a Hawaii limited liability company, whose address is 737 Bishop Street, Suite 2750, Honolulu, Hawaii 96813 ("**Grantor**"), in favor of KALAELOA VENTURES LLC, a Delaware limited liability company, whose address is 737 Bishop Street, Suite 2750, Honolulu, Hawaii 96813 ("**Grantee**").

LOGS

W I T N E S S E T H:

By that certain Limited Warranty Deed dated November 2, 2016, filed in the Office of the Assistant Registrar of the Land Court of Hawaii as Document No. T-9807136 and noted on Transfer Certificate of Title No. 529664 ("Deed"), Grantee conveyed to Grantor its leasehold interest in that certain real property described in Exhibit A to the Deed and also as described in Exhibit "A" attached hereto and expressly made a part hereof (the "Property").

The Property is a portion of property subject to that certain Real Estate Ground Lease dated October 6, 2008, as amended, a Memorandum of which is recorded as Land Court Document No. 3841817.

Grantor, for and in consideration of the sum of TEN AND NO/100 DOLLARS ($10.00) and other good and valuable consideration paid by Grantee to Grantor, hereby remises, quitclaims, and reconveys all of its interests in the Property unto Grantee;

And the reversions, remainders, rents, issues, and profits thereof and all of the estate, right, title, and interest of Grantor, both at law and in equity, therein and thereto;

The terms "**Grantor**" and "**Grantee**", as used herein, or any pronouns used in place thereof, mean the masculine or feminine, the singular or plural number, individuals, associations, trustees, partnerships, limited liability companies, or corporations, and each of their respective successors in interest, heirs, personal representatives, and permitted assigns, according to the context thereof.

This Quitclaim Reconveyance of Interests may be executed in counterparts, each of which shall be deemed an original, and said counterparts shall together constitute one and the same agreement, binding all of the parties hereto notwithstanding all of the parties are not signatories to the original or same counterparts. For all purposes, including, without limitation, recordation, filing and delivery of this instrument, duplicate unexecuted pages of the counterparts may be discarded and the remaining pages assembled as one document.

[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, Grantor and Grantee have executed this instrument effective as of the day and year first above written.

HUNT COMMUNITIES HAWAII LLC,
a Hawaii limited liability company,

By: Hunt Communities Development Co., LLC,
a Texas limited liability company, Member

By: Hunt Communities Group, Inc.,
a Texas corporation, Member

By: _____
Name: JUSTIN CHAPMAN
Title: President

"Grantor"

KALAELOA VENTURES LLC,
a Delaware limited liability company,

By: Hawaii Renaissance Builders, LLC,
Its Sole Member

By: _____
Steven W. Colón
Its: Senior Vice President

"Grantee"

IN WITNESS WHEREOF, Grantor and Grantee have executed this instrument effective as of the day and year first above written.

HUNT COMMUNITIES HAWAII LLC,
a Hawaii limited liability company,

By: Hunt Communities Development Co., LLC,
a Texas limited liability company, Member

By: Hunt Communities Group, Inc.,
a Texas corporation, Member

By:_____
Name:_____
Title:_____

"Grantor"

KALAELOA VENTURES LLC,
a Delaware limited liability company,

By: Hawaii Renaissance Builders, LLC,
Its Sole Member

By:_____
Steven W. Colón
Its: Senior Vice President

"Grantee"

STATE OF TEXAS)
)
COUNTY OF EL PASO)

This instrument was acknowledged before me on February 2nd, 2017, by Justin Chapman, President of Hunt Communities Group, Inc., a Texas corporation, Member of Hunt Communities Development Co., LLC, A Texas limited liability company, Member of Hunt Communities Hawaii, LLC, a Hawaii limited liability company, on behalf of said limited liability company.

NELDA RODRIGUEZ
NOTARY PUBLIC
In and for the State of Texas
My commission expires
December 16, 2020

Nelda Rodriguez
Notary Public

STATE OF HAWAII)
) SS.
CITY AND COUNTY OF HONOLULU)

On this 2nd day of February, 2017, before me appeared STEVEN W. COLÓN, as Senior Vice President of Hawaii Renaissance Builders, LLC, a Delaware limited liability company, as sole Member of Kalaeloa Ventures, LLC, to me personally known, who being by me duly sworn or affirmed, did say that such person executed the foregoing instrument as the free act and deed of such person, and if applicable in the capacities shown, having been duly authorized to executed such instrument in such capacities.

L.S.

Emily Davids
Print name: Emily Davids
Notary Public, State of Hawaii
My commission expires: 11/15/19

Date of Doc:	undated	# Pages:	7
Name of Notary:	Emily Davids	Notes:	
Doc. Description:	Quitclaim Reconveyance of Interests		
		(stamp or seal)	
Emily Davids	2/2/17		L.S.
Notary Signature	Date		
First Circuit, State of Hawaii			
NOTARY CERTIFICATION			

EXHIBIT A

Leasehold interest, a Memorandum of which is recorded as Document No. 3841817, in and to that certain real property described as follows:

Parcel 1; Land Ct Lot 13047: Lot 13047, consisting of an area of 49.679 acres, more or less, shown on Map 957, as set forth in Land Court Order No. 134783, filed in the Office of the Assistant Registrar of the Land Court of the State of Hawaii with Land Court Application 1069, covered by Transfer Certificate of Title No. 529,664, issued to the United States of America.

Parcel 2; TMK (1) 9-1-013-004; Land Ct Lot 13049: Lot 13049, consisting of an area of 30.941 acres, more or less, shown on Map 957, as set forth in Land Court Order No. 134783, filed in the Office of the Assistant Registrar of the Land Court of the State of Hawaii with Land Court Application 1069, covered by Transfer Certificate of Title No. 529,664, issued to the United States of America.

Parcel 3; TMK (1) 9-1-013-0128; Land Ct Lot 13051-A-1;
TMK (1) 9-1-013-0130; Land Ct Lot 13051-A-3: Lot 13051-A-1, consisting of an area of 20.597 acres, more or less, and Lot 13051-A-3, consisting of an area of .053 acre, more or less, shown on Map 1609, as set forth in Order of Subdivision, dated April 28, 2014, filed in said Office as Document No. T-8932121 and noted on Transfer Certificate of Title No. 529,664.

SUBJECT HOWEVER TO all encumbrances of record.

END OF EXHIBIT A

The EDR Aerial Photo Decade Package

Parcels 1, 2, and 3

Franklin D Roosevelt Ave

Kapolei, HI 96707

Inquiry Number: 5070053.12

October 06, 2017

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

10/06/17

Site Name:

Parcels 1, 2, and 3
Franklin D Roosevelt Ave
Kapolei, HI 96707
EDR Inquiry # 5070053.12

Client Name:

Element Environmental , LLC
98-030 Hekaha Street
Aiea, HI 96701-0000
Contact: Angie Peltier

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2008	1"=625'	Flight Date: April 08, 2008	USGS
2001	1"=625'	Acquisition Date: February 22, 2001	USGS/DOQQ
1992	1"=625'	Flight Date: September 25, 1992	USGS
1985	1"=625'	Flight Date: May 02, 1985	USGS
1977	1"=625'	Flight Date: February 12, 1977	USGS
1968	1"=625'	Flight Date: February 06, 1968	USGS
1951	1"=625'	Flight Date: May 14, 1951	USGS

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INQUIRY #: 5070053.12
YEAR: 2008
= 625'
N
EDR

INQUIRY #: 5070053.12
YEAR: 2001
= 625'
N
EDR

INQUIRY #: 5070053.12
YEAR: 1992
= 625'
N
EDR

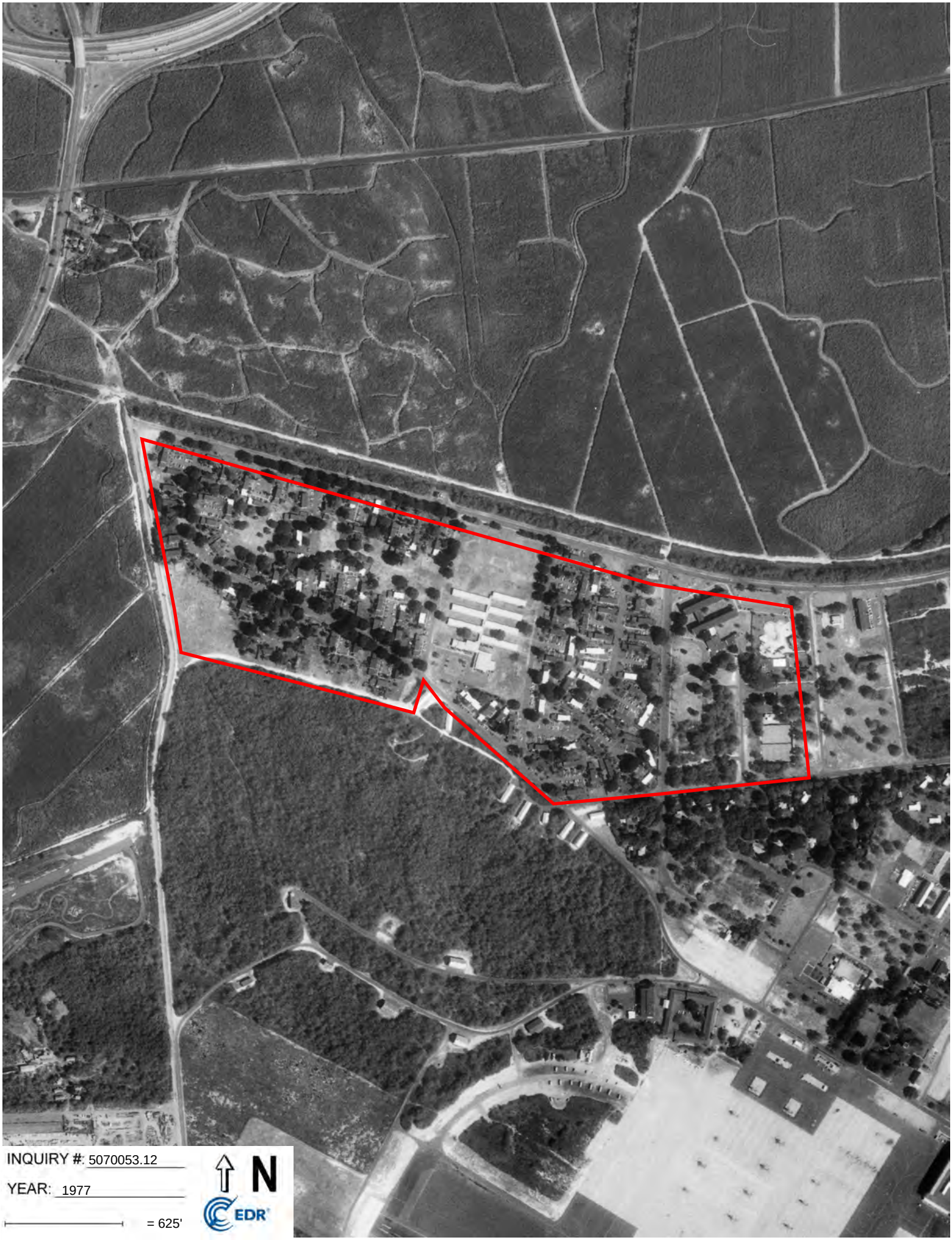
INQUIRY #: 5070053.12

YEAR: 1985

= 625'

N

EDR


INQUIRY #: 5070053.12
YEAR: 1977
= 625'
N
EDR

INQUIRY #: 5070053.12
YEAR: 1968
= 625'
N
EDR

INQUIRY #: 5070053.12
YEAR: 1951
= 625'
N
EDR

EDR Certified Sanborn Map Report

Parcels 1, 2, and 3

Franklin D Roosevelt Ave

Kapolei, HI 96707

Inquiry Number: 5070053.3

October 05, 2017

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

10/05/17

Site Name:	Client Name:
Parcels 1, 2, and 3	Element Environmental , LLC
Franklin D Roosevelt Ave	98-030 Hekaha Street
Kapolei, HI 96707	Aiea, HI 96701-0000
EDR Inquiry # 5070053.3	Contact: Angie Peltier

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Element Environmental , LLC were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 5E82-4DD9-87AF

PO # 170063

Project Hunt Phase I ESAs

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: 5E82-4DD9-87AF

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✔ Library of Congress
- ✔ University Publications of America
- ✔ EDR Private Collection

The Sanborn Library LLC Since 1866™

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EDR Historical Topo Map Report with QuadMatch™

Parcels 1, 2, and 3

Franklin D Roosevelt Ave

Kapolei, HI 96707

Inquiry Number: 5070053.4

October 05, 2017

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

10/05/17

Site Name:	Client Name:
Parcels 1, 2, and 3	Element Environmental , LLC
Franklin D Roosevelt Ave	98-030 Hekaha Street
Kapolei, HI 96707	Aiea, HI 96701-0000
EDR Inquiry # 5070053.4	Contact: Angie Peltier

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Element Environmental , LLC were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:		*Coordinates:*	
P.O.#	170063	**Latitude:**	21.321929 21° 19' 19" North
Project:	Hunt Phase I ESAs	**Longitude:**	-158.080198 -158° 4' 49" West
		UTM Zone:	Zone 4 North
		UTM X Meters:	595390.49
		UTM Y Meters:	2358055.50
		Elevation:	52.00' above sea level

Maps Provided:

2013
1998
1983
1970
1968
1962
1953
1928

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Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2013 Source Sheets

Ewa
2013
7.5-minute, 24000

1998 Source Sheets

Ewa
1998
7.5-minute, 24000
Aerial Photo Revised 1998

1983 Source Sheets

Ewa
1983
7.5-minute, 24000
Aerial Photo Revised 1977

1970 Source Sheets

OAHU
1970
15-minute, 62500

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1968 Source Sheets

Ewa
1968
7.5-minute, 24000
Aerial Photo Revised 1968

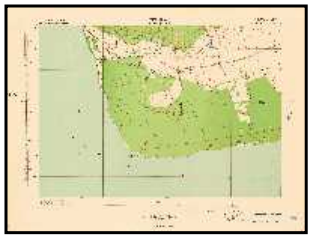
1962 Source Sheets

Ewa
1962
7.5-minute, 24000
Aerial Photo Revised 1952

1953 Source Sheets

Ewa
1953
7.5-minute, 24000
Aerial Photo Revised 1952

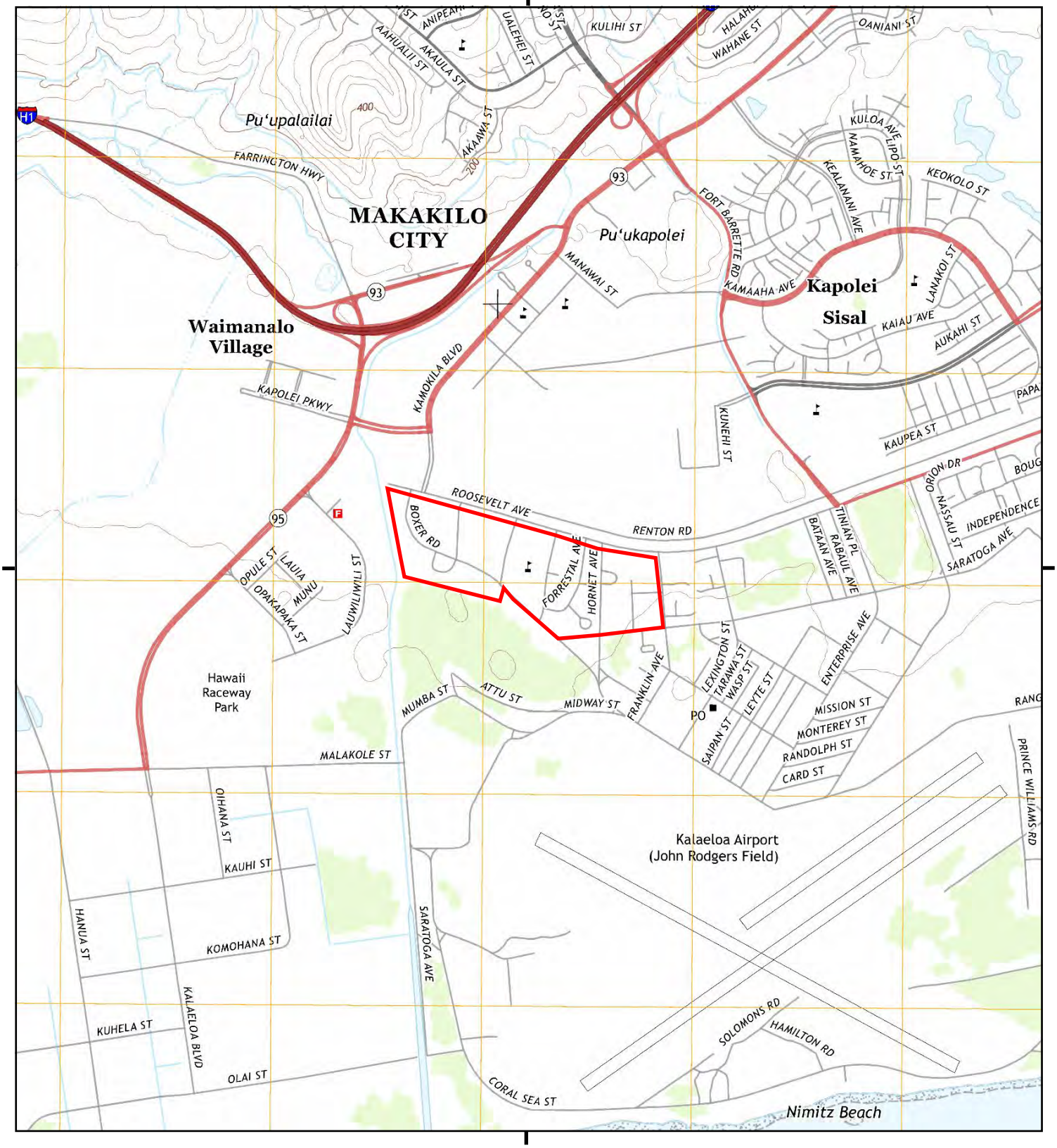
1928 Source Sheets



BARBERSPOINT
1928
7.5-minute, 20000

Historical Topo Map

2013



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

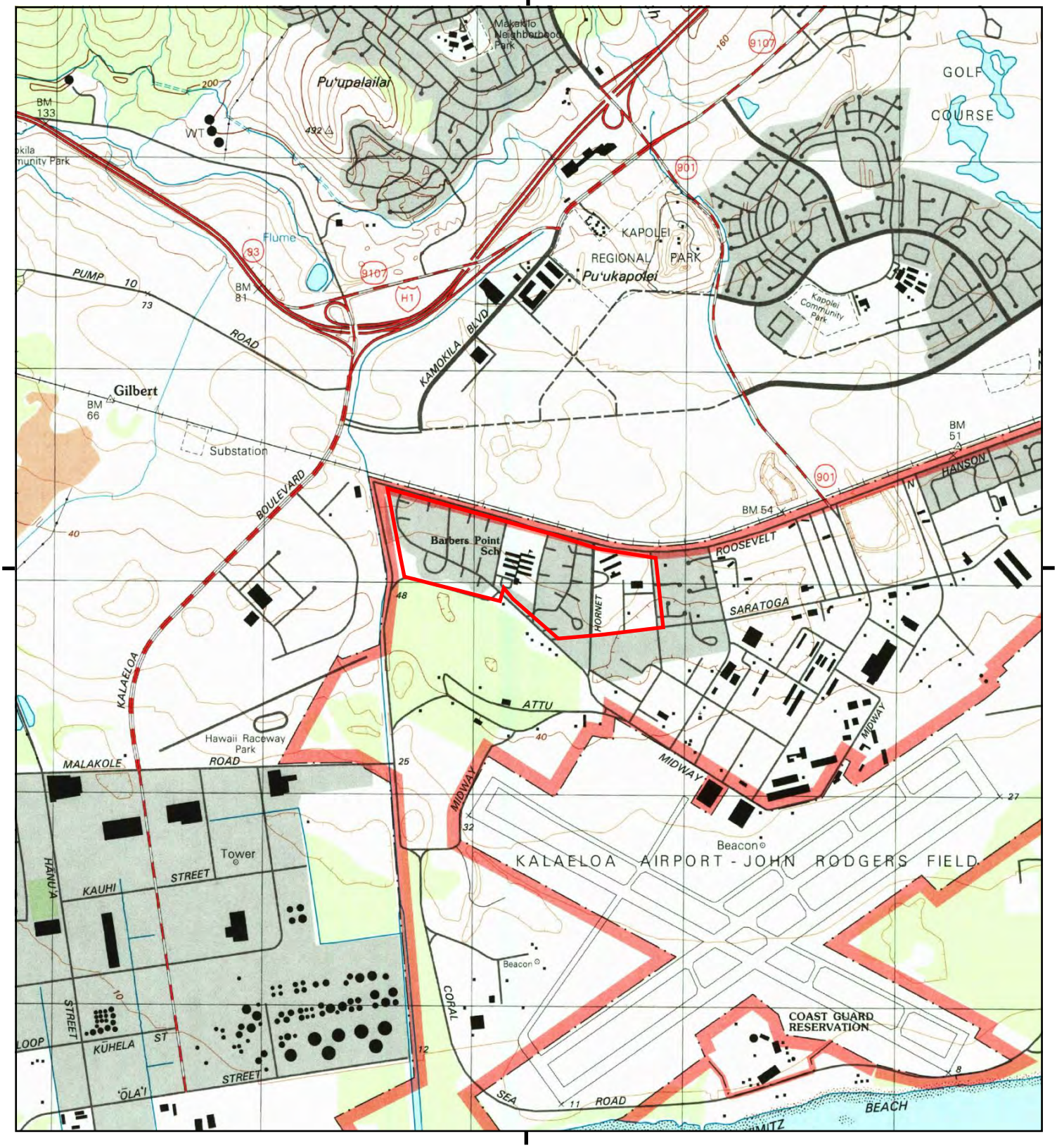
TP, Ewa, 2013, 7.5-minute

SITE NAME: Parcels 1, 2, and 3
ADDRESS: Franklin D Roosevelt Ave
Kapolei, HI 96707
CLIENT: Element Environmental , LLC

N

Historical Topo Map

1998



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

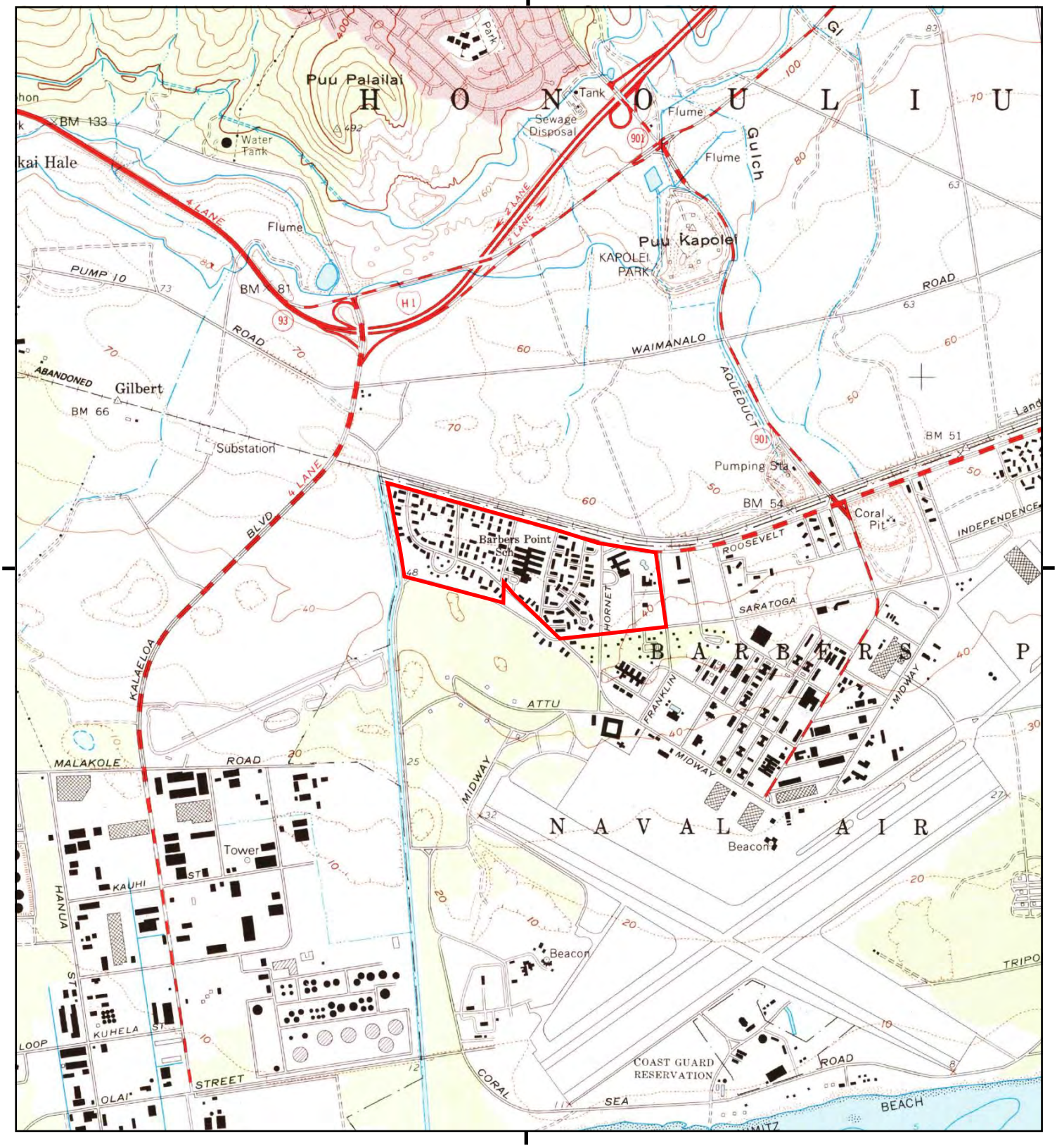
TP, Ewa, 1998, 7.5-minute

SITE NAME: Parcels 1, 2, and 3
ADDRESS: Franklin D Roosevelt Ave
Kapolei, HI 96707
CLIENT: Element Environmental , LLC

N

Historical Topo Map

1983



This report includes information from the following map sheet(s).

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NW N NE
W E
SW S SE

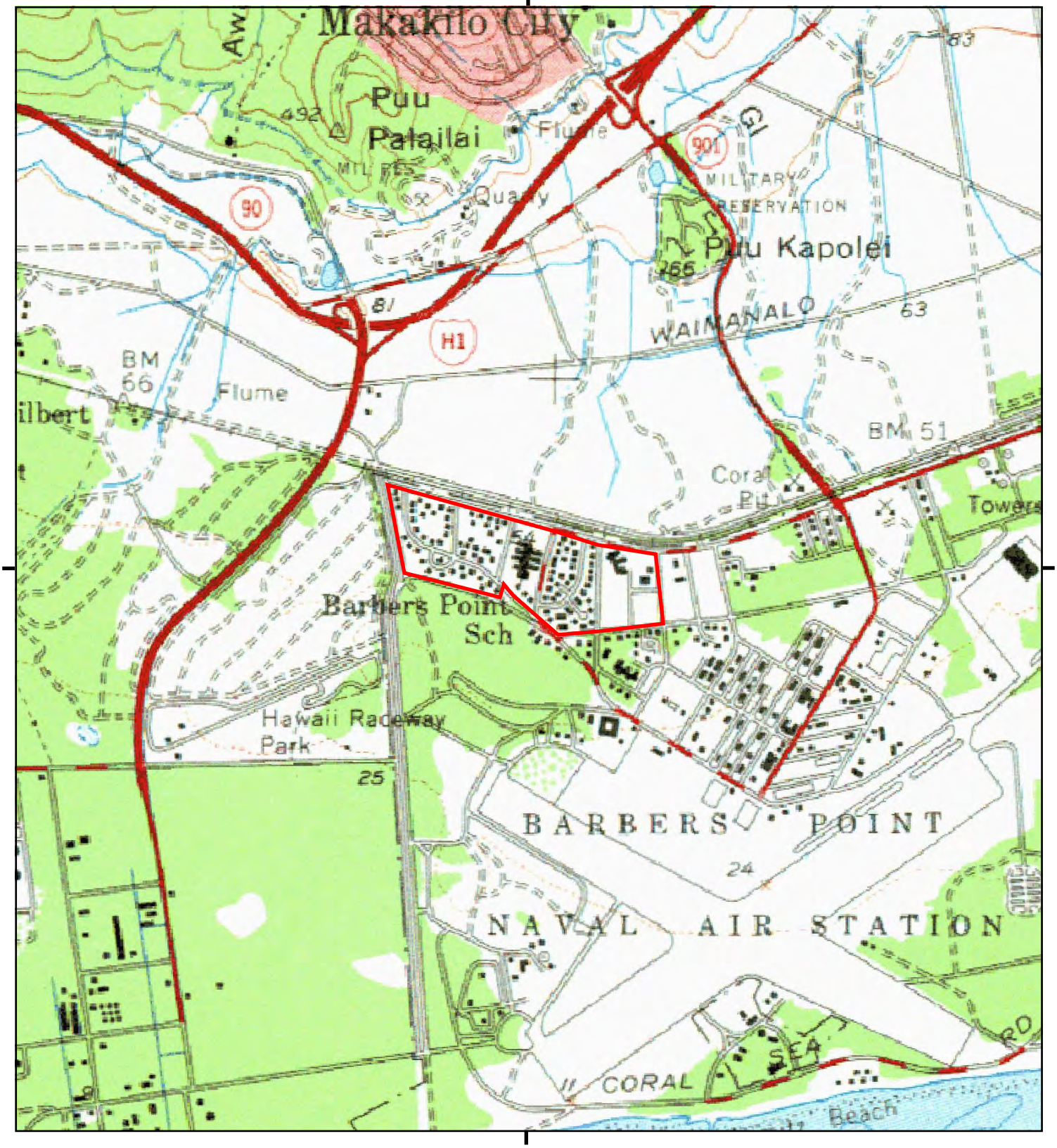
TP, Ewa, 1983, 7.5-minute

SITE NAME: Parcels 1, 2, and 3
ADDRESS: Franklin D Roosevelt Ave
Kapolei, HI 96707
CLIENT: Element Environmental , LLC

N

Historical Topo Map

1970



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

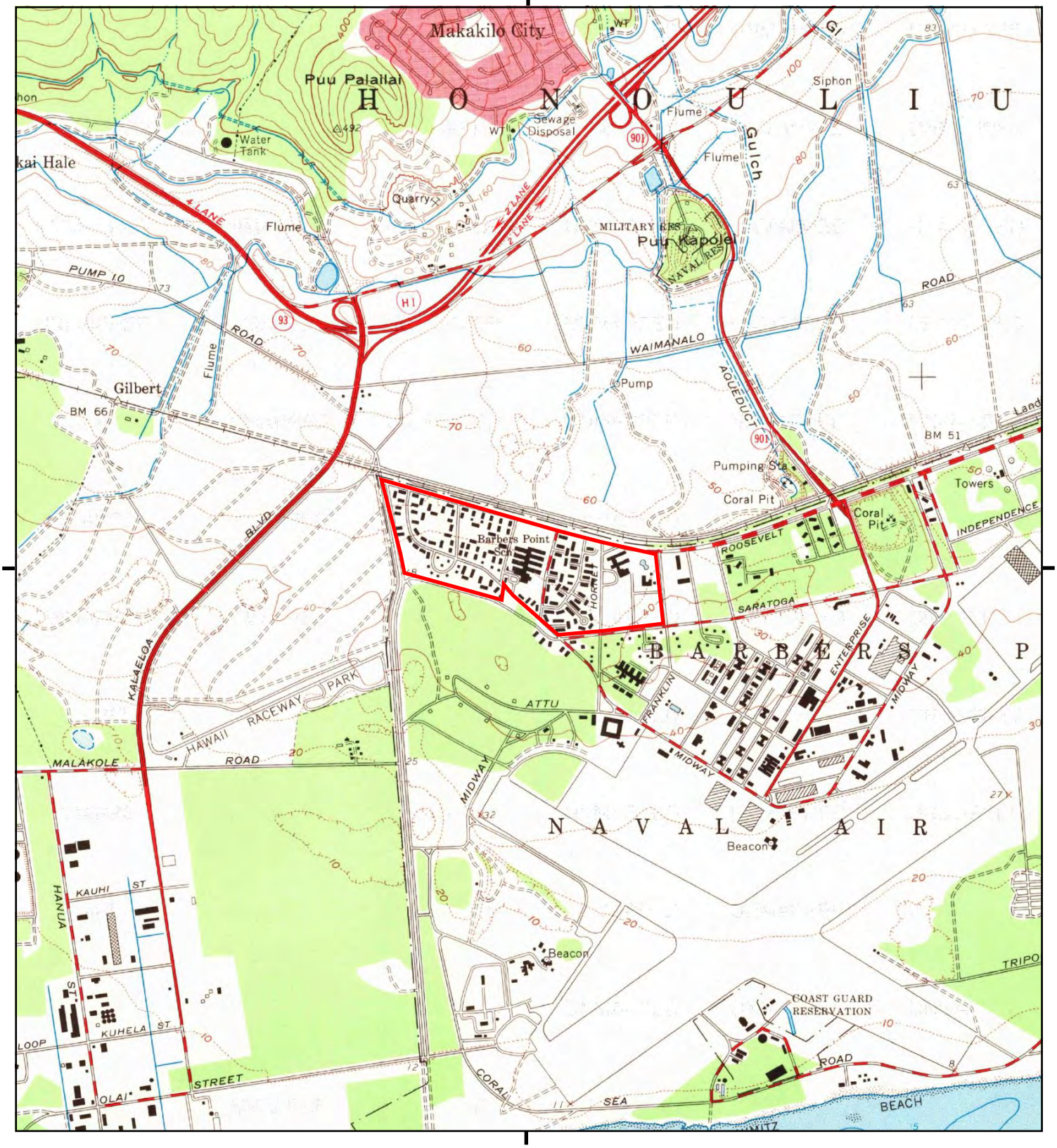
TP, OAHU, 1970, 15-minute

SITE NAME: Parcels 1, 2, and 3
ADDRESS: Franklin D Roosevelt Ave
Kapolei, HI 96707
CLIENT: Element Environmental , LLC

N

Historical Topo Map

1968



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

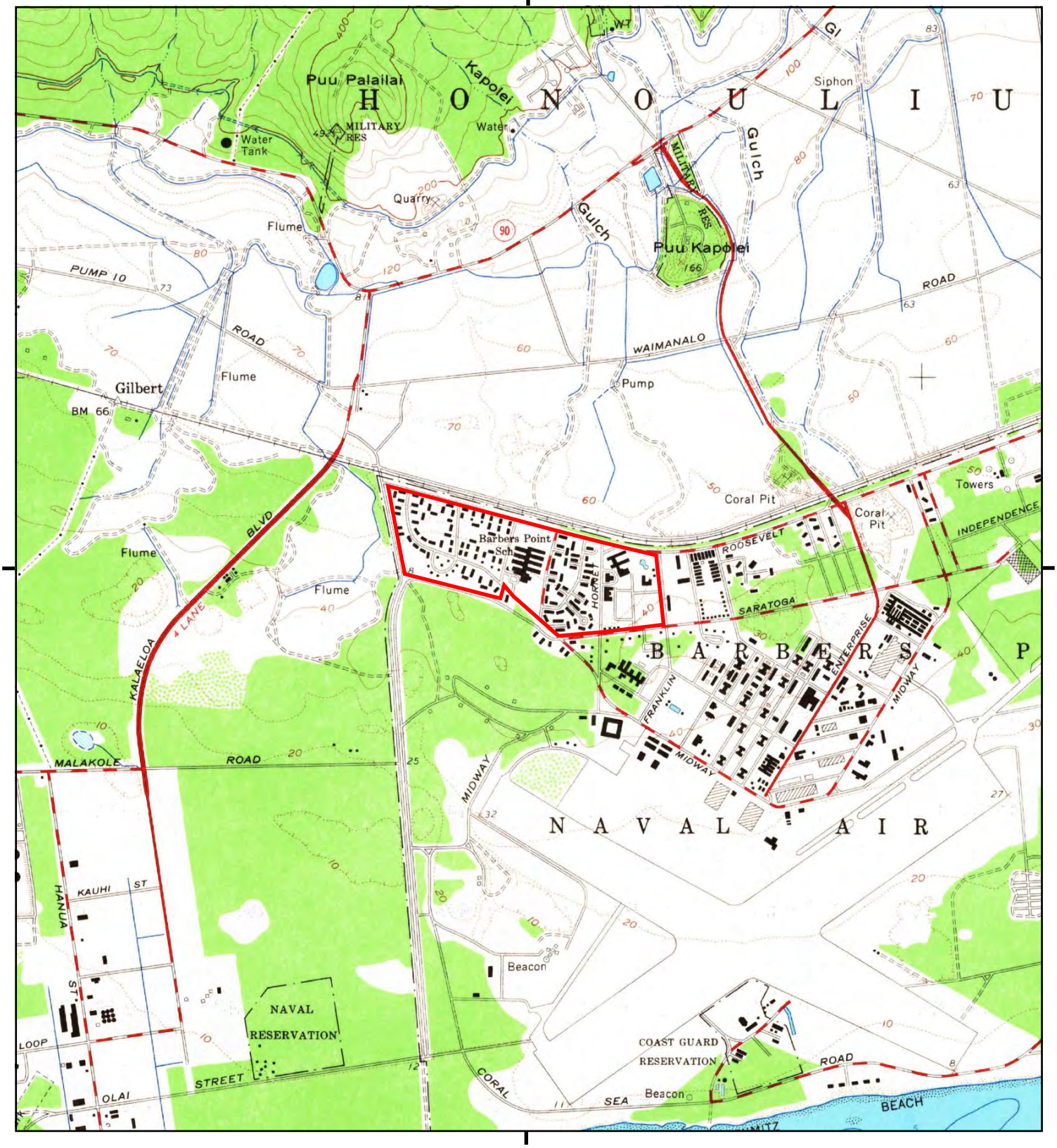
TP, Ewa, 1968, 7.5-minute

SITE NAME: Parcels 1, 2, and 3
ADDRESS: Franklin D Roosevelt Ave
Kapolei, HI 96707
CLIENT: Element Environmental , LLC

N

Historical Topo Map

1962



This report includes information from the following map sheet(s).

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NW N NE
W E
SW S SE

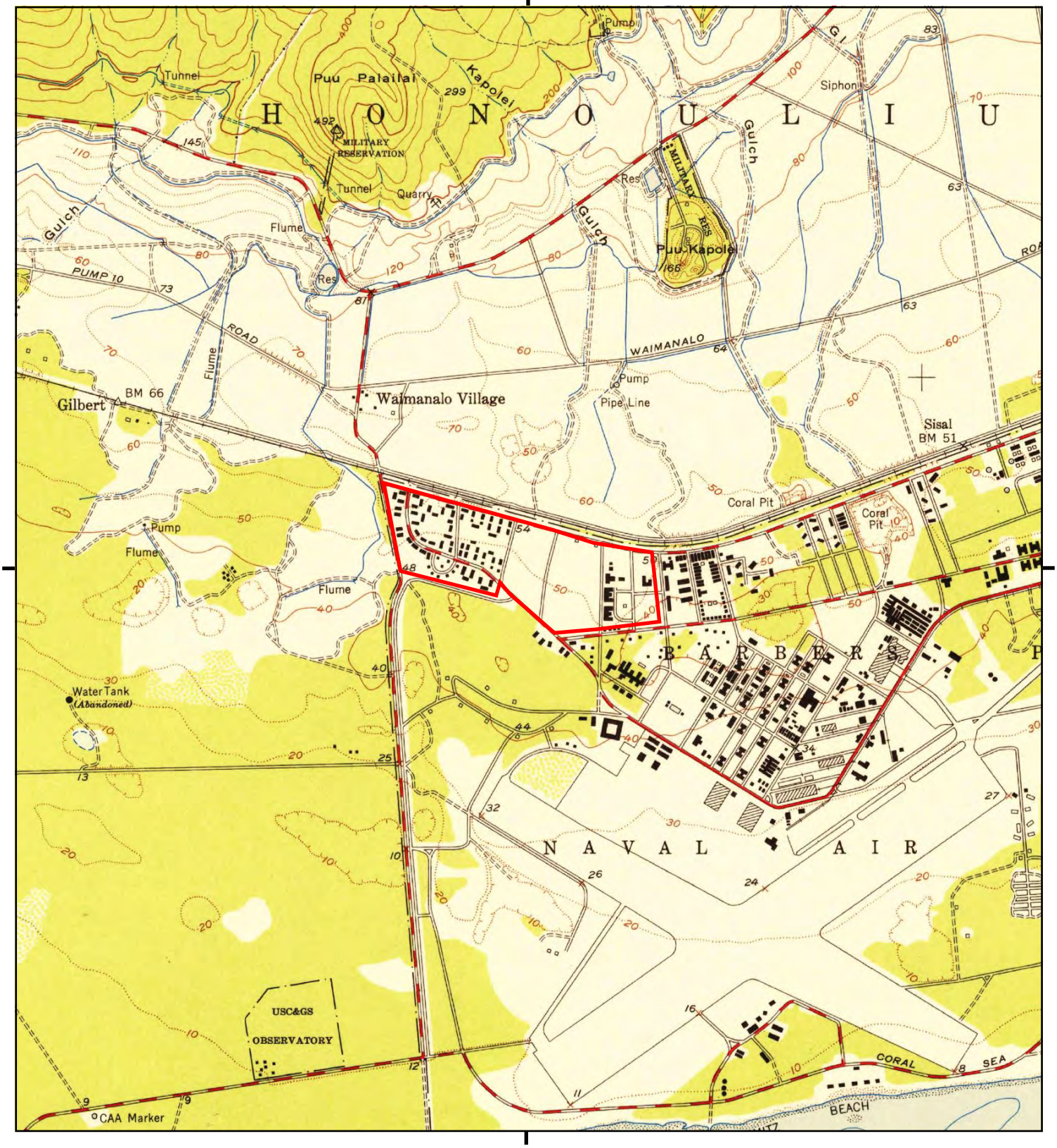
TP, Ewa, 1962, 7.5-minute

SITE NAME: Parcels 1, 2, and 3
ADDRESS: Franklin D Roosevelt Ave
Kapolei, HI 96707
CLIENT: Element Environmental , LLC

N

Historical Topo Map

1953



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

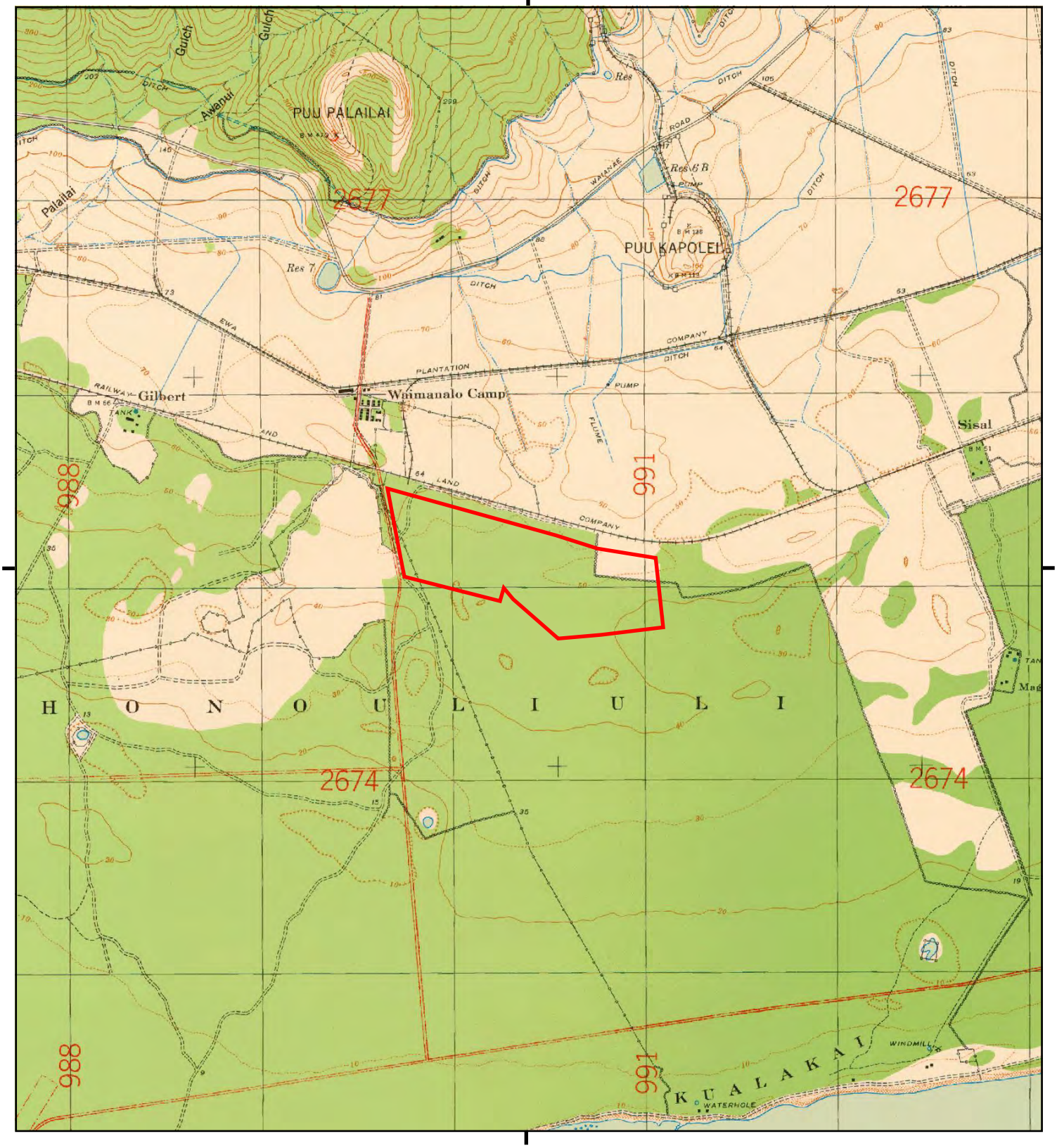
TP, Ewa, 1953, 7.5-minute

SITE NAME: Parcels 1, 2, and 3
ADDRESS: Franklin D Roosevelt Ave
Kapolei, HI 96707
CLIENT: Element Environmental , LLC

N

Historical Topo Map

1928



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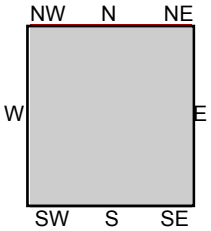
0 Miles 0.25 0.5 1 1.5



TP, BARBERSPOINT, 1928, 7.5-minute

SITE NAME: Parcels 1, 2, and 3
ADDRESS: Franklin D Roosevelt Ave
Kapolei, HI 96707
CLIENT: Element Environmental , LLC

N

The EDR-City Directory Image Report

Parcels 1, 2, and 3
Franklin D Roosevelt Ave
Kapolei, HI 96707

Inquiry Number: 5070053.5
October 06, 2017

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION

Executive Summary

Findings

City Directory Images

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Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	*Target Street*	*Cross Street*	*Source*
2013	☐	☑	Cole Information Services
2008	☑	☑	Cole Information Services
2003	☑	☑	Cole Information Services
1999	☑	☐	Cole Information Services
1995	☑	☐	Cole Information Services
1992	☐	☐	Cole Information Services

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FINDINGS

TARGET PROPERTY STREET

Franklin D Roosevelt Ave
Kapolei, HI 96707

Year	*CD Image*	*Source*	
FRANKLIN D ROOSEVELT AVE			
2013	-	Cole Information Services	Target and Adjoining not listed in Source
2008	-	Cole Information Services	Target and Adjoining not listed in Source
2003	-	Cole Information Services	Target and Adjoining not listed in Source
1999	-	Cole Information Services	Target and Adjoining not listed in Source
1995	-	Cole Information Services	Target and Adjoining not listed in Source
1992	-	Cole Information Services	Street not listed in Source
ROOSEVELT AVE			
2013	-	Cole Information Services	Target and Adjoining not listed in Source
2008	pg A4	Cole Information Services	
2003	pg A6	Cole Information Services	
1999	pg A7	Cole Information Services	
1995	pg A8	Cole Information Services	
1992	-	Cole Information Services	Street not listed in Source

FINDINGS

CROSS STREETS

Year	*CD Image*	*Source*	
LAUWILIWILI ST			
2013	pg. A2	Cole Information Services	
2008	pg. A3	Cole Information Services	
2003	pg. A5	Cole Information Services	
1999	-	Cole Information Services	Street not listed in Source
1995	-	Cole Information Services	Street not listed in Source
1992	-	Cole Information Services	Street not listed in Source

City Directory Images

Target Street	Cross Street	Source
-	✓	Cole Information Services

LAUWILIWILI ST 2013

2009	STORQUEST SELF STORAGE
2029	H & W FOODS
	PALAMA MEAT COMPANY
2045	A & B PARTY RENTALS
	GLOBAL PROFESSIONAL SERVICE LLC
	OLA PROPERTIES INC
2060	CARRIER HAWAII
2074	THE CHURCH OF JESUS CHRIST OF LATTER
2106	FASTENAL
2110	ALARM HAWAII
	CRAIGS AIR CONDITIONING
2112	CARWASH WERKS
	LIQUID ALOHA EXPRESS WASH
	PACIFIC ISLAND SECURITY
2114	SHERWINWILLIAMS PAINT STORE
2116	HAWAII SOLAR & ELECTRIC
	HERMANN HUBERT
	LIFELINE FIRE & SECURITY
	MICROCOM
2118	TESTRON INTERNATIONAL
2120	LUXUS
2130	HENKELS & MCCOY
2149	FOPCO
	SALVATION ARMY KROC CENTER HAWAII TH
2159	SCREEN PRODUCTS INC
2176	AUTO CHEM SYSTEMS
	SMAC HAWAII INC

Target Street	Cross Street	Source
-	✓	Cole Information Services

LAUWILIWILI ST 2008

2009	ALOHA ISLAND SELF STORAGE INC
2029	H & W FOODS PAL
	MAYS
2112	TRISTAR HAWAII CORP
2116	R SAPLA
2149	FOPCO INC
2159	ALII GLASS & METAL INC
	SCREEN PRODUCTS INC

Target Street	Cross Street	Source
✓	-	Cole Information Services

ROOSEVELT AVE 2008

2015 SHERIE BREAUX

Target Street	Cross Street	Source
-	✓	Cole Information Services

LAUWILIWILI ST 2003

2029	ERIC CHING H & W FOODS H & W FOODS ACQUISITION CORP PALAMA MEAT CO

Target Street	Cross Street	Source
✓	-	Cole Information Services

ROOSEVELT AVE 2003

2005 TIMOTHY TOWER

Target Street	Cross Street	Source
✓	-	Cole Information Services

ROOSEVELT AVE 1999

2005	TIMOTHY TOWER
2007	JODI BUSH
2011	C BUSH
	JIM WEATHERBEE
2017	OCCUPANT UNKNOWN
2019	K BOWMAN
2021	NANCY MACESICH
	REX LACEBY
2023	T KOZUBER
2037	BOBBI MAXWELL
	DEBORAH CAVENEE
	PATRICK DAVIS
2041	ERIC WEBB
2121	TRACY PETERSON
3051	JOHN SHARLOCK
	TARA GRAHAM

Target Street	Cross Street	Source
✓	-	Cole Information Services

ROOSEVELT AVE 1995

2005	MARINO, DAVID
2007	MCGETTIGAN, TRACI
	MILINDER, V B
	SCARBOROUGH, JIMMMY
	WOOD, KIM
2009	ASHLEY, DAVID
	HUGHES, ROBERT A
	MCCORD, JESSE
2011	BROWNING, ROBERT
	GUENTZ, DANIEL T
	MCGEE, HARRY E
2013	URENDA, DAVID
2014	MORALES, H
2015	HOBBA, ROBERT L
	SMITH, WENDELL
2019	POE, JAY D
2021	TUCKER, KURT
2023	BRINK, CONNIE
	HEIMEYER, LYNETTE
	KISS, LYNETTE
2037	DAVIS, DAVID
	DELEON, LORAINE
2039	GIPSON, WILLIAM
	NEWMAN, STEVEN
2041	BONILLA, LEO P
	STOLEN, ERIC E
3051	WETZSTEIN, ANGELA

EDR Building Permit Report

Parcels 1, 2, and 3
Franklin D Roosevelt Ave
Kapolei, HI 96707

Inquiry Number: 5070053.8
October 05, 2017

EDR Building Permit Report

Target Property and Adjoining Properties

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

EDR Building Permit Report: Search Documentation

10/05/17

Site Name:
Parcels 1, 2, and 3
Franklin D
Kapolei, HI 96707

EDR Inquiry # 5070053.8

Client Name:
Element Environmental , LLC
98-030 Hekaha Street
Aiea, HI 96701-0000

Contact: Angie Peltier

Search Documentation

DATA GAP

The complete collection of Building Permit data available to EDR has been searched, and as of 10/05/17, EDR does not have access to building permits in the city where your target property is located (Kapolei, HI).

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About This Report

The EDR Building Permit Report provides a practical and efficient method to search building department records for indications of environmental conditions. Generated via a search of municipal building permit records gathered from more than 1,600 cities nationwide, this report will assist you in meeting the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

Building permit data can be used to identify current and/or former operations and structures/features of environmental concern. The data can provide information on a target property and adjoining properties such as the presence of underground storage tanks, pump islands, sumps, drywells, etc., as well as information regarding water, sewer, natural gas, electrical connection dates, and current/former septic tanks.

ASTM and EPA Requirements

ASTM E 1527-13 lists building department records as a "standard historical source," as detailed in § 8.3.4.7: "Building Department Records - The term building department records means those records of the local government in which the property is located indicating permission of the local government to construct, alter, or demolish improvements on the property." ASTM also states that "Uses in the area surrounding the property shall be identified in the report, but this task is required only to the extent that this information is revealed in the course of researching the property itself."

EPA's Standards and Practices for All Appropriate Inquires (AAI) states: "§312.24: Reviews of historical sources of information. (a) Historical documents and records must be reviewed for the purposes of achieving the objectives and performance factors of §312.20(e) and (f). Historical documents and records may include, but are not limited to, aerial photographs, fire insurance maps, building department records, chain of title documents, and land use records."

Methodology

EDR has developed the EDR Building Permit Report through our partnership with BuildFax, the nation's largest repository of building department records. BuildFax collects, updates, and manages building department records from local municipal governments. The database now includes 30 million permits, on more than 10 million properties across 1,600 cities in the United States.

The EDR Building Permit Report comprises local municipal building permit records, gathered directly from local jurisdictions, including both target property and adjoining properties. Years of coverage vary by municipality. Data reported includes (where available): date of permit, permit type, permit number, status, valuation, contractor company, contractor name, and description.

Incoming permit data is checked at seven stages in a regimented quality control process, from initial data source interview, to data preparation, through final auditing. To ensure the building department is accurate, each of the seven quality control stages contains, on average, 15 additional quality checks, resulting in a process of approximately 105 quality control "touch points."

For more information about the EDR Building Permit Report, please contact your EDR Account Executive at (800) 352-0050.

EDR® Environmental Data Resources Inc

BUILD FAX® PROPERTY HISTORY

The EDR Property Tax Report

Parcels 1, 2, and 3
Franklin D Roosevelt Ave
Kapolei, HI 96707

Inquiry Number: 5070053.8
October 05, 2017

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EDR® Environmental Data Resources Inc

BUILD FAX® PROPERTY HISTORY

APPENDIX C

Qualifications of Environmental Professionals

Arlene Campbell, Licensed Geologist

element environmental llc
environmental · engineering · water resources

Arlene H. Campbell, L.G.
Associate
Senior Geologist

EDUCATION:

Graduate Work in Geology - Vanderbilt University, 1988 - 1989
B.A., Geology (minor in Hydrology) - Austin Peay State University, 1988

PROFESSIONAL REGISTRATIONS:

Licensed Geologist, Washington State, No. 1664, 2002

SPECIALIZED TRAINING:

OSHA 40-hour Initial HAZWOPER Training and Current 8-hour Refresher
Hazardous Waste Site Supervisor Training

SUMMARY OF EXPERIENCE:

Ms. Campbell is an Associate and Senior Geologist at Element Environmental LLC (E2). Ms. Campbell joined E2 on July 1, 2006, when E2 merged with Mountain Edge Environmental, Inc. She has 17 years of experience in Hawaii in the environmental consulting field. Her specific expertise includes site assessment, characterization, and remediation. Ms. Campbell has assisted with several state level task forces to assess environmental risk and address petroleum contaminated soils.

Ms. Campbell has managed many environmental projects involving Phase I Environmental Site Assessments (ESAs), preliminary assessments, emergency spill response, subsurface investigation, groundwater monitoring, assessment of fate and transport of surface and groundwater contaminants, soil and groundwater remediation, and risk assessment. She has also managed numerous underground storage tank (UST) removal projects which included preparation of plans and specifications for UST removal, UST removal monitoring, release response activities such as over-excavation, installation of soil borings and groundwater monitoring wells, long term remediation design and implementation, and report preparation.

Ms. Campbell has also managed a number of complex hazardous and biological waste removal and site closure projects which involved geophysical surveys, preparation of plans and specifications, waste characterization, and removal and disposal activities. She has performed Phase I ESAs and has assisted with the preparation and review of environmental impact statements. She has also performed environmental and hydrogeological investigations and has conducted remediation activities for several illegal landfill sites. Noteworthy projects Ms. Campbell has managed included several large emergency response site investigations and remediation projects involving the release of petroleum and PCBs. One of these projects included an emergency response to a major gasoline spill on Kauai that impacted air, soil, surface water, and groundwater. For this project, Ms. Campbell coordinated with the U.S. Coast Guard, county fire and police departments, EPA Region 9, Hawaii DOH, responsible parties, property owners, tenants, and the community. She monitored explosivity and contaminant migration in the subsurface, underground structures/utilities, buildings, a private sewage pumping station, an adjacent stream and the Pacific Ocean; coordinated emergency medical treatment and medical monitoring of affected spill response personnel and civilians; monitored installation of soil vapor points, soil borings, and groundwater monitoring wells; collected soil vapor, soil, groundwater, and stream water samples; prepared release response report; and provided technical support to legal team.

Ms. Campbell has been the principal investigator for several water quality related projects, including preparation of National Pollutant Discharge Elimination System (NPDES) permit applications for an auto recycling facility, an aquarium, a well drilling operation, a cemetery, and a museum; preparation of Storm Water Pollution Control Plans for an auto recycling facility and a solid waste transfer station; storm water and industrial discharge monitoring at various sites; and assisting clients in addressing NPDES compliance issues.

Angela Peltier, Geologist

element environmental llc
environmental · engineering · water resources

Angela K. Peltier
Geologist

EDUCATION:

B.S., Geology and Geophysics – University of Hawaii, 2004

SPECIALIZED TRAINING:

OSHA 40-hour Initial HAZWOPER Training

SUMMARY OF EXPERIENCE:

Ms. Peltier is a Geologist at Element Environmental LLC (E2). Ms. Peltier joined E2 on July 1, 2006, when E2 merged with Mountain Edge Environmental, Inc. She has 9 years of experience in Hawaii in the environmental consulting field. Her specific expertise includes site assessment, characterization, and remediation.

Ms. Peltier has assisted in many environmental projects involving Phase I Environmental Site Assessments (ESAs), preliminary assessments, emergency spill response, subsurface investigation, groundwater monitoring, assessment of fate and transport of surface and groundwater contaminants, soil and groundwater remediation, risk assessment, groundwater monitoring, and explosive gas monitoring. She has also assisted in underground storage tank (UST) removal projects which included preparation of plans and specifications for UST removal, UST removal monitoring, release response activities such as over-excavation, installation of soil borings and groundwater monitoring wells, long term remediation design and implementation, and report preparation.

Ms. Peltier has also performed Phase I ESAs and has assisted with the preparation of environmental impact statements. She has also performed environmental and hydrogeological investigations and has conducted remediation activities for several illegal landfill sites.

Ms. Peltier has been involved in several water quality related projects, including preparation of National Pollutant Discharge Elimination System (NPDES) permit applications for an auto recycling facility, an aquarium, and a well drilling operation, preparation of Storm Water Pollution Control Plans for an auto recycling facility and a solid waste transfer station; storm water and industrial discharge monitoring at various sites.

Appendix C

Biological surveys for proposed road improvements at Kalaeloa, Kapolei, O‘ahu, AECOS, Inc., January 2018

Biological surveys for proposed road improvements at Kalaeloa, Kapolei, Oʻahu

January 5, 2018 | ***DRAFT*** | *AECOS* No. 1529

Eric Guinther, Susan Burr, David Miranda, and Bryson Luke
AECOS, Inc.
45-939 Kamehameha Hwy, Suite 104
Kāneʻohe, Hawaiʻi 96744
Phone: (808) 234-7770 Fax: (808) 234-7775 Email guiinther@aecos.com

Introduction

The Kalaeloa Community Development District (Kalaeloa) encompasses approximately 3,695 acres of land within the former Barbers Point Naval Air Station (BPNAS) in Leeward Oahu (see Figure 1). The lands within Kalaeloa are presently owned by various federal, state, and county agencies. In 2002, Hawaiʻi Senate Bill 2702 was enacted into law (becoming Act 184), transferring responsibility of the Kalaeloa Community Development District (Kalaeloa) to the Hawaii Community Development Authority (HCDA). In May 2005, the Authority formally adopted the Kalaeloa Strategic Plan that envisioned Kalaeloa as a "Center for Excellence" or *Wahi Hoʻokela* within the Ewa District of Oahu. The redevelopment of Kalaeloa is a complex undertaking that will occur over the course of a generation or more, but is now underway (HCDA, 2018). Hunt Kalaeloa, in cooperation with the HCDA and various state and county agencies, proposes to alter and/or improve roadways in the central (former main base) area as an implementation of a site master plan and to better integrate the area with the adjacent Kapolei roadway layout.

Surveys conducted and reported on in this document cover natural resources along proposed roadway alignments (Figure 2). *AECOS*, Inc. was contracted by R. M. Towill to conduct the surveys for inclusion in an Environmental Assessment for the Project. The proposed improvements will involve an area of approximately 40 ac (16.2 ha). When completed the project will support the future development of public, residential and commercial uses within Kalaeloa. The proposed project involves modifications (e.g., widening, utilities, turn lanes) to a number of streets, particularly Saratoga and Roosevelt Avenues. In addition, significant road reconfiguration is indicated for the new southern

extension of Kamōkila Boulevard, between Saratoga and Roosevelt Avenues, as well as alterations to Bennington Street between Hornet and Franklin streets (Cultural Surveys Hawai'i, 2017).

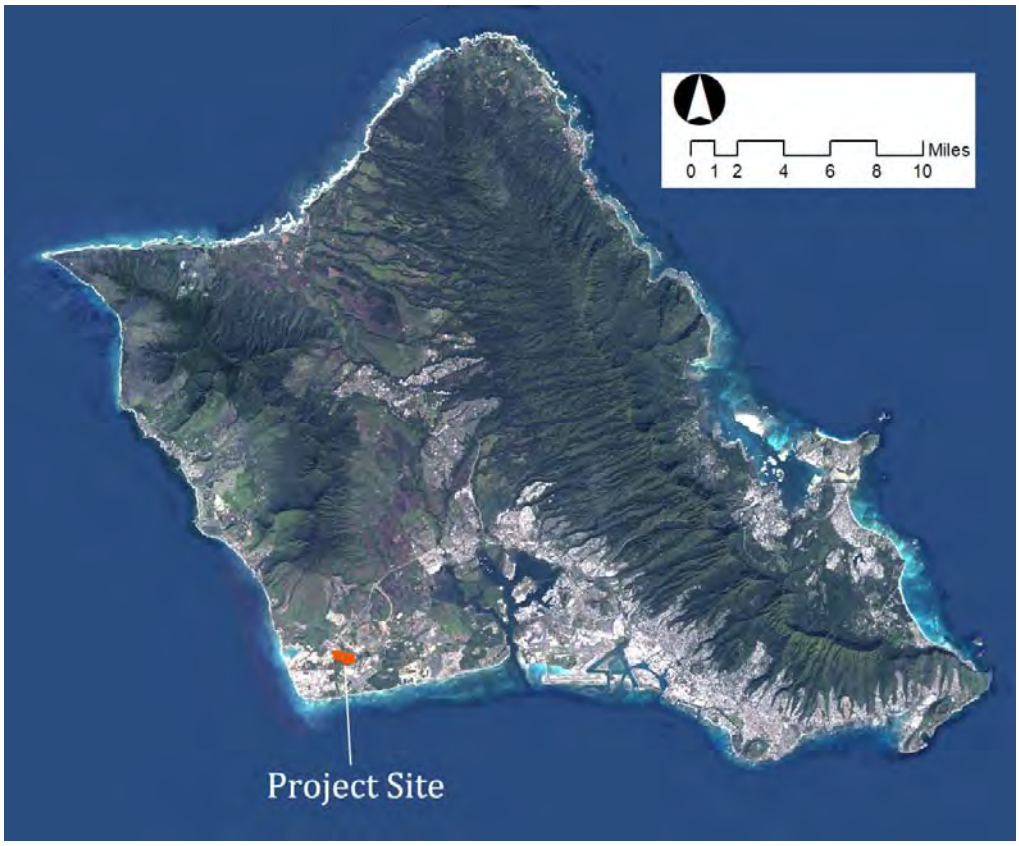

Figure 1. Project location (in red) on Island of O'ahu.

Previously, *AECOS* completed covering the rehabilitation of the Navy Bachelor Officers Quarters (Bldg. 77; TMK: 9-1-013: 011) into an apartment complex, located along Roosevelt Ave between Hornet Ave. and Franklin Ave. (AECOS, 2014).

Methods

Flora Survey

Biological surveys of the site were conducted on December 8, 2017 by the authors. Our survey methodology entailed walking multiple "transects" along

Figure 2. Survey area (outlined in red) showing avian point-count stations in light blue.

the existing and proposed roadways to achieve coverage sufficient to discover the presence of any biological resources of interest or concern. Plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner, Herbst, & Sohmer, 1990; Wagner & Herbst, 1999) for native and naturalized flowering plants and *A Tropical Garden Flora* (Staples & Herbst, 2005) for crop and ornamental plants. More recent name changes for naturalized plants follow Imada (2012).

Avifauna Survey

The avian survey utilized nine point-count stations, distributed over the site and at representative environments within the survey area in order to maximize the likelihood of observing a broad range of bird species. Avian counts were

conducted after sunrise and before noon, when birds are likely to be most active. The location of each station is provided in Fig. 2. All birds observed and/or heard during a six-minute period at each point-count station were identified to species and counted. Bird species not observed during stationary point-counts but observed at other times of the survey were noted as incidental observations.

Avian species identifications were verified with: *A Photographic Guide to the Birds of Hawaii: the Main Islands and Offshore Waters* (Denny, 2009). Taxonomy follows the Checklist of North and Middle American Birds by American Ornithologists' Union (AOU, 2017).

Terrestrial Mammals Survey

A list of mammal species observed in the project area was recorded as biologists conducted botanical and avian surveys. Visual observation for tracks, scat, and other signs of mammalian use of the Project area were noted during the survey.

Results

Vegetation

The project location is within the central former residential and administrative parts of the former BPNAS and all of the area of proposed new or improved roadways is over highly disturbed ground. Only the extreme southwest corner (extension of Saatoga Avenue and new intersection with Kamōkila Blvd.) is an area lacking former development (roads and building structures and appurtenances). Consequently, the vegetation comprises level ground covered by weedy growth (grass and shrubland) with much unattended remnant landscape shrubs and trees. A few areas are grassy fields (see Figures 3 and 4).

Flora

Table 1 is a listing of all the vascular plants observed in the survey area. A relative abundance code is presented for each. A total of 119 species is included in the list. Seven (7 or 6%) of the listed species are native (indigenous) plant species. Another 5 (4%) are early Polynesian introductions. Twenty-six (26) species (22%) are either ornamental plants or naturalized species used as ornamentals that were used as landscaping when the base was an active one.

Figure . 3. Saratoga Avenue is typical of the survey area roads that are in generally good condition and regularly utilized.

Figure 4. Southwest corner of the Project area (here at avian point-count Sta. 5) is a mixture of scrub and grassland with coral roads.

Table 1. Listing of plants (flora) for proposed roadway areas at Kalaeloa, west O'ahu, Hawai'i.

Family Species	Common name	Status	Abundance	Notes
	GYMNOSPERMS CONIFERS AND CYCADS			
ARAUCARIACEAE				
Araucaria columnaris (G. Forster) J.D. Hook.	Cook Island pine	Nat	R	
	FLOWERING PLANTS DICOTYLEDONES			
ACANTHACEAE				
Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat	A	
Graptophyllum pictum (L.) Griff.	caricature plant	Nat	R	<1>
AMARANTHACEAE				
Achyranthes aspera L.	---	Nat	R	
Alternanthera pungens Kunth	khaki weed	Nat	Oa	
Amaranthus viridis L.	slender amaranth	Nat	R	
ANACARDIACEAE				
Mangifera indica L.	mango	Nat	R	<1>
Schinus terebinthefolius Raddi	Christmas berry	Nat	R	
APOCYNACEAE				
Nerium oleander L.	oleander	Orn	Uu	
Plumeria obtusa L.	Singapore plumeria	Orn	R	
Plumeria rubra L.	graveyard flower	Orn	R	
Thevetia peruviana (Pers.) K. Schum.	be-still tree	Nat	R	<1>
ARALIACEAE				
Schefflera actinophylla (Endl.) Harms	octopus tree	Nat	R	
ASCLEPIADACEAE				
Stapelia gigantea N. E. Brown	giant toad plant	Nat	Uc	
ASTERACEAE (COMPOSITAE)				
Bidens alba L.	beggartick	Nat		
Calyptocarpus vialis Less.	---	Nat	A	<2>
Dyssodia tenuiloba (Cand.) Robinson		Nat	Ua	
Eclipta alba (L.) Hassk.	false daisy	Nat	R	
Emilia fosbergii Nicolson	Flora's paintbrush, *pualele*	Nat	U	<3>
Pluchia carolinensis (Jacq.) G. Don	sourbush	Nat	O	
Sonchus oleraceus L.	sow thistle	Nat	Rc	
Synedrella nodiflora (L.) Gaertn.	nodeweed	Nat		
Tridax procumbens L.	coat buttons	Nat	O	

Table 1 (continued).

Family Species	Common name	Status	Abundance	Notes
ASTERACEAE (continued)				
Verbesina enceliodes (Cav.) Benth. & Hook.	golden crown-beard	Nat	U	
Xanthium strumarium L.	cocklebur, *kīkānia*	Nat	R	<3>
Youngia japonica (L.) DC.	Oriental hawksbeard	Nat	U	
BIGNONIACEAE				
? *Tabebuia* sp.	---	Orn	Uc	<3>
Tabebuia heterophylla (A. P. de Candolle) Britt.	pink tecoma	Orn	R	
BORAGINACEAE				
Cordia sebestena L.	geiger tree	Orn	R	
Cordia subcordata Lam.	*kou*	**Ind**	R	<3>
Heliotropum procumbens Mill.	---	Nat	Oc	
CHENOPODIACEAE				
Atriplex suberecta Verd.	---	Nat	R	
Chenopodium ambrosioides L.	Mexican tea	Nat	R	
Salsola kali L.	Russian thistle	Nat	R	
CLUSIACEAE				
Calophyllum inophyllum L.	*kamani*	**Pol**	R	
CONVOLVULACEAE				
Ipomoea cairica (L.) Sweet	*koali 'ai*	**Ind**	R	
Ipomoea obscura (L.) Ker-Gawl.	---	Nat	U	
Ipomoea triloba L.	little bell	Nat	U	
Merremia aegyptica (L.) Urb.	hairy merremia	Nat	U	
CUCURBITACEAE				
Cucumus sp.	indet. melon	Orn	R	<3>
Momordica charantia L.	wild bitter melolon	Nat	U	
EUPHORBIACEAE				
Euphorbia hirta L.	garden spurge	Nat	Oc	
Euphorbia hypericifolia L.	graceful spurge	Nat	R	
Euphorbia prostrata Aiton	prostrate spurge	Nat	Oc	
FABACEAE				
Acacia farnesiana (L.) Willd.	*klu*	Nat	R	
Albizia saman F. Muell.	monkeypod	Nat	C	
Cassia x*nealiae* H.S. Irwin & Barneby	rainbow shower	Orn	R	<3>
Chamaecrista nictitans (L.) Moench	partridge pea	Nat	Uc	
Desmanthus virgatus (L.) Willd.	virgate mimosa	Nat	O	
Enterolobium cyclocarpum (N. Jacq.) Grisb.	earpod	Orn	U	<1>
Leucaena leucocephala (Lam.) deWit	*koa haole*	Nat	Oc	
Indigofera hendecaphyla Jacq.	creeping indigo	Nat	R	

Table 1 (continued).

Family Species	Common name	Status	Abundance	Notes
FABACEAE (continued)				
Indigofera suffruticosa Mill.	indigo	Nat	R	
Macroptilium atropurpureum (DC.) Urb.	---	Nat	U	
Macroptilium lathyroides (L.) Urb.	wild bean, cow pea	Nat	R	
Neonotonia wightii (Wight & Arnott) Lackey	glycine	Nat	R	
Pithecelobium dulce (Roxb.) Benth.	*'opiuma*	Nat	C	
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	*kiawe*	Nat	C	
Senna surattensis (L. Burm.) H. Irwin & Barneby	*kolomona*	Nat	R	<3>
Senna sp.		Nat	R	<3>
LAMIACEAE				
Leonotis nepetifolia (L.) R. Br.	lion's ear	Nat	U	
Ocimum basilicum L.	common basil	Nat	R	
LAURACEAE				
Cassytha filiformis L.	*kauna'oa pehu*	**Ind**	R	<3>
MALVACEAE				
Abutilon grandifolium (Wild.) Sweet	hairy abutilon	Nat	R	
Abutilon incanum (Link) Sweet	*ko'oloa keokeo*	**Ind**	R	
Alysicarpus vaginalis (L.) DC.	Alyce clover	Nat	R	
Hibiscus rosa-sinensis L.	Chinese hibiscus	Orn	Ru	
Malva parviflora L.	cheese weed	Nat	Oc	
Malvastrum coromandelianum (L.) Garck	false mallow	Nat	U	
Sida ciliaris L.	---	Nat	AA	
Sida fallax Walp.	*'ilima*	**Ind**	Oc	
Waltheria indica L.	*'uhaloa*	Nat	Oa	
MELASTOMATACEAE				
Dissotis rotundifolia (Sm.) Triana	---	Nat	Ru	
MORACEAE				
Artocarpus altilis (Z.) Fosb.	*'ulu*, breadfruit	**Pol**	R	
Ficus lyrata Warburg	fiddle-leaf fig	Orn	Ru	
Ficus microcarpa L. fil.	Chinese banyan	Nat	O	
MORINGACEAE				
Moringa oleifera Lam.	horseradish tree	Nat	R	
NYCTAGINACEAE				
Boerhavia coccinea Mill.	false *alena*	Nat	A	
Bougainvillea spectabilis Wild.	bougainvillea	Orn	U	

Table 1 (continued).

Family Species	Common name	Status	Abundance	Notes
OXALIDACEAE				
Oxalis corniculatum L.	*ihi'ai*	**Pol**	R	
PASSIFLORACEAE				
Passiflora foetida L.	running pop	Nat	O	
MORACEAE				
Artocarpus altilis (Z.) Fosb.	*'ulu*, breadfruit	**Pol**	R	
PLANTAGINACEAE				
Plantago lanceolata L.	nrw-lvd plantain	Nat	R	
POLYGONACEAE				
Antigonon leptopus Hook. & Arnott	Mexican creeper	Nat	R	
PORTULACACEAE				
Portulaca oleracea L.	pigweed	Nat	R	
Portulaca pilosa L.	---	Nat	Uc	
RUBIACEAE				
Spermacoce assurgens Rius & Pav..	buttonweed	Nat	R	
RUTACEAE				
Murraya paniculata (L.) W. Jack	mock orange	Nat	R	
SAPINDACEAE				
Filicium decipiens Thwaites ex. J.D. Hook.	fern tree	Nat	R	
SCROPHULARIACEAE				
Bacopa monnieri (L.) Pennell	*'ae'ae*	**Ind**	R	
SOLANACEAE				
Solanum lycopersicum var. *cerasiforme* (Dunal) Spooner, G. Anderson, & Jansen	wild cherry tomato	Nat	R	
Solanum seaforthianum Andr.	---	Nat	R	
VERBENACEAE				
Stachytarpheta australus Moldenke	---	Nat	R	
Vitex trifolia var. *subtrisecta* (Kuntze.) Mold.	*polinalina,* vitex	Nat	Uc	
ZYGOPHYLLACEAE				
Guaiacum officinale L.	lignum-vitae	Orn	R	<3>
MONOCOTYLEDONES				
AGAVACEAE				
Agave attenuata Salm-Dyck	swan's-neck agave	Orn	R	
Agave sisalina Perrine	sisal	Nat	R	
Sanseviera trifasciata Prain	bowstring-hemp	Orn	R	
ALOACEAE				
Aloë vera (L.) N.L. Burm.	aloë	Orn	R	

Table 1 (continued).

Family Species	Common name	Status	Abundance	Notes
ARACEAE				
Epipremnum pinnatum (L.) Engler	golden pothos	Nat	R	
ARECACEAE				
Cocos nucifera L.	coconut palm	**Pol**	Uc	<1>
Pritchardia sp.	*loulu* palm	?Orn	R	
Veitchia merrilli (Becarri) H. E. Moore	Manila palm	Orn	R	
COMMELINACEAE				
Commelina benghalensis L.	hairy *honohono*	Nat	R	
Tradescantia spathacea Swartz	oyster plant	Orn	R	
CYPERACEAE				
Cyperus gracilis R. Br.	McCoy grass	Nat	Ru	
Cyperus rotundus L.	nut grass	Nat	Uu	
Kylinga nemoralis (J. R. Forster & G. Forster) Dandy ex Hutchinson & Dalziel	*kili'o'opu*	Nat	U	
LILIACEAE				
Crinum asiaticum L.	giant lily	Nat	R	<1,3>
PANDANACEAE				
Pandanus tectorius S. Parkinson x Z.	*hala*	**Ind**	R	
POACEAE				
Axonopus compressus (Swartz) P. Beauv.	brd-lv carpet grass	Nat	Oa	<2>
Bothriochloa pertusa (L.) Camus	pitted beardgrass	Nat	Ca	<2>
Cenchrus ciliaris L.	buffelgrass	Nat	AA	
Cenchrus echinatus L.	common sandbur	Nat	U	
Chloris barbata (L.) Sw.	swollen fingergrass	Nat	O	
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat	AA	
Eleusine indica (L.) Gaertn.	wiregrass	Nat	O	
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	Nat	O	
Eremochloa ophiuroides Büse	centipede grass	Orn	Ua	<2>
Megathyrsus maximus (Jacq.) B.K. Simon & W.L. Jacobs	Guinea grass	Nat	AA	
Melinus repens (Willd.) Zizka	Natal redtop	Nat	O	
Urochloa distachya (L.) T.Q. Nguyen	---	Nat	U	

Legend to Table 1.

STATUS = distributional status for the Hawaiian Islands:

Ind = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.

Table 1 (continued).

Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
Orn = exotic, ornamental or cultivated; plant not naturalized (not well-established outside of cultivation).
Pol = Polynesian introduction before 1778 (none in the list).

ABUNDANCE = occurrence ratings for plants by area:
R – Rare seen in only one or perhaps two locations.
U - Uncommon- seen at most in several locations
O - Occasional seen with some regularity
C - Common observed numerous times during the survey
A - Abundant found in large numbers; may be locally dominant.
AA - Very abundant; abundant and dominant; defining vegetation type.
Lowercase letters following an occurrence rating indicate clusters within the survey area. The ratings above provide an estimate of the likelihood of encountering a species within the specified survey area; numbers modify this where abundance, where encountered, tends to be greater than the occurrence rating:
u = several plants present ; with C or A = in one area only.
c = many plants present ; with C or A = in a few areas.
a = locally abundant; with C or A = in several to many areas but still limited.

NOTES:
<1> - Naturalized, but planted here as a landscape plant (used as an ornamental).
<2> - In maintained lawns.
<3> – Plant observed was lacking fruit or flowers; identification uncertain.

Avian Survey

A total of 247 birds representing 22 species was observed during the avian survey (Table 2). The fauna listing includes one endemic and two indigenous migratory species, as well as 19 species alien to the Hawaiian Islands.

Three individuals of the endemic Hawaiian Black-necked Stilt or *'ae'o* (*Himantopus mexicanus knudseni*) were observed foraging on the lawn of Barber's Point Elementary School at Station 8, before being flushed by the school children coming out to recess. A single Wandering Tattler or *'ūlili* (*Tringa incana*), an indigenous migrant shorebird, was incidentally observed in-flight, transitioning through the Project area in a west-bound direction near Boxer Road. A total of 17 Pacific Golden Plover or *kolea* (*Pluvialis fulva*), another indigenous migratory species, were observed at five of the nine point-count stations and commonly found on lawns and other open grassy areas throughout the Project. The presence of both the Wandering Tattler and

Hawaiian Black-necked Stilts may be partly attributed to the drainage canal to the west of the Project, as the riparian and estuarine habitats in the canal are attractants for the two species.

The avian diversity and density at the Project was fairly typical of highly-disturbed dry lowlands and urbanized developments on the 'Ewa Plain of O'ahu. Of the total individual birds observed, approximately 92% are non-native alien species. The species most observed were Common Waxbill (*Estrilda astrild*), Common Mynah (*Acridotheres tristis*), Zebra Dove (*Geopelia striata*), and Spotted Dove (*Streptopelia chinensis*). Combined, these four species constituted 55% of the total birds observed during the survey, and each species was counted at seven or more of the nine point-count stations.

Terrestrial Mammals

Feral and domestic (pet) cats (*Felis catus*) were observed occasionally throughout the survey area, but were most frequently observed in the scrub-shrub outlying residential areas adjacent to the survey area. One domestic (pet) dog (*Cannis l. familiaris*) was being walked along Franklin Street. Other mammals likely to frequent the area include the small Asian mongoose (*Herpestes javanicus*) and various introduced rodent species.

Discussion

Flora

No plants species of any particular concern were noted during the survey and, given the highly disturbed nature of most of the area, none is expected to be present. No plants listed as endangered or threatened under the federal Endangered Species Act of 1973 (ESA) as amended, or the State of Hawai'i endangered species statute, Hawai'i Revised Statutes (HRS) 195D (USFWS, 2014; DLNR, 1998) were observed

Botanical resources of interest or potential concern from a conservation perspective are valuable landscape trees, exceptional trees (protected by County ordnance), and rare native species. Only very rare natives would be candidates for listing as threatened or endangered under the Endangered Species Act (ESA), and these would very likely be endemics (plants uniquely native to the Hawaiian Islands). ESA listed species known from the 'Ewa Plain include *ko'oloa'ula* (*Abutilon menziesii*), *Achyranthes splendens* var. *rotundata*, and an *'akoko* (*Euphorbia skottsbergii* var. *skottsbergii*). Not listed, but

Table 2. Avian point-count stations and incidental sighting results.

Common Name	Scientific Name	ST	Station 1	2	3	4	5	6	7	8	9	IS
GALLIFORMES												
PHASIANIDAE - Pheasants & Partridges												
Grey Francolin	*Francolinus pondicerianus*	A	--	--	--	--	2	--	--	--	--	
Domestic chicken	*Gallus* sp.	D	--	--	1	1	--	--	--	--	--	
PELECANIFORMES												
ARDEIDAE - Herons, Bitterns & Allies												
Cattle Egret*	*Bubulcus ibis*	A	--	1	1	--	--	--	--	--	--	
CHARADRIIFORMES												
RECURVIROSTRIDAE – Stilts & Avocets												
aʻeo, Hawaiian Black-necked Stilt*	*Himantopus mexicanus knudseni*	**EE**	--	--	--	--	--	--	--	3	--	
CHARADRIIDAE - Lapwings & Plovers												
kōlea, Pacific Golden-Plover*	*Pluvialis fulva*	**IM**	1	6	1	--	--	--	--	5	4	
SCOLOPACIDAE - Sandpipers												
ʻūlili, Wandering Tattler*	*Tringa incana*	**IM**	--	--	--	--	--	--	--	--	--	✓
COLUMBIFORMES												
COLUMBIDAE - Pigeons & Doves												
Spotted Dove	*Streptopelia chinensis*	A	4	8	3	2	--	1	2	2	2	
Zebra Dove	*Geopelia striata*	A	1	7	3	--	4	3	1	10	6	
PASSERIFORMES												
PYCNONOTIDAE - Bulbuls												
Red-vented Bulbul	*Pycnonotus cafer*	A	2	4	1	6	3	--	--	3	--	
Red-whiskered Bulbul	*Pycnonotus jocosus*	A	--	--	--	--	--	--	--	--	--	✓
ZOSTEROPIDAE - White-eyes												
Japanese White-eye	*Zosterops japonicus*	A	4	2	1	2	2	3	3	--	3	
MIMIDAE - Mimids												
Northern Mockingbird*	*Mimus polyglottos*	A	--	1	--	--	--	1	--	--	--	

Table 2 (continued).

Common Name	Scientific Name	ST	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*IS*
						Station						
STURNIDAE - Starlings												
Common Myna	*Acridotheres tristis*	A	4	10	5	2	4	--	1	7	3	
CARDINALIDAE - Cardinals, Saltators & Allies												
Northern Cardinal*	*Cardinalis cardinalis*	A	2	1	--	--	--	2	5	--	--	
PASSERIDAE - Old World Sparrows												
House Sparrow	*Passer domesticus*	A	1	--	1	--	1	--	1	--	4	
FRINGILLIDAE - Fringilline & Carduline Finches & Allies												
House Finch*	*Haemorhous mexicanus*	A	--	1	--	2	2	--	2	--	--	
THRAUPIDAE - Tanagers												
Red-crested Cardinal	*Paroaria coronata*	A	1	--	1	--	1	--	2	--	--	
Saffron Finch	*Sicalis flaveola*	A	--	--	5	--	--	--	--	--	2	
ESTRILDIDAE - Estrildid Finches												
African Silverbill	*Euodice cantans*	A	--	--	--	--	4	--	--	--	--	
Common Waxbill	*Estrilda astrild*	A	5	3	14	--	4	2	-	3	10	
Java Sparrow	*Lonchura oryzivora*	A	--	--	1	--	--	--	--	--	--	
Chestnut Munia	*Lonchura atricapilla*	A	--	--	1	--	--	--	--	1	--	

Key to Table 2

ST Status

D Domestic – Domesticated species not considered established in the wild on O'ahu.
A Alien – Introduced to the Hawaiian Islands by humans.
IM Indigenous Migratory – A native migratory species, but not unique to the Hawaiian Islands.
EE Endangered Endemic – Endemic and Endangered species, unique to the Hawaiian Islands.
RA Relative Abundance – Number of birds detected divided by the number of count stations (9).

* Species protected by MBTA.
IS Incidental observation.

considered rare and potentially threatened, especially within its range on O'ahu, is *maiapilo* (*Capparis sandwichiana*). None of these plants occur within the survey area.

Although 7 of the observed plant species are native (indigenous) plants, only *ko'oloa keokeo* (*Abutilon incanum*) can be described as uncommon in most lowland dry areas on O'ahu, but is not so rare outside of urban settings. Various planted trees are scattered across the site, some of considerable age (for examples, mango, monkeypod, earpod, and *'opiuma*, trees). These may have considerable landscape value, but none is protected or, for that matter, likely to be disturbed by the roadway improvements plans. However, no trees listed by the City and County of Honolulu, Exceptional Trees Program occur here (C&C, 2017).

An area south of Boxer Road just outside the survey area is designated Critical Habitat for selected plants listed on O'ahu (Lowland dry habitat Unit 10). The endangered *'akoko* (*Euphorbia skottsbergii* var. *skottsbergii*) is known to occur in this designated area (USFWS, 2011).

Fauna

Avian Resources - The avian survey revealed a total of 22 avian species, including one endemic and two indigenous migratory species. The other 19 species are alien (not native) to the Hawaiian Islands. Of the bird species observed, only the Hawaiian Black-necked Stilt is listed as an endangered species under both the federal Endangered Species Act of 1973 and the State of Hawai'i endangered species statutes (USFWS, 2014; DLNR, 2015). Project activities are not anticipated to directly impact foraging habitat for this species; indeed the birds were observed on a playground field at Barber's Point Elementary School, a location unlikely to be disturbed by Project activities. Construction-related noise may be an indirect impact influencing foraging behavior, an impact already occurring when students play on the field. Suitable alternative foraging habitat is abundant in nearby areas, and no long-term impacts to the species are anticipated. This species does not actively nest in the area due to a lack of suitable nesting habitat.

Of the 22 bird species observed, seven are protected by the Migratory Bird Treaty Act of 1918 (MBTA): Black-necked Stilt; Wandering Tattler; Northern Mockingbird (*Mimus polyglottos*); Cattle Egret (*Bubulcus ibis*); House Finch (*Carpodacus mexicanus*); Northern Cardinal (*Cardinalis cardinalis*); and Pacific Golden Plover (USFWS, 2013). It is unlawful to pursue, hunt, take, capture, kill, or sell birds species protected under the MBTA without a permit. The statute also protects bird parts, including feathers, eggs, and nests.

The *pueo* or Hawaiian short-eared owl (*Asio flammeus sandwichensis*) is a state-listed endemic sub-species (on O'ahu only) and has been recorded on undeveloped lands *mauka* (inland) of Kapolei. While not observed during this survey (these birds are crepuscular, active mostly in the evening and early morning hours), it is possible that this owl may hunt over grassy fields in the the Project area. With the exception of "new" roadways proposed for the far western end, *Pueo* feeding and ground-nest sites would be unlikely due to the extensive development and regularly disturbing activities.

No seabirds were observed during the survey, and no evidence of seabird nesting colonies were discovered, nor are any such colonies currently known in this area. However, seabirds may overfly the site on occasion. Therefore, the only likely impact to seabirds would be the installation of outdoor lights. Night lights can disorient nocturnally-flying seabirds, particularly fledglings, resulting in their potential downing and harm from collision with objects and/or predation by feral dogs and cats if downed.

- During construction, the presence of any ESA-listed species within 50 m (164 ft) of the project work area would necessitate halting of work until the animal voluntarily leaves the work area.

- Immediately prior to the start of grading at the far western end of the site, a survey for *Pueo* ground-nesting activity should be undertaken. If a nest is discovered, DLNR must be notified before proceeding with grading or grubbing that could disturb the nesting activity.

- If night-time construction activity and/or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground.

- If streetlights or exterior facility lighting are installed in conjunction with the project, it is recommended that the lights be shielded to reduce the potential for interactions between nocturnally flying seabirds and external lights and/or man-made structures (Reed et al., 1985; Telfer et al., 1987).

<u>Mammalian Resources</u> - The findings of mammals at the survey are consistent with the location of the survey area and habitats present. Both dog and cat are alien to the Hawaiian Islands. Other mammal species not observed during the survey but likely to occur in the area include the small Asian mongoose and various rodent species, of which all are considered alien to the Hawaiian

Islands, as well as deleterious to the native ecosystems and native faunal species.

The Hawaiian hoary bat or *'ōpe'ape'a* (*Lasiurus cinereus semotus*) is the only ESA listed terrestrial mammal in Hawai'i. Surveys for the bat were not included in the scope of this survey, as detection for the species requires specialized acoustic equipment deployed over multiple nights. Given the scarcity of records of this species from the 'Ewa Plain, it is unlikely that bats use resources in the project vicinity. Numerous potential roosting trees (trees in excess of 4.6 m [15 ft]) are present on the property.

- To avoid potential deleterious impacts to roosting bats with pups, it is recommended that no woody vegetation taller than 4.6 m (15 ft) be removed during the pupping season, from June 1 to September 15.

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Appendix D

Archaeological Literature Review and Field Inspection,
Cultural Surveys Hawai'i, Inc., December 2017

Draft
Archaeological Literature Review and Field Inspection Report for the Kalaeloa Access Roadways Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu TMK: [1] 9-1-013 and 160

Prepared for
R.M. Towill Corporation
on behalf of
Hunt Kalaeloa

Prepared by
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Cultural Surveys Hawai‘i, Inc.
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(Job Code: HONOULIULI 138)

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Management Summary

Reference	Archaeological Literature Review and Field Inspection Report for the Kalaeloa Access Roadways Project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK: [1] 9-1-013 and 160 (Harrington et al. 2017)
Date	December 2017
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: HONOULIULI 138
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological fieldwork permit number 17-08, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-282.
Agencies	SHPD
Land Jurisdiction	United States of America; State of Hawai‘i; City & County of Honolulu
Project Proponent	Hunt Kalaeloa
Project Funding	R.M. Towill Corporation
Project Location	The project area includes various streets, intersections, and cross-country segments in the area of Barbers Point in Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK Plats: [1] 9-1-013 and 160. The intersections include those of Kapolei Parkway and Kalaeloa Boulevard, Kapolei Parkway and Kamōkila Boulevard, Roosevelt Avenue and Kamōkila Boulevard, Kapolei Parkway and Wākea Street, Fort Barrette Road and Kapolei Parkway, and Fort Barrette Road and Kama‘aha Avenue. The street segments include a northwestern portion of Saratoga Avenue, a southern extension of Kamōkila Boulevard, a West Perimeter Road, Copahee Avenue, a northern portion of Hornet Street, a southern extension of Wākea Street, a northern portion of Franklin street, and a western portion of Roosevelt Avenue. The cross-country segment is Road A. It is depicted on a portion of the 1998 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle.
Project Description	The proposed project involves modifications (e.g., widening, utilities, turn lanes) to a number of streets, particularly Saratoga and Roosevelt Avenues. In addition, significant road reconfiguration is indicated for a new southern extension of Kamōkila Boulevard between Saratoga and Roosevelt Avenues, as well as new alterations to Bennington Street between Hornet and Franklin Streets.
Project Acreage	40 acres (16.2 hectares)

Document Purpose	This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project and, based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project's planning and support the project's historic preservation and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per HAR §13-276.
Fieldwork Effort	The fieldwork component of this field inspection was completed 17 and 18 October 2017, and 15 November 2017 by CSH archaeologists under the general supervision of Principal Investigator David Shideler, M.A. This work required approximately 5-person days to complete. A 100%-coverage pedestrian inspection of the project area and GPS data collection was undertaken for the purpose of historic property identification and documentation. The pedestrian survey was accomplished through systematic sweeps spaced 5 m apart.
Results Summary	Background research and review of previous archaeological studies has identified the area as not having been heavily used in the pre-Contact and post-Contact periods for habitation. In pre-Contact periods, the area is associated with various gods. The Pu‘u o Kapolei Heiau is located to the northeast of the project area. In the post-Contact period, the area was used for domestic animal husbandry and was later heavily utilized for military purposes, including Barbers Point military complex. During the field inspection, several remnants of historic foundations were documented and designated as CSH 1. These features correspond with the historic military buildings built in the 1940s to 1950s. A filled-in well (CSH 2) of indeterminate age was documented along Roosevelt Avenue. A former road (CSH 3) was also documented along Saratoga Avenue near the area of CSH 1. CSH 3 corresponds with a road seen on historic maps. Consultation with SHPD is recommended regarding formal historic property designation for CSH 2 due to the historic nature of artesian well drilling in the area.

Recommendations	While the features of CSH 1 are older than 50 years of age, they appear to lack integrity due to the buildings and foundations having been removed and only remnants of base course and debris remaining. Consultation with SHPD is recommended regarding formal historic property designations for these remnant foundations and the former road (CSH 3). CSH's informed opinion is that the CSH 1 features do not fulfill the criteria pursuant to HAR §13-275-6. Consultation with SHPD is recommended regarding formal historic property designation for the filled-in well (CSH 2) due to the historic nature of artesian well drilling in the area. Based on the results of this study, early consultation with SHPD is recommended to determine what (if any) further archaeological study is indicated. CSH recommends a combination of on-site and on-call monitoring with on-site monitoring limited to the southern extension of Kamōkila Boulevard, the Wākea Street Extension, and "Road A" and on-call monitoring for all other areas of the project that are current roadways. Reasoning for this recommended monitoring plan is due to the potential for historic surface and subsurface sites to be encountered within the areas previously utilized by the Barbers Point Naval Air Station. Due to the heavily disturbed nature at the intersections, it is unlikely that historic properties would be encountered.

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Section 1 Introduction

1.1 Project Background

At the request of R.M. Towill Corporation on the behalf of Hunt Kalaeloa, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this literature review and field inspection report (LRFI) for the Kalaeloa Access Roadways project, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu, TMK: [1] 9-1-013, various parcels and roads. The 40 acre (16.2 hectares) project area, owned by the United States of America; State of Hawai‘i; and the City and County of Honolulu, is depicted on a portion of the 1998 Ewa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), tax map plats (Figure 2 and Figure 3), and a 2013 aerial photograph (Figure 4).

The proposed project involves modifications (e.g., widening, utilities, turn lanes) to a number of streets, particularly Saratoga and Roosevelt Avenues. In addition, significant road reconfiguration is indicated for the new southern extension of Kamōkila Boulevard, between Saratoga and Roosevelt Avenues, as well as new alterations to Bennington Street between Hornet and Franklin streets. The study area includes the following:

- The proposed intersection improvements at:
    - The intersection of Kapolei Parkway and Kalaeloa Boulevard,
    - The intersection of Kapolei Parkway and Kamōkila Boulevard,
    - The intersection of Roosevelt Avenue and Kamōkila Boulevard,
    - The intersection of Kapolei Parkway and Wākea Street,
    - The intersection of Fort Barrette Road and Kapolei Parkway,
    - The intersection of Fort Barrette Road and Kama‘aha Avenue,
- A northwestern portion of Saratoga Avenue including a yet-to-be created segment,
- A southern extension of Kamōkila Boulevard,
- A West Perimeter Road,
- Copahee Avenue,
- A northern portion of Hornet Street,
- A southern extension of Wākea Street,
- A northern portion of Franklin Street,
- A to be created Road A, and
- A western portion of Roosevelt Avenue.

1.2 Document Purpose

This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project and, based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project’s planning and support the project’s historic preservation and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per Hawai‘i Administrative Rules (HAR) §13-276.

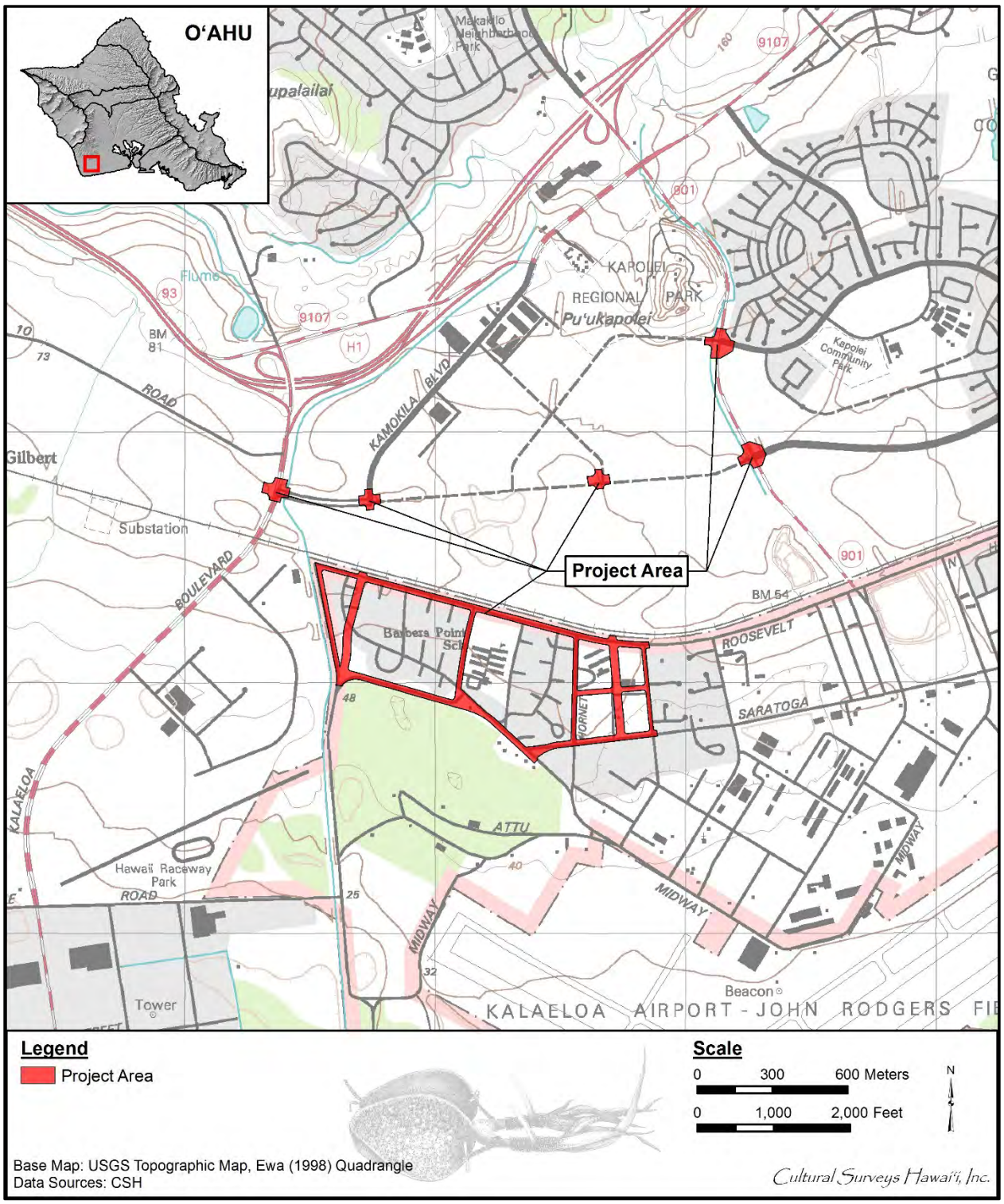


Figure 1. Portion of the 1998 Ewa USGS 7.5-minute topographic quadrangle showing the project area

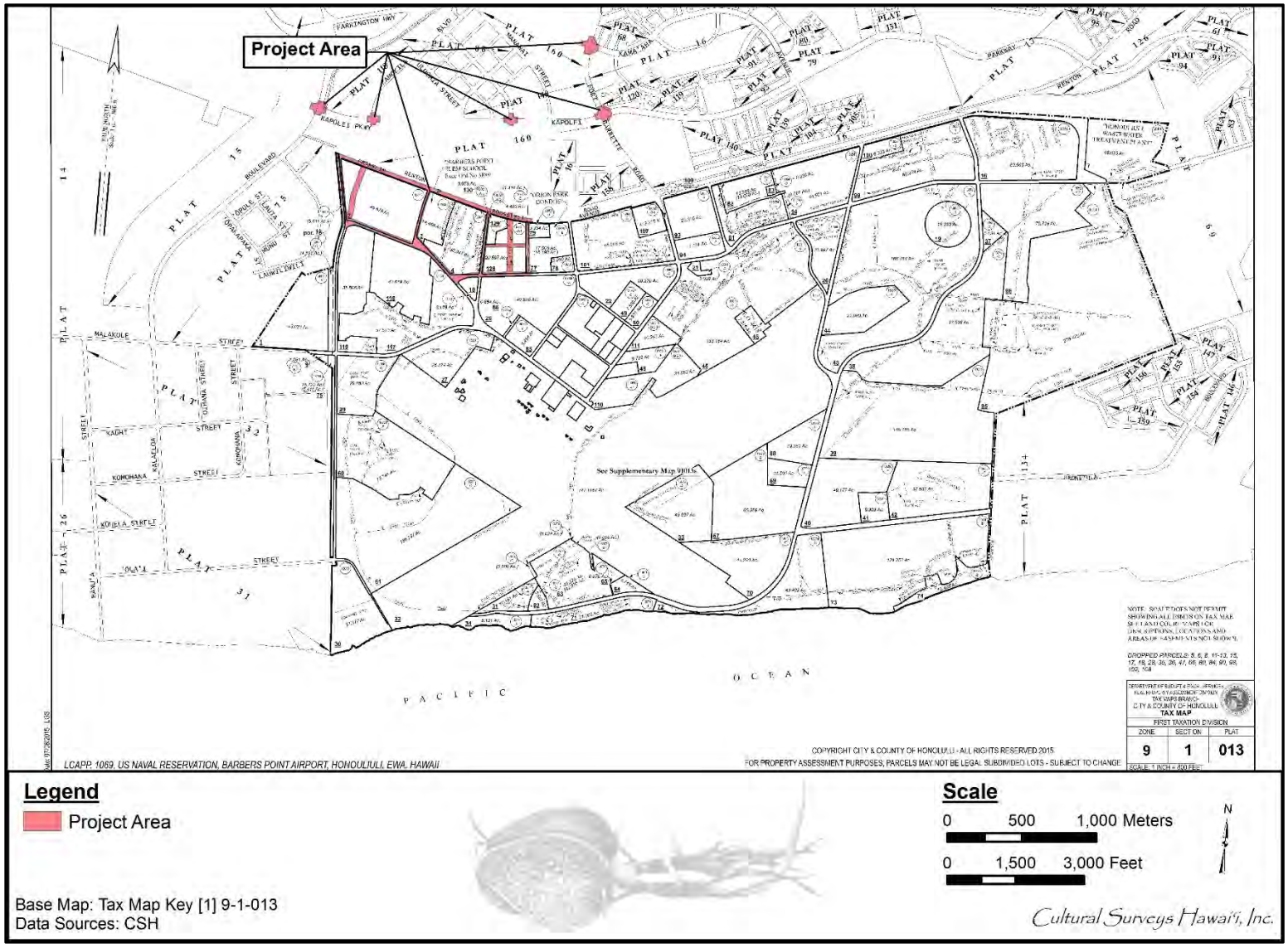
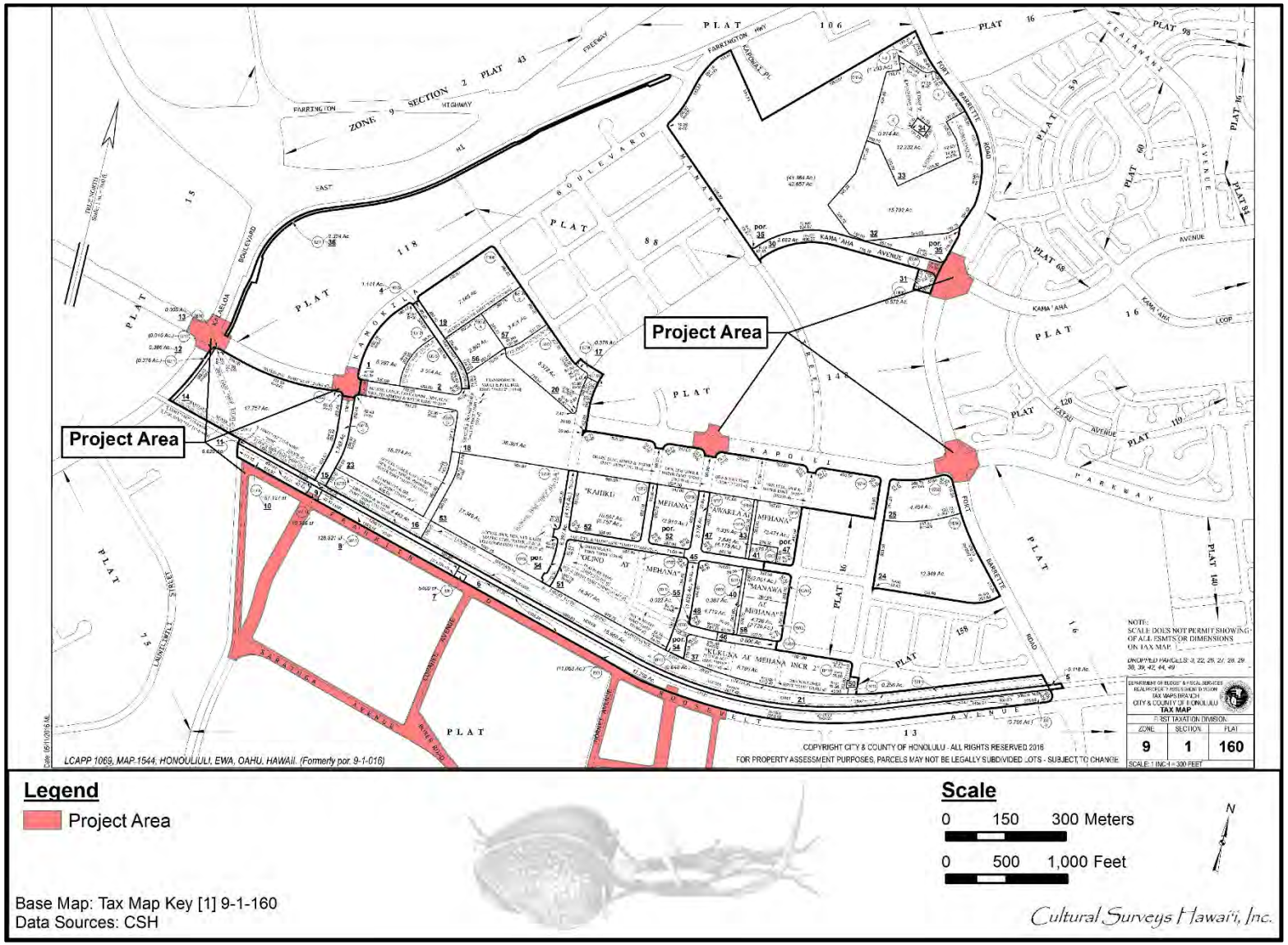


Figure 2. Tax Map Key (TMK) [1] 9-1-013 showing the project area (Hawai‘i TMK Service 2014)



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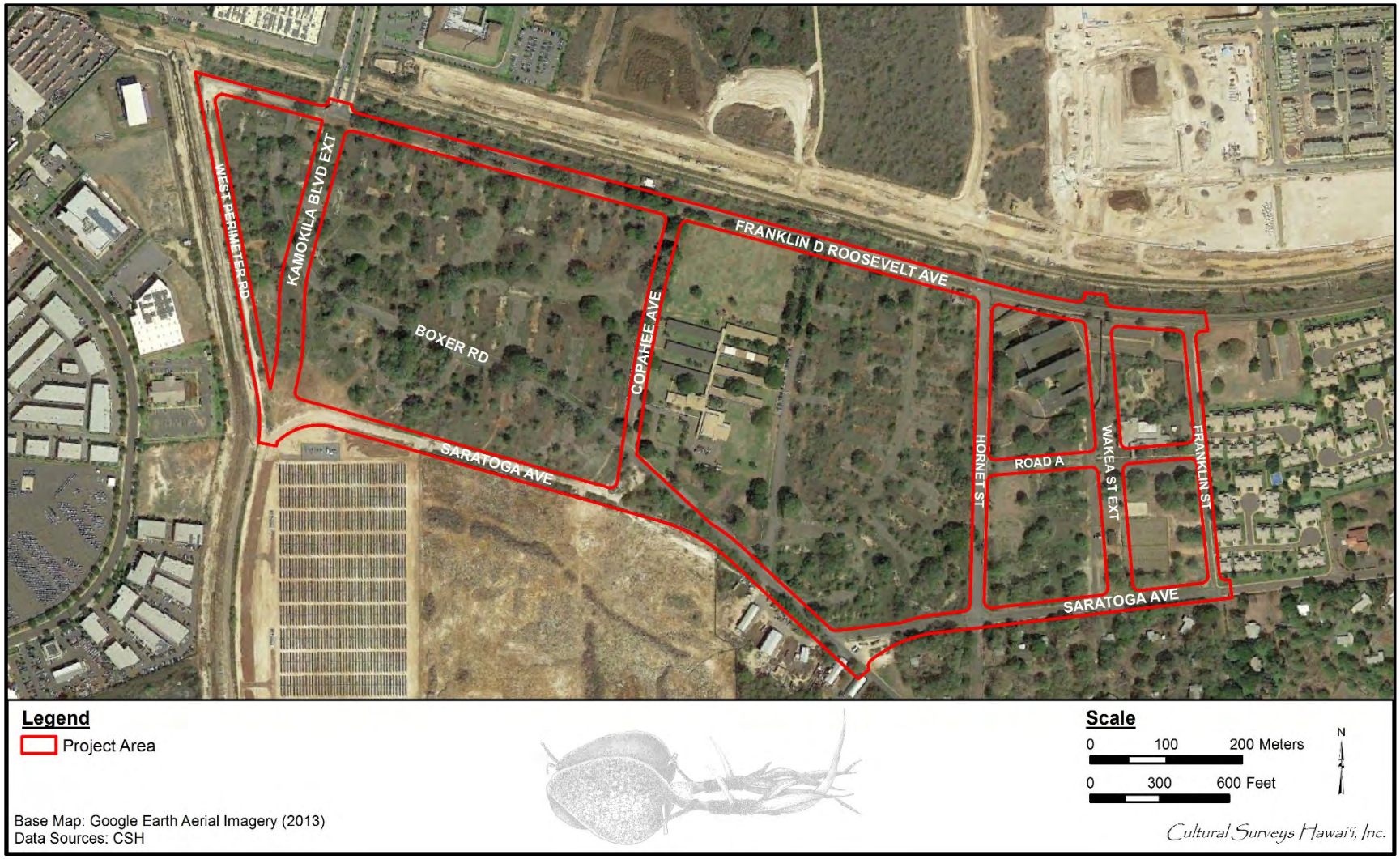

Figure 4. Aerial photograph showing the location of the project area (Google Earth 2013)

Figure 5. Project area schema as provided by client (does not show “Road A” and “Wākea St. Extension”)

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is in the *mauka* (inland) portion of the former Barbers Point Naval Air Station (closed), approximately 2 km (1.2 miles) inland. The terrain generally consists of limestone and alluvial deposits overlying flows of the Wai‘anae volcanic series (Macdonald et al. 1983:423). To the east of the project area is the Makakilo GI stream that runs north to south, and to the west of the project area is the Barbers Point stream that runs north to south. There is also a dry, concrete lined canal that extends north to south just west of Saratoga Street. The project area is generally level, with an elevation of approximately 14–15 m (46–49 feet [ft]) above mean sea level (AMSL). The project area is in one of the driest regions of O‘ahu. Rainfall for the area averages approximately 545 mm (21.5 inches) annually (Giambelluca et al. 2013). The average temperature in the area is approximately 23.6°C (74.5°F) (Giambelluca et al. 2014). In pre-Contact Hawai‘i, the vicinity of the project area would have consisted mostly of lowland coastal dry shrub and grassland. However, the area has been extensively disturbed and transformed by human activity, with most of the land now dominated by a variety of exotic grasses, weeds, and shrubs. These grasses and shrubs, along with pockets of *kiawe* (*Prosopis pallida*), castor bean (*Ricinus communis*), monkeypod (*Albizia saman*), *klu* (*Acacia farnesiana*), *koa haole* (*Leucaena leucocephala*), and a few scattered banyan (*Ficus* spp.) trees are characteristic of the vegetation of the project vicinity. Alternatively, portions of the area have been graded and grubbed bare.

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the project area’s soils consist primarily of Mamala stony silty clay loam (MnC) within the western 25% of the project area, and Coral (limestone) Outcrop (CR) in the eastern 75% of the project area (Foote et al. 1972) (Figure 6). There are small areas that consist of Ewa silty clay loam (EmA) and Honouliuli clay (HxA) in the northern areas. It is believed the limestone coral outcrop is the base material and that the overlying stony silty clay loam may be of no great thickness. Furthermore, commercial agriculture sought to transport soil onto the limestone coral outcrop plains, and it may be soil cover in the western project area is only about a century old.

The surface of the Pleistocene age limestone outcrop, where not covered by alluvium or stockpiled material, has characteristic dissolution “pit caves” (Mylroie and Carew 1995). These pit caves are nearly universally, but erroneously, referred to as “sink holes” (Halliday 2005). These pit caves vary widely in extent and depth, with the more modest features comparable in volume to 5-gallon buckets. The larger features, although usually irregularly shaped, are up to several meters wide and several meters deep.

Mamala soils are described as follows:

> This series consists of shallow, well-drained soils along the coastal plains on the island of Oahu and Kauai. These soils formed in alluvium deposited over coral limestone and consolidated calcareous sand. They are nearly level to moderately sloping. [Foote et al. 1972:93]

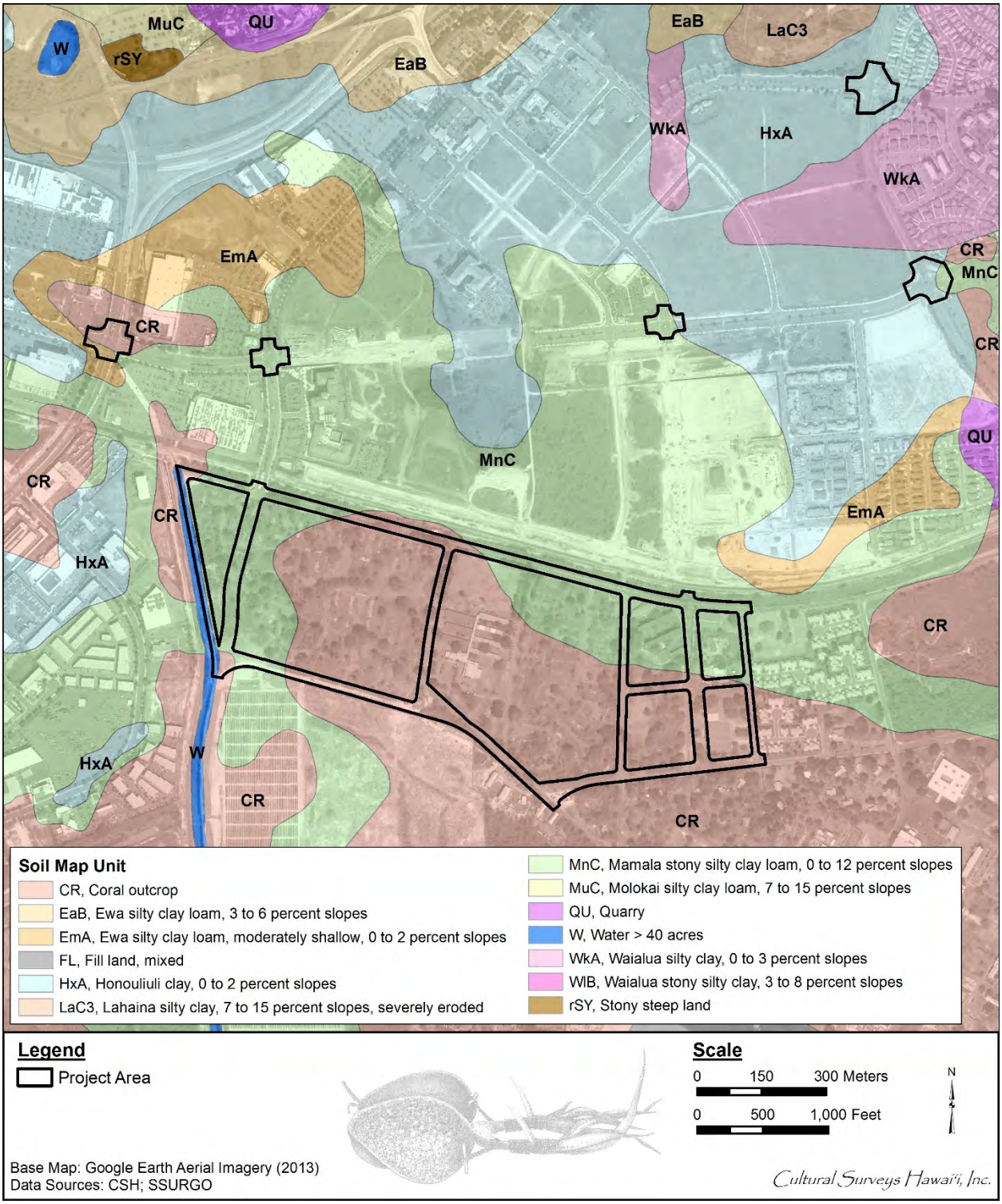

Figure 6. 2013 Google Earth aerial image with an overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the project area (USDA SSURGO 2001)

Coral (limestone) Outcrop (Cr) soils are described as follows:

> Coral outcrop (Cr) consists of coral or cemented calcareous sand on the island of Oahu . . . Coral outcrop makes up about 80 to 90 percent of the acreage. The remaining 10 to 20 percent consists of a thin layer of friable, red soil material in cracks, crevices, and depressions within the coral outcrop. This soil material is similar to that of the Mamala series. [Foote et al. 1972:29]

Ewa soils are described as follows:

> This series consists of well-drained soils in basins and on alluvial fans on the islands of Maui and Oahu. These soils developed in alluvium derived from basic igneous rock. They are nearly level to moderately sloping. [Foote et al. 1972:29]

Honouliuli soils are described as follows:

> This series consists of well-drained soils on coastal plains on the island of Oahu in the Ewa area. These soils developed in alluvium derived from basic igneous material. They are nearly level and gently sloping. [Foote et al. 1972:43]

1.3.2 Built Environment

The project area is approximately 700 m (0.4 miles) north of the Kalaeloa Airport runway in Barbers Point (see Figure 4). It is within a former military area that contains vestiges of the former structures and roads associated with previous military development. These include foundations of former military buildings, roads in various states of repair, and a few unpaved trails made by off-road vehicles.

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological fieldwork permit number 17-08, issued by the State Historic Preservation Division (SHPD) pursuant to HAR §13-282. Fieldwork was conducted 17 and 18 October 2017, and 15 November 2017 by CSH archaeologists Gina Farley, M.A., Katherine I. Harrington, M.A., Alexandra Bennicas, B.A., and Allison Hummel, M.A., under the general supervision of Principal Investigator David Shideler, M.A. This work required approximately 5 person-days to complete. Fieldwork consisted of a 100% pedestrian inspection of the project area and GPS data collection.

A 100%-coverage pedestrian inspection of the project area was undertaken for the purpose of historic property identification and documentation. The pedestrian survey was accomplished through systematic sweeps spaced 5 m apart. GPS data collection and photography of any potential historic properties was accomplished during the field inspection. The GPS data collected was compared with historic data and maps to determine if the potential historic properties corresponded with any documented historic structures.

2.2 Research Methods

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘I at Mānoa, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (2000).

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of historic properties in the project area.

Section 3 Background Research

3.1 Traditional Background

As a traditional land unit, Honouliuli Ahupua‘a contained tremendous amounts of varied resources available for exploitation by early Hawaiians. Within Honouliuli Ahupua‘a, a long coastline fronts the normally calm waters of leeward O‘ahu. In addition, 6.4 km (4 miles) of shore fronts the west side of the West Loch of Pearl Harbor. The “karstic desert” and marginal characterization of the limestone plain—the area’s most readily visible terrain—does not do justice to the *ahupua‘a* as a whole. The following available resources contribute to the richness of this land unit:

1. 19.3 km (12 miles) of coastline with continuous shallow fringing reef offering rich marine resources;
2. 6.4 km (4 miles) of frontage on the waters of West Loch (west side of Pearl Harbor, or Pu‘uloa) offering extensive fisheries (mullet, *awa*, shellfish) and frontage suitable for the development of fishponds (e.g., Laulaunui);
3. The lower portion of Honouliuli Valley in the ‘Ewa plain providing rich, level alluvial soils with plentiful sources of irrigation from either the stream or abundant springs, stretching well up the valley;
4. A broad limestone plain with innumerable limestone sinkholes offering nesting sites for a large population of avifauna, which may have been one of the early attractions to human settlement; and
5. An expansive upland forest zone extending as far as 19.3 km (12 miles) inland from the edge of the coastal plain comprising a biologically diverse forest with *kukui* (*Aleurites moluccanus*) *‘ōhia* (*Metrosideros polymorpha*), *‘iliahi* (sandalwood*; Santalum* spp.), *hau* (*Hibiscus tiliaceus*), *tī* (*Cordyline fruticosa*), and banana (*Musa* sp.), among others.

The *‘ili* (smaller land division within an *ahupua‘a*) of Honouliuli, where Honouliuli Stream empties into the northern portion of West Loch, is understood to have been the political and cultural center of the *ahupua‘a.* This area, east of the present project area, contained a dense settlement with rich lands irrigated for taro cultivation. The name of the *ahupua‘a*, translated as “dark bay” (Pukui et al. 1974:51), may refer to the nature of the waters of West Loch at the mouth of Honouliuli Stream. Early accounts and maps indicate the *‘ili* of Honouliuli contained a large settlement. Additionally, the political power of this village was potentially great enough that its jurisdiction extended well to the northwest. The northwest area was anticipated to fall under the dominion of the ruling Wai‘anae chiefs.

3.1.1 Mythological and Traditional Accounts

The traditions of Honouliuli Ahupua‘a have been compiled and summarized numerous times in various reports (Charvet-Pond and Davis 1992, Hammatt and Folk 1981, Haun and Kelly 1991, Maly 1992, Sterling and Summers 1978, Tuggle and Tomonari-Tuggle 1997). Some of the themes of these traditions include connections with Kahiki (i.e., Tahiti, thought to be one of the primary sources of major migrations to Hawai‘i in pre-Contact times), and the special character and relationship to the places known as Pu‘uokapolei and Kualaka‘i. There are several versions of the chief Kaha‘i leaving from Kalaeloa for a trip to Kahiki; upon his return to the Hawaiian Islands he

brought back the first breadfruit (Kamakau 1991:110) and planted it at Pu‘uloa, near Pearl Harbor in ‘Ewa (Beckwith 1940:97). Several stories associate places in Honouliuli with the gods Kāne and Kanaloa, with the Hawaiian pig god Kamapua‘a and the Hina family, and with the sisters of Pele, the Hawaiian volcano goddess. These deities all have strong connections with Kahiki (Kamakau 1991:111; Pukui et al. 1974:200). In addition, there are several references to chiefly lineages and to the ruling chiefs Hilo-a-Lakapu and Kūali‘i, while Ko ‘Olina is reported to have been a vacationing place for ruling chief Kākuhihewa. The locations of traditional place names for Honouliuli are illustrated in Figure 7.

3.1.1.1 The Naming of Honouliuli

Honouliuli is the largest *ahupua‘a* in the *moku* (district) of ‘Ewa. One translation of the name for this district is given as “unequal” (*Saturday Press*, 11 August 1883). Others translate the name as “strayed” and associate it with legends of the gods, Kāne and Kanaloa:

> When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of the land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere, in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by the name. The stone that strayed. [Told to E.S. by Simeon Nawaa, 22 March 1954 in Sterling and Summers 1978:1]

Honouliuli has been translated as “dark water,” “dark bay,” or “blue harbor” and was named after the waters of Pearl Harbor (Jarrett 1930:22), which marks the eastern boundary of the *ahupua‘a*. The Hawaiian name for Pearl Harbor, “Pu‘uloa,” is usually translated as “long hill” but may refer to a heaped mound. Another explanation for the name comes from the “Legend of Lepeamoa,” the chicken-girl of Pālama. In this legend, Honouliuli is the name of the husband of the chiefess Kapālama and grandfather of Lepeamoa (Thrum 1923:164–184). “Her grandfather gave his name, Honouliuli, to a land district west of Honolulu” (Thrum 1923:170). Westervelt (1987:209–210) provides an almost identical account.

It seems likely the boundaries of the westernmost *ahupua‘a* of ‘Ewa were often contested with Wai‘anae people. However, the ‘Ewa people could cite divine sanction that the dividing point was between two hills at Pili o Kahe:

> Eventually the stone was found at Pili o Kahe. This is a spot where two small hills of the Wai‘anae Range come down parallel on the boundary between Honouliuli and Nānākuli (‘Ewa and Wai‘anae). The ancient Hawaiians said the hill on the ‘Ewa side was the male and the hill on the Wai‘anae side was female. The stone was found on the Waianae side hill and the place is known as Pili o Kahe.
>
> (Pili = cling to, Kahe = flow). The name refers, therefore, to the female or Waianae side hill. And that is where the boundary between the two districts runs. [Told to E.S. by Simeon Nawaa, 22 March 1954, cited in Sterling and Summers 1978:1]

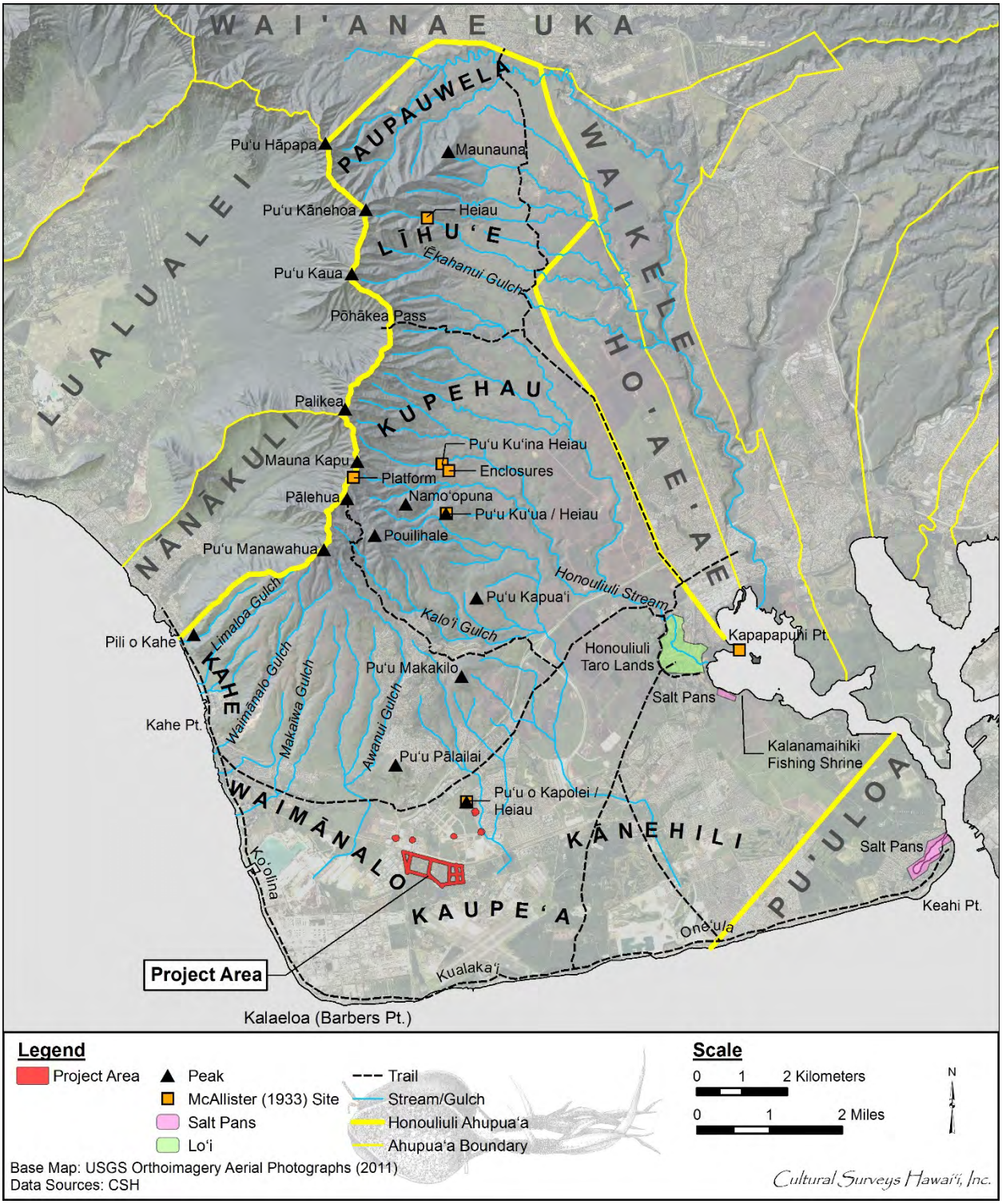

Figure 7. 2011 USGS Orhtoimagery aerial photograph with overlay of place names of Honouliuli (adapted from Sterling and Summers 1978)

3.1.1.2 The Pele Family at Honouliuli

Kapolei (literally “beloved Kapo”), specifically the 50.6-m (166-ft) high cone of that name, was named in reference to the volcano goddess Pele’s sister, Kapo (Pukui et al. 1974:89). Pōhākea Pass is known as one of the resting places of another of Pele’s sisters, Hi‘iaka, as she was returning from Kaua‘i with Pele’s lover, Lohiau (Fornander 1919:5:188 note 6). A considerable number of *mele* (songs) and *pule* (prayers) are ascribed to Hi‘iaka as she stood at the summit of Pōhākea (*Aluna au a Pōhākea, Kū au, nānā ia Puna,* in Emerson 1915:162–168). From her vantage point and with her powers of vision, Hi‘iaka could see that her beloved *lehua* groves and friend Hopoe at Puna, Hawai‘i Island, had been blasted by her jealous sister Pele. She could also see that in her canoe, off the coast of Wai‘anae, Lohiau was seducing her traveling companion Wahine‘ōma‘o. Additionally, a spring located at Kualaka‘i near Barbers Point was named Hoaka-lei (*lei* reflection) because Hi‘iaka picked *lehua* flowers (from *‘Ōhi‘a-lehua* trees, *Metrosideros macropus*) here to make a *lei* (a garland or wreath symbolizing love, honor, or friendship) and saw her reflection in the water.

3.1.1.3 Kamapua‘a

Kamapua‘a, the pig god, is associated with Honouliuli as follows:

> Kamapua‘a subsequently conquered most of the island of O‘ahu, and, installing his grandmother [Kamaunuaniho] as queen, took her to Puuokapolei, the lesser of the two hillocks forming the southeastern spur of the Wai‘anae Mountain Range, and made her establish her court there. This was to compel the people who were to pay tribute to bring all the necessities of life from a distance, to show his absolute power over all. [Nakuina 1904:50]

Nakuina (1904:50) further notes “[a]” very short time ago [prior to 1904] the foundations of Kamaunuaniho’s house could still be seen at Puuokapolei.” Another account (*Ka Loea Kālai‘āina* 13 January 1900) speaks of Kekeleaiku, the older brother of Kamapua‘a, who also was said to have lived on Pu‘uokapolei.

3.1.1.4 The Traveling Mullet of Honouliuli (Fish Stories)

The story of (Ka) Ihuopala‘ai is also associated with the tradition of the *‘anae-holo*, or traveling mullet:

> The home of the anae-holo is at Honouliuli, Pearl Harbor, at a place called Ihuopalaai. They make periodical journeys around to the opposite side of the island, starting from Puuloa and going to windward, passing successively Kumumanu, Kalihi, Kou, Kalia, Waikiki, Kaalawai, and so on, around to the Koolau side, ending at Laie, and then returning by the same course to their starting point. [Thrum 1907:271]

Thrum (1907) provides an account where Ihuopala‘ai is a male who possesses a Kū‘ula, or fish god, who supplied the large mullet known as *‘anae*. His sister lived in Lā‘ie, and there came a time when there were no fish. She sent her husband to visit Ihuopala‘ai, who was kind enough to send the fish following his brother-in-law on his trip back to Lā‘ie. This story is associated with a poetical saying documented by Pukui (1983) about Honouliuli:

Ka i‘a hali a ka makani

The fish fetched by the wind [Pukui 1983:145]

Pukui (1983:145) further explains "[t]he *‘anaeholo*, a fish that travels from Honouliuli, where it breeds, to Kaipāpa‘u on the windward side of O‘ahu. It then turns about and returns to its original home. It is driven closer to shore when the wind is strong."

3.1.1.5 Pu‘uokapolei and the Reckoning of the Seasons (Kamakau)

Kamakau (1976) relates the following:

> . . . the people of O‘ahu reckoned from the time when the sun set over Pu‘uokapolei until it set in the hollow of Mahinaona and called this period Kau [summer], and when it moved south again from Pu‘uokapolei and it grew cold and the time came when young sprouts started, the season was called from their germination *(‘ōilo*) the season of Ho‘oilo [winter, rainy, season]. [Kamakau 1976:14]

3.1.1.6 Pu‘u Kapolei and the Plains of Kaupe‘a and Kānehili

There are several places on the ‘Ewa coastal plain associated with *ao kuewa*, the realm of the homeless souls. Kamakau (1964:47–49) explains Hawaiian beliefs of the afterlife as follows:

> . . . There were three realms (*ao*) for the spirits of the dead . . . There were, first, the realm of the homeless souls, the *ao kuewa*; second, the realm of the ancestral spirits, the *ao ‘aumakua*; and third, the realm of Milu, *ke ao o Milu* . . .
>
> The *ao kuewa*, the realm of homeless souls, was also called the *ao ‘auwana*, the realm of wandering souls. When a man who had no rightful place in the *‘aumakua* realm (*kanaka kuleana ‘ole*) died, his soul would wander about and stray amongst the underbrush on the plain of Kama‘oma‘o on Maui, or in the *wiliwili* grove of Kaupe‘a on Oahu. If his soul came to Leilono [in Hālawa, ‘Ewa near Red Hill], there he would find the breadfruit tree of Leiwalo, *ka‘ulu o Leiwalo*. If it was not found by an *‘aumakua* soul who knew it (*i ma‘a mau iaia*), or one who would help it, the soul would leap upon the decayed branch of the breadfruit tree and fall down into endless night, the *pō pau ‘ole o Milu*. Or, a soul that had no rightful place in the *‘aumakua* realm, or who had no relative or friend (*makamaka*) there who would watch out for it and welcome it, would slip over the flat lands like a wind, until it came to a leaping place of souls, a *leina a ka ‘uhane* . . . [Kamakau 1964:47]
>
> On the plain of Kaupe‘a beside Pu‘uloa [Pearl Harbor], wandering souls could go to catch moths (*pulelehua*) and spiders (*nanana*). However, wandering souls could not go far in the places mentioned earlier before they would be found catching spiders by ‘aumakua souls, and be helped to escape. . . . [Kamakau 1964:49]

The breadfruit tree, Leilono, was said to have been on the ‘Ewa-Kona border, above Āliamanu. In another section of his account of the dead, Kamakau calls the plain of wandering souls the "plain at Pu‘uokapolei":

> There are many who have died and have returned to say that they had no claim to an ‘aumakua [realm] (*kuleana‘ole*). These are the souls, it is said, who only wander

upon the plain of Kama‘oma‘o on Maui or on the plain at Pu‘uokapolei on Oahu. Spiders and moths are their food. [Kamakau 1964:29]

This association of Pu‘u o Kapolei and Kānehili with wandering souls is also illustrated in a lament on the death of Kahahana, the paramount chief of O‘ahu killed by his father, Kahekili, after Kahahana became treacherous and killed the high priest Kaopulupulu:

Go carefully lest you fall dead in the sun,	*E newa ai o hea make i ka lā,*
The god that dwells on Kapolei hill.	*Akua noho la i Pu‘uokapolei.*
The sun is wailing on account of the women of Kamao,	*E hanehane mai ana ka lā i nā wahine o Kamao*,
A hiding god, blossoming ohai of the banks,	*Akua pe‘e, pua ‘ohai o ke kaha*,
Contented among the stones-	*I walea wale i ke a-*
Among the breadfruit planted by Kahai.	*I ka ulu kanu a Kahai*.
Thou hast spoken of by the oo-	*Haina ‘oe e ka oo-*
By the bird of Kanehili.	*E ka manu o Kānehili.*

[Fornander 1919:6 (2):297]

Fornander also provides some notes on this lament. The god dwelling at Kapolei is the god Kahahana, stating that this is where his soul has gone. Kamao is one of the names of the door to the underworld. This lament also draws an association with wandering souls and the place where the first breadfruit tree was planted by Kahai at Pu‘uloa (Fornander 1919:6 [2]:304).

Pukui offers the following Hawaiian saying, which places the wandering souls in a *wiliwili* (*Erythrina sandwicensis*) grove at Kaupe‘a:

The wiliwili grove of Kaupe‘a	*Ka wiliwili of Kaupe‘a*.

In ‘Ewa, O‘ahu. Said to be where homeless ghosts wander among the trees. [Pukui 1983:180]

Beckwith (1940:154) has stressed that “the worst fate that could befall a soul was to be abandoned by its *‘aumakua* [family god; deified ancestor] and left to stray, a wandering spirit (*kuewa*) in some barren and desolate place.” As these wandering spirits were often malicious, the places they wandered were avoided.

In a chant by Hi‘iaka, several place names in ‘Ewa are mentioned as she travels from Pu‘uokapolei toward the ‘Ewa coast. In the chant, Hi‘iaka is moving downhill from Kaupe‘a, probably the plains adjacent to Pu‘uokapolei, toward the coast to the plains of Kānehili. The chant also refers to Pe‘e-kaua, which may be a variation of Kau-pe‘e or Kaupe‘a. Hi‘iaka sang this bitter chant addressed to Lohi‘au and Wahine-oma‘o, and it references the association of the Plains of Kaupe‘a as a place for the wandering of lost souls. The name Kānehili also refers to wandering, as the word *hili* means “to go astray” (Emerson 1915:162). Hi‘iaka’s chant is presented below:

Ku‘u aikana i ke awa lau o Pu‘uloa,

Mai ke kula o Pe‘e-kaua, ke noho ‘oe,

E noho kaua e kui, e lei i ka pua o ke kauno‘a,

I ka pua o ke akuli-kuli, o ka wili-wili;

O ka iho‘na o Kau-pe‘e i Kane-hili,

Ua hili au; akahi no ka hili o ka la pomaika‘i;

E Lohiau ipo, e Wahine-oma‘o,

Hoe ‘a mai ka wa‘a i a‘e aku au.

We meet at Ewa’s leaf-shaped lagoon, friends;

Let us sit, if you will on this lea

And bedeck us with wreaths of Kaunao‘a,

Of akuli-kuli and wili-wili,

My soul went astray in this solitude;

It lost the track for once, in spite of luck,

As I came down the road to Kau-pe‘a.

No nightmare dream was that which tricked my soul.

This way, dear friends; turn the canoe this way;

Paddle hither and let me embark.

[Emerson 1915:162–163]

3.1.2 Pre- to Early Post-Contact Period

Various Hawaiian legends and early historical accounts indicate the *ahupua‘a* of Honouliuli was once widely inhabited by pre-Contact Hawaiian populations, including the Hawaiian *ali‘i* (chiefly class). This substantial population was supported by the plentiful marine and estuarine resources available at the coast. The coastal area contains several historic properties that are interpreted as permanent habitations. Other important subsistence-related features of the *ahupua‘a* included irrigated lowlands suitable for wetland taro cultivation (Hammatt and Shideler 1990) and the lower forested mountain slopes for the procurement of forest goods.

As suggested by Handy and Handy, the exploitation of the forest resources along the slopes of the Wai‘anae Range probably acted as a viable subsistence alternative during times of famine:

> . . . The length or depth of the valleys and the gradual slope of the ridges made the inhabited lowlands much more distant from the *wao*, or upland jungle, than was the case on the windward coast. Yet the *wao* here was more extensive, giving greater opportunity to forage for wild foods during famine time. [Handy and Handy 1972:469–470]

These upper valley slopes may have been a significant resource for opportunistic quarrying of basalt for the manufacturing of stone tools. This is evidenced by the existence of a probable quarrying site (State Inventory of Historic Places [SIHP] # 50-80-12-4322) in Makaīwa Gulch at 152 m (500 ft) elevation, west of the current study area (Hammatt et al. 1991).

Honouliuli was not as densely populated as other parts of ‘Ewa. Habitation and ceremonial sites were usually found along streams in the foothills, where taro could be cultivated, including at Kalo‘i Gulch and Pu‘u Ku‘ua. A more populated area was Pu‘uloa, on the east side of the *ahupua‘a*, along the west loch of Pearl Harbor.

The Hawaiian *ali‘i* were also attracted to the region. One historical account of particular interest refers to an *ali‘i* residing in Ko ‘Olina, southwest of the current study area:

> Ko ‘Olina is in Waimānalo near the boundary of ‘Ewa and Wai‘anae. This was a vacationing place for chief Kakuhihewa and the priest Napuaikamao was the caretaker of the place. Remember Reader; this Koolina is not situated in the Waimānalo on the Koolau side of the island but the Waimānalo in ‘Ewa. It is a lovely and delightful place and the chief; Kakuhihewa loved this home of his. [Sterling and Summers 1978:41]

John Papa ‘Ī‘ī describes a network of Leeward O‘ahu trails (Figure 8). In later historic times these trails encircled and crossed the Wai‘anae Range, allowing passage from West Loch to the Honouliuli lowlands, past Pu‘u o Kapolei and Waimānalo Gulch to the Wai‘anae coast and onward, circumscribing the shoreline of O‘ahu (‘Ī‘ī 1959:96–98). Early historical maps, such as a Malden 1825 map (see Figure 9), show trails to the north, east, south and west; however, they are all a kilometer or more distant, suggesting little activity in the project area vicinity.

Other early historical accounts of the general region typically refer to the more populated areas of the ‘Ewa district. Missions and schools were established in these areas, where subsistence resources were perceived to be greater. However, the presence of historic properties along the coral plains and coast of southwest Honouliuli Ahupua‘a indicate pre- and early post-Contact populations also adapted to less inviting areas.

Subsequent to Western Contact, the landscape of Honouliuli, the ‘Ewa plains, and the Wai‘anae slopes was adversely affected by the removal of sandalwood and other trees, as well as the introduction of domesticated animals and new vegetation. Goats, sheep, and cattle brought to the Hawaiian Islands by Vancouver in the early 1790s were allowed to graze freely about the land for some time after. L.A. Henke reports the existence of a longhorn cattle ranch in Wai‘anae by at least 1840 (Frierson 1972:10). During this time, possibly as early as 1790, exotic plant species were also introduced to the area. This included species suited to a terrain disturbed by the logging of sandalwood forest and eroded by animal grazing. The following dates of introduced vegetation are given by Smith and outlined by Frierson (1972):

> early, circa 1790:
>
> Prickly pear cactus, *Opuntia tuna*
>
> *Haole koa, Leucaena leucocephala*
>
> Guava, *Psidium guajava*
>
> 1835–1840:
>
> Burmuda [*sic*] grass, *Cynodon dactylon*
>
> Wire grass, *Eleusine indica*

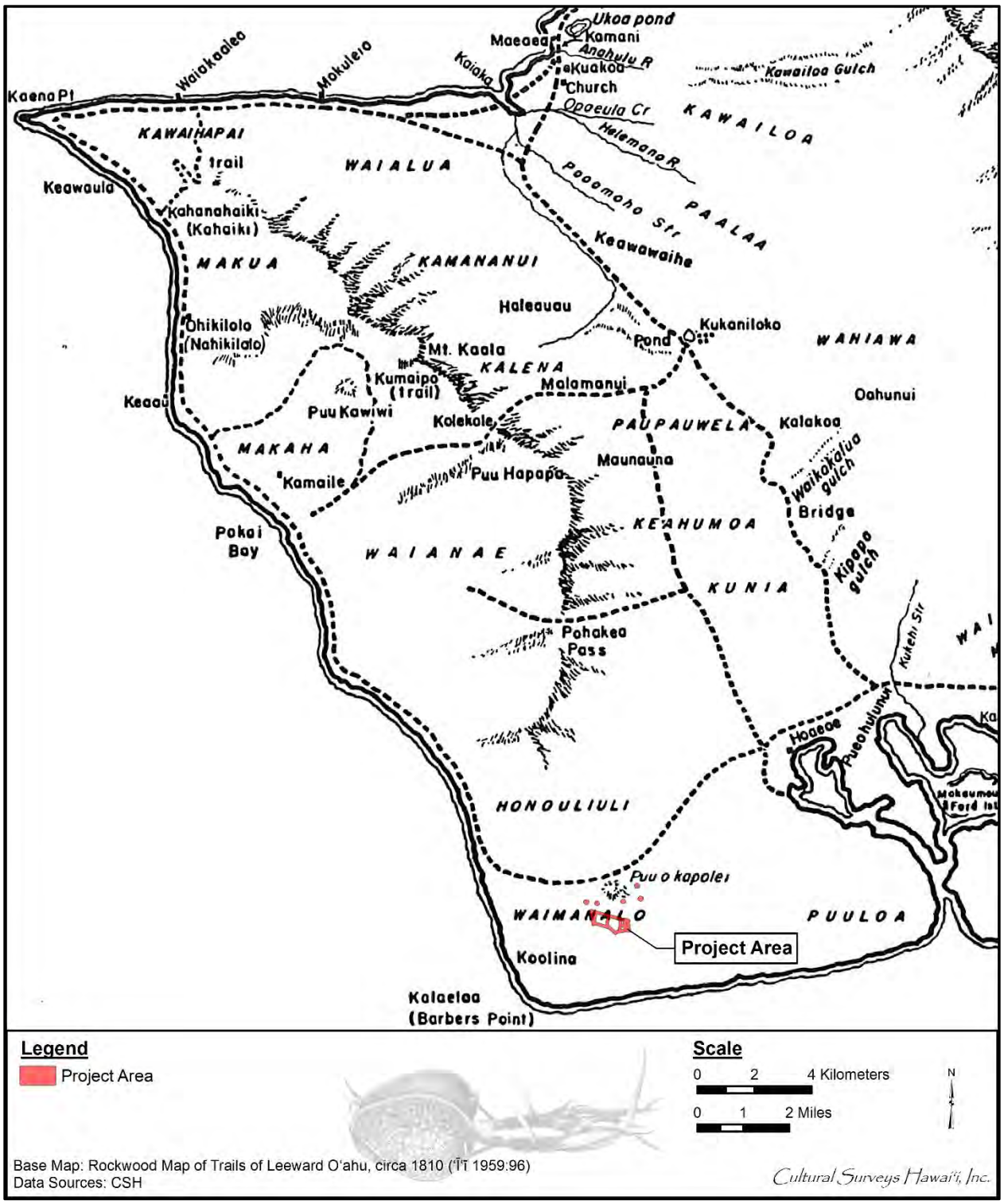

Figure 8. Portion of 1810 Rockwood Map of Trails of Leeward O‘ahu as described by ‘Ī‘ī (1959:96)

1858:

Lantana, *Lantana camara*. [Frierson 1972:10–11]

The *kiawe* tree (*Prosopis pallida*) was also introduced during this period, either in 1828 or 1837 (Frierson 1972:11).

3.1.3 Honouliuli Settlement Patterns

Archaeological and traditional sources show a general settlement pattern of three main areas within Honouliuli Ahupua‘a: a coastal zone, the Honouliuli taro lands, and inland settlement at Pu‘u Ku‘ua.

3.1.3.1 The Coastal Zone – Kalaeloa (Barbers Point)

Archaeological research at Barbers Point has focused on the areas in and around the Deep Draft Harbor (Barrera 1975, Davis and Griffin 1978, Hammatt and Folk 1981, McDermott et al. 2000). Series of small clustered shelters, enclosures, and platforms show limited but recurrent use at the shoreline zone for marine-oriented exploitation. This settlement covers much of the shoreline, with more concentrated features around small marshes and wet sinks. Immediately behind the shoreline, under a linear dune deposit, is a buried cultural layer believed to contain some of the earliest habitation evidence in the area.

The plentiful and easily exploited bird population may have attracted early Hawaiians to the area. Evidence for the capture of the Hawaiian Petrel (*‘ua‘u*; *Pterodroma sandwichensis*) was found at SIHP # 50-80-12-2763, a pit cave (Hammatt and Folk 1981). Initial heavy exploitation of nesting seabirds and other species, in conjunction with habitat destruction, may have contributed to some avian extinctions.

There is evidence of limited agriculture in mulched sinkholes and limited soil areas. The low annual rainfall averages for the area suggest any agricultural activities would have been limited. Agriculture may have involved tree crops and roots (e.g., sweet potato [*Ipomoea batatas*]). However, the archaeological content of the sites indicates a major focus on marine resources.

Davis and Griffin (1978) distinguish functional classes of historic properties based on surface area size and argue that the Barbers Point settlement consists of functionally integrated, multi-household residence groups. Hammatt and Folk (1981) plotted density contours of midden (by weight) and artifacts (by number) for residence sites. These generally indicated narrowly defined spatial foci of discard and may suggest the continuous use of sites, or a lack of refurbishing or additions to structures over time (Hammatt and Folk 1981). The sites reflect small habitation areas that typically lack the full range of features found in larger, permanent residence complexes (e.g., high platforms, complex enclosures, and conspicuous ceremonial sites).

3.1.3.2 Honouliuli Taro Lands

The rich irrigated lands of the *‘ili* of Honouliuli are centered around the west side of Pearl Harbor, at Honouliuli Stream and its broad outlet into the West Loch waters, the *ahupua‘a*’s namesake. The major archaeological reference to this area is Dicks et al. (1987), who documented remnants of a once widespread wetland system (*lo‘i* [ponded taro patch] and fishponds), as well as dryland cultivation of the adjacent slopes.

Silva’s “Historic Research Relative to the Land of Honouliuli” (in Dicks et al. 1987) depicts the Honouliuli area bordering West Loch as a major population center. This population center likely formed in response to the abundance of fish and shellfish resources in close proximity to a wide expanse of well-irrigated bottomland suitable for wetland taro cultivation. The earliest detailed map by Malden (1825; see Figure 9) shows the roads of southwest O‘ahu coalescing and descending the *pali* (cliff) as they funnel into the area of Honouliuli Village. Honouliuli was likely a locus of habitation for thousands of Hawaiians. Pre-Contact population estimates are a matter of some debate, but from 1831–1832 the earliest mission census indicates the land (*‘āina*) of Honouliuli contained 1,026 men, women, and children (Schmitt 1973:19). It is unclear whether this population relates to Honouliuli Village or Honouliuli Ahupua‘a, but the village probably contained the majority of the population. It is worth noting Honouliuli’s population was composed of less than 20% of children younger than 12 years of age, and the population decreased by more than 15% over the next four years. This indicates Honouliuli’s pre-Contact population may have been significantly greater than that reported by the mission census (Schmitt 1973:22).

3.1.3.3 Pu‘u Ku‘ua: Inland Settlement

Documentation of inland settlement in Honouliuli Ahupua‘a is more problematic, as there are relatively few documented archaeological sources on inland settlement in the area. However, it is probable that the area around Pu‘u Ku‘ua on the east side of the Wai‘anae Ridge, 7 miles inland of the coast, was a Hawaiian place of some importance. In 1899, the Hawaiian Newspaper *Ka Loea Kalaiaina* related a story of Pu‘u Ku‘ua as “a place where chiefs lived in ancient times,” a “battle field,” and “thickly populated.” The article summarizes the following:

> 1) That Pu‘u Ku‘ua was entirely deserted and left uninhabited, seemingly before the coming of righteousness to Hawai‘i Nei, and
>
> 2) The descendants of the people of this place were so mixed that they were all of one class; here the gods became tired and returned to Kahiki. [Sterling and Summers 1978:33]

McAllister (1933) recorded three sites in this area: two *heiau* (pre-Christian place of worship) (Site 134, Pu‘u Kuina, and Site 137, Pu‘u Ku‘ua, both destroyed) and a series of enclosures in Kukuilua, which he calls “*kuleana* sites.” On the opposite side of the Wai‘anae range, along the trail to Pōhākea Pass, Cordy (2002:36) states “Kākuhihewa was said to have built (or rebuilt) Nīoi‘ula, a *po‘okanaka* [sacrificial] *heiau* (1,300 square meter) in Hālona in upper Lualualei, along the trail to Pōhākea Pass leading into ‘Ewa, circa A.D. 1640-1660.” ‘Ī‘ī (1959) described a journey that Liholiho took which led him and an entourage through inland Honouliuli and over Pōhākea Pass. Although there is no direct archaeological evidence available that suggests intensive Hawaiian settlement occurred here, it is considered a place of high probability given the above indications Geographically, the area receives sufficient quantities of water and would have had abundant, locally available forest resources.

3.1.3.4 Summary of Honouliuli Settlement Patterns

Based on the above summary of the Honouliuli settlement areas, the following general considerations are provided to place the study area within the context of the *ahupua‘a* pattern.

1. There are three areas of Hawaiian settlement in the *ahupua‘a*; the extensive limestone plain with recurrent use habitations for fishermen and gatherers, and sometime gardeners; the

rich lands of Honouliuli ‘Ili for extensive wetland taro cultivation, and the likely population center of the *ahupua‘a*; and the uplands around Pu‘u Ku‘ua for probable agriculture and forest resource utilization. Two (coastal zone and taro lands) are well documented, while the third (inland settlement) is less clear.

2. Honouliuli is designed as a unit to contain all the geographic elements of a typical Hawaiian valley *ahupua‘a*. However, these elements were geomorphically arranged in an atypical relationship. The *ahupua‘a* is not organized around a single drainage network but rather shares the western portions of Waikele drainage in its upper reaches. The vast coastline, fringing reef, and extensive limestone plain provided typical, highly advantageous features for human subsistence. Additionally, the limestone plain, which supported only limited agriculture, was an excellent source for bird catching in early times. The richest forestland for foraging for wood, birds, feathers, and other resources would have been the east slope of the Wai‘anae Range. The *mauka/makai* route would have been traversed up the Honouliuli Gulch or the Makakilo ridge and paralleled the coast from Honouliuli Gulch to Kahe. The most convenient route to *mauka* lands, even from the western end of the coast near Kahe Point, would have remained *mauka* up to the base of the hills and then up either the Makakilo Ridge or northeast to a trail to Pu‘u Ku‘ua and Pōhākea Pass. The *makai* slope is the dry side of the ridgeline. Along this side, streams would respond to rainfall quickly but drain rapidly, leaving little available water for even short-term use. However, abundant springs may have provided adequate water for localized dryland cultivation.
3. The *makai* slope of the Wai‘anae Range (i.e., *mauka* of Ko Olina) was not a major thoroughfare. There is some very limited evidence of part-time agriculture in and around gulches and two foci of sparse habitation. The first is limited to the *makai* portions of gulches and lava flats; this habitation focus is considered a *mauka* component or continuation of the Ko Olina coastal settlement rather than an independent focus. The second focus is separated from the first by a barren zone and is generally above 243.8 m (800 ft) in elevation. This *mauka* habitat, possibly supported by seasonal dryland planting and forest foraging, may correspond to the lower portion of a thinly scattered but widespread zone of settlement. This zone stretches eastward and northeast along the east Wai‘anae Range slopes; it may increase in intensity along the more watered lands forming the *mauka* western boundary of Honouliuli.
4. The *‘ili* of Honouliuli, near the West Loch of Pearl Harbor, was the central place of Honouliuli Ahupua‘a in terms of population and cultivated foods. Furthermore, considering the lack of intensive agricultural resources in other locations during pre-Contact times, it is reasonable to assume most other habitation zones were economically and socially codependent.
5. Presently, there is no archaeological evidence of high status residence in Honouliuli. Large residential structures are not present along the shoreline, where they would be expected. This may be because the ocean shoreline, though rich in marine resources, was uninviting for sport and unsuitable for fishponds. Instead, the chiefly focus of ‘Ewa District was Waipi‘o; activities of this class that occurred in Honouliuli likely would have been in or near the rich lands fronting West Loch (the *‘ili* of Honouliuli). Regarding status associations within Honouliuli, it is interesting to note the connection of the Pu‘u Ku‘ua

settlement with pariah (*kauwā*), or “slaves,” the lowest class of Hawaiians (Sterling and Summers 1978:33).

The current project area is well back from the coast, approximately 2 km (1.2 miles) inland, and is not near any known sources of potable water. The rainfall in the project area, approximately 545 mm (21.5 inches) per year, is insufficient for non-irrigated agriculture. Pre- and early post-Contact land use in this area appears to have been very limited.

3.2 Historical Background

3.2.1 Early 1800s

Barbers Point is named after Captain Henry Barber, whose ship ran aground on 31 October 1796. At this time, a major Hawaiian community existed at the Honouliuli taro lands, where Honouliuli Stream enters the West Loch of Pearl Harbor, with a surprising amount of Hawaiian activity scattered close to the coast. Despite this, the inland areas of the ‘Ewa raised reef limestone plain had no potable water and low rainfall, suggesting little to recommend it for habitation or enterprise. Early historical maps, such as a Malden 1825 map (Figure 9), show no indication of human activity in the immediate vicinity of the project area. Following Western Contact, the landscape of the ‘Ewa plains and Wai‘anae slopes was greatly changed. Specifically, the area was adversely affected by the over-harvesting of the sandalwood forest, as well as the introduction of domesticated animals and exotic plant species.

3.2.2 Mid- to Late 1800s

During the Māhele of 1848, which introduced private land ownership into Hawaiian society, 99 individual land claims in the *ahupua‘a* of Honouliuli were registered and awarded by King Kamehameha III. No *kuleana* claims (land claims by *maka‘āinana*, or common people) were made for land within the current study area or vicinity. The vast majority of the Land Commission Awards (LCAs) were near the Pu‘uloa Salt Works and the taro lands of the *‘ili* of Honouliuli. In Honouliuli Ahupua‘a the largest award (Royal Patent 6071, LCA 11216, *‘Āpana* [parcel] 8) granted was to Miriam Ke‘ahi-Kuni Kekau‘onohi in January 1848. Kekau‘onohi acquired a deed to all unclaimed land within the *ahupua‘a*, including a total of 17,502 hectares (43,250 acres). Kamakau (1961) relates the following about Kekau‘onohi as a child:

> Kamehameha’s granddaughter, Ke-ahi-Kuni Kekau-‘onohi...was also a tabu chiefess in whose presence the other chiefesses had to prostrate and uncover themselves, and Kamehameha would lie face upward while she sat on his chest. [Kamakau 1961:208–209]

Kekau‘onohi was one of Liholiho’s (Kamehameha II’s) wives, and after his death, she lived with her half-brother, Luanu‘u Kahala‘i‘a, who was governor of Kaua‘i (Kamakau 1961:20). Subsequently, Kekau‘onohi ran away with Queen Ka‘ahumanu’s stepson, Keli‘i-ahonui, and later became the wife of Chief Levi Ha‘alelea. Upon her death on 2 June 1851, all her property was passed on to her husband and his heirs. When Ha‘alelea died, the property went to his surviving wife, who in turn leased it to James Dowsett and John Meek in 1871 for ranching operations.

In 1877, James Campbell purchased most of Honouliuli Ahupua‘a for $95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek, and James Robinson and constructed a fence around his property (Bordner and Silva 1983:C-12). In 1879, Campbell brought in a well driller

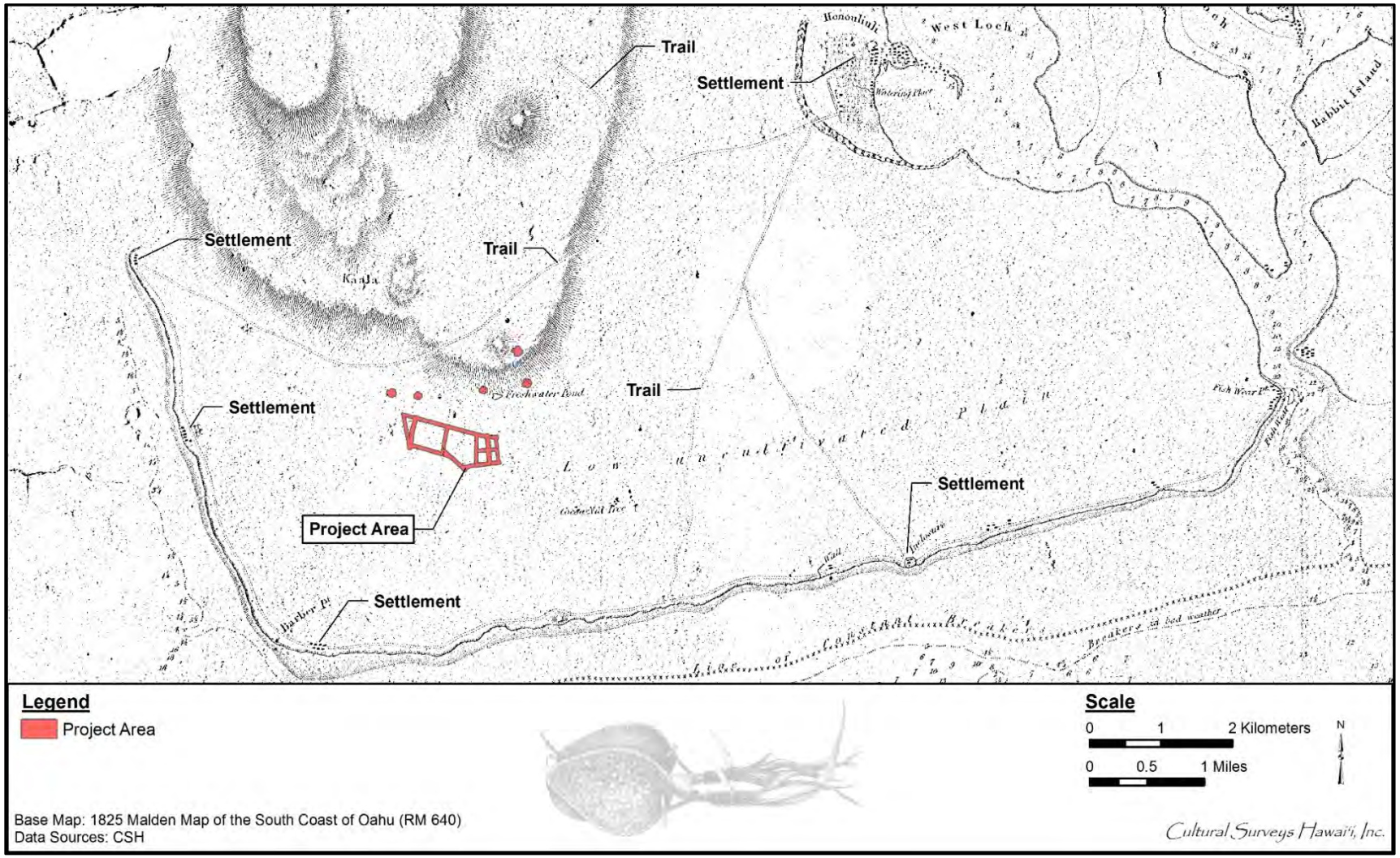

Figure 9. Portion of the 1825 Malden map of the south coast of O‘ahu (RM 640) showing relationship of project area to trails

from California to search the ‘Ewa plains for water and discovered a significant, untapped source. Following this discovery, plantation developers and ranchers drilled numerous wells in search of the valuable resource. By 1881, the Campbell property of Honouliuli prospered as a cattle ranch with “abundant pasturage of various kinds” (Briggs in Haun and Kelly 1984:45). Within ten years of the first drilled well in ‘Ewa, the addition of a series of artesian wells throughout the island was supplying most of Honolulu’s water needs.

Campbell leased his property to Benjamin Dillingham in 1889. Subsequently, Dillingham formed the Oahu Railway & Land Company (OR&L) in 1890. To attract business to his new railroad, Dillingham subleased all land below 200 ft elevation to William Castle. Castle in turn sublet the area to the Ewa Plantation Company for sugarcane cultivation (Frierson 1972:15). Dillingham’s Honouliuli lands above 200 ft elevation that were suitable for sugarcane cultivation were sublet to the Oahu Sugar Company.

The Ewa Plantation Company was incorporated in 1890 and continued in full operation up into modern times. The plantation grew quickly with the abundant artesian water. The Ewa Plantation Company installed ditches running from the lower slopes of the mountain range to the lowlands and then plowed the slopes vertically prior to the rainy season. This induced erosion to facilitate soil deposition onto the coral plain and increase arable land in the lowlands (Frierson 1972:17).

In 1897, the Oahu Sugar Company was incorporated to include lands in the foothills above the ‘Ewa plain and Pearl Harbor. Prior to commercial sugar cultivation, the lands occupied by the Oahu Sugar Company were described as being “of near desert proportion until water was supplied from drilled artesian wells and the Waiahole Water project” (Condé and Best 1973:313). The Oahu Sugar Company took over the Ewa Plantation lands in 1970 and continued operations into the 1990s.

In western Honouliuli, Dillingham’s *mauka* lands that were unsuitable for commercial sugar production remained pasture for grazing livestock. From 1890 to 1892, the Ranch Department of the OR&L tapped plantation flumes in search of alternative sources of water. Von Holt leaves this account of her husband Harry’s (Superintendent of the OR&L Ranch Department) search for water in the foothills of the Wai‘anae Range:

> One of those places is on the old trail to Pālehua, and had evidently been a place of which the Hawaiians had known, for its name is Kalo‘i (the taro patch), and even in dry weather water would be standing in the holes made by the cattle, as they tried to get a drop or two. [Von Holt 1985:136]

The spring was on the upper slopes of the southern face of Kalo‘i Gulch. A second account is given of the discovery of spring water in an area over the ridge on the north side of Kalo‘i Gulch:

> Shouting to the men to come over with their picks and shovels, he [Harry Von Holt] soon got them busy clearing away lots of small stones and earth. Almost at once they could see that there were evidences of a paved well, and at about three feet down they came upon a huge flat rock, as large around as two men could span with their arms. Digging the rock loose and lifting it to one side, what was their astonishment to find a clear bubbling spring! [Von Holt 1985:138]

Following the discovery, two old Hawaiians began to ask Von Holt about the spring:

> Finally he [Harry Von Holt] got them to explain that the spring, called ‘Waihuna’ (Hidden Spring) had been one of the principal sources of water for all that country, which was quite heavily populated before the smallpox epidemic of 1840 . . . A powerful Kahuna living at the spring had hidden it before he died of the smallpox, and had put a curse on the one who disturbed the stone, that he or she would surely die before a year was out. [Von Holt 1985:138–140]

3.2.3 Early 1900s to Present

Much of the *mauka* lands in western Honouliuli, including ridges and deep gulches, were unsuitable for commercial sugar cultivation and remained pastureland for grazing livestock. However, by 1919 a reservoir had been established just south of Pālehua Road, and by 1920 much of the land of Honouliuli was used for commercial sugarcane cultivation (Frierson 1972:18). In the late 1920s, the main residential communities were at the northeast edge of the ‘Ewa Plain; the largest community was still at Honouliuli Village. ‘Ewa was primarily a plantation town focused around the sugar mill, with a public school and a Japanese school. Additional settlement was in Waipahu, centered around the Waipahu sugar mill operated by the Oahu Sugar Company. Historical maps of the Makakilo area indicate a lack of any other significant development in the area into the 1940s.

A 1919 map shows the project area as devoid of any formal development (Figure 12) other than a fence line likely associated with cattle ranching, a “pipe line,” and the OR&L Railroad. The OR&L is along present-day Renton Road, just north of Roosevelt Avenue, which is in the current project area. At this location, the alignment of the rail runs northwest/southeast. Gilbert Station, approximately 1.2 km (0.75 miles) west of the project area and known as a small plantation community on the OR&L Railroad, was the largest formal development in the area during this time. Another small plantation community, labelled “Waimanalo Camp” on a 1936 map (Figure 13), is depicted between present-day Roosevelt Avenue and Kapolei Parkway. The pipe line in the western portion of the project area carried water for men and cattle down to the coast.

A 1936 map suggests the project area continued to lack documented development other than a cattle control fence line, pipe line, and railroad infrastructure (see Figure 13). The vicinity is shown as largely undeveloped other than the small plantation community mentioned above, “Waimanalo Camp.”

Major land use changes came to western Honouliuli when the U.S. military began development in the area. Military installations were constructed both near the coast and in the foothills and upland areas. Barbers Point Military Reservation (a.k.a. Battery Barbers Point from 1937–1944) was at Barbers Point Beach and was used beginning in 1921 as a training area for firing 155 mm guns (Payette 2003). Also within the vicinity was the Camp Malakole Military Reservation (a.k.a. Honouliuli Military Reservation), used from 1939, and the Gilbert Military Reservation, used from 1922–1944. The largest and most significant base built in the area was the Barbers Point Naval Air Station, which operated from 1942 into the 1990s. It housed numerous naval and defense organizations, including maritime surveillance and anti-submarine warfare aircraft squadrons, a U.S. Coast Guard Air Station, and the U.S. Pacific Fleet.

Located atop Pu‘u o Kapolei, Fort Barrette (a.k.a. Kapolei Military Reservation and Battery Hatch) was used from 1931 to 1948 to house four 3-inch anti-aircraft batteries (Payette 2003). In the 1950s, the site was used as a Nike missile base. Palailai Military Reservation was atop Pu‘u

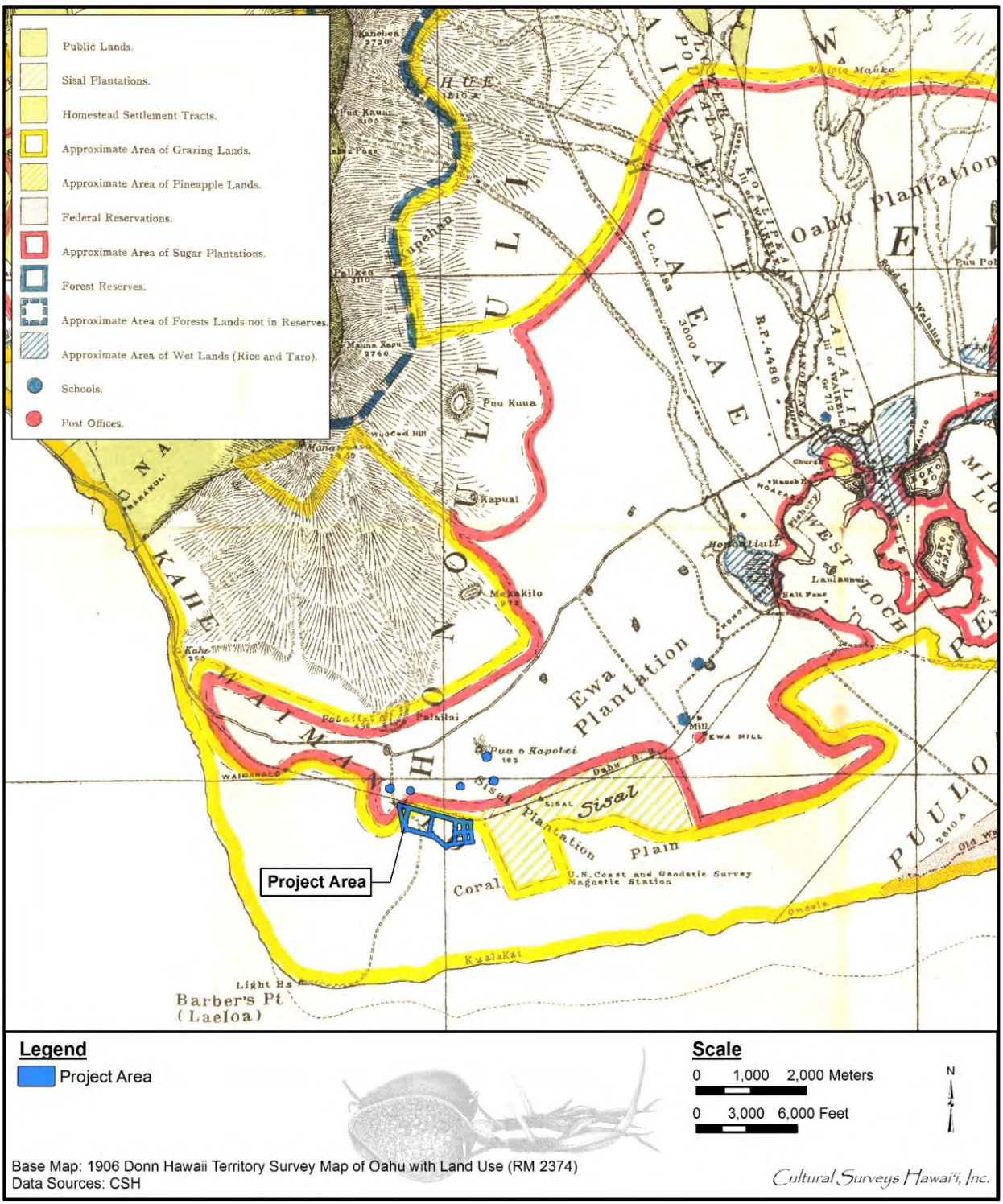

Figure 10. Portion of the 1906 Donn Hawaii Territory Survey map of O‘ahu with land use showing project area

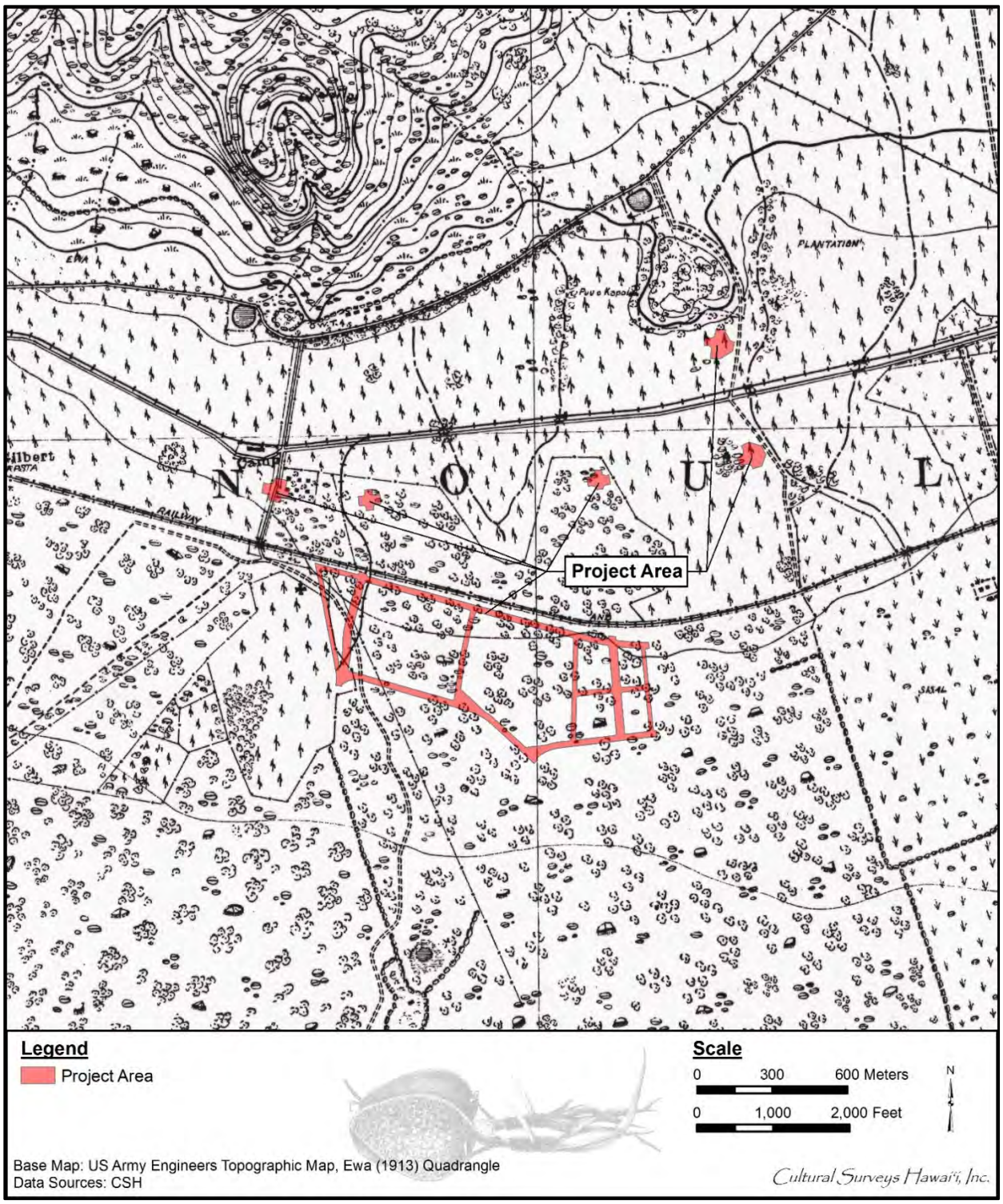

Figure 11. Portion of the 1913 U.S. Army Engineers topographic map, Ewa Quadrangle showing project area

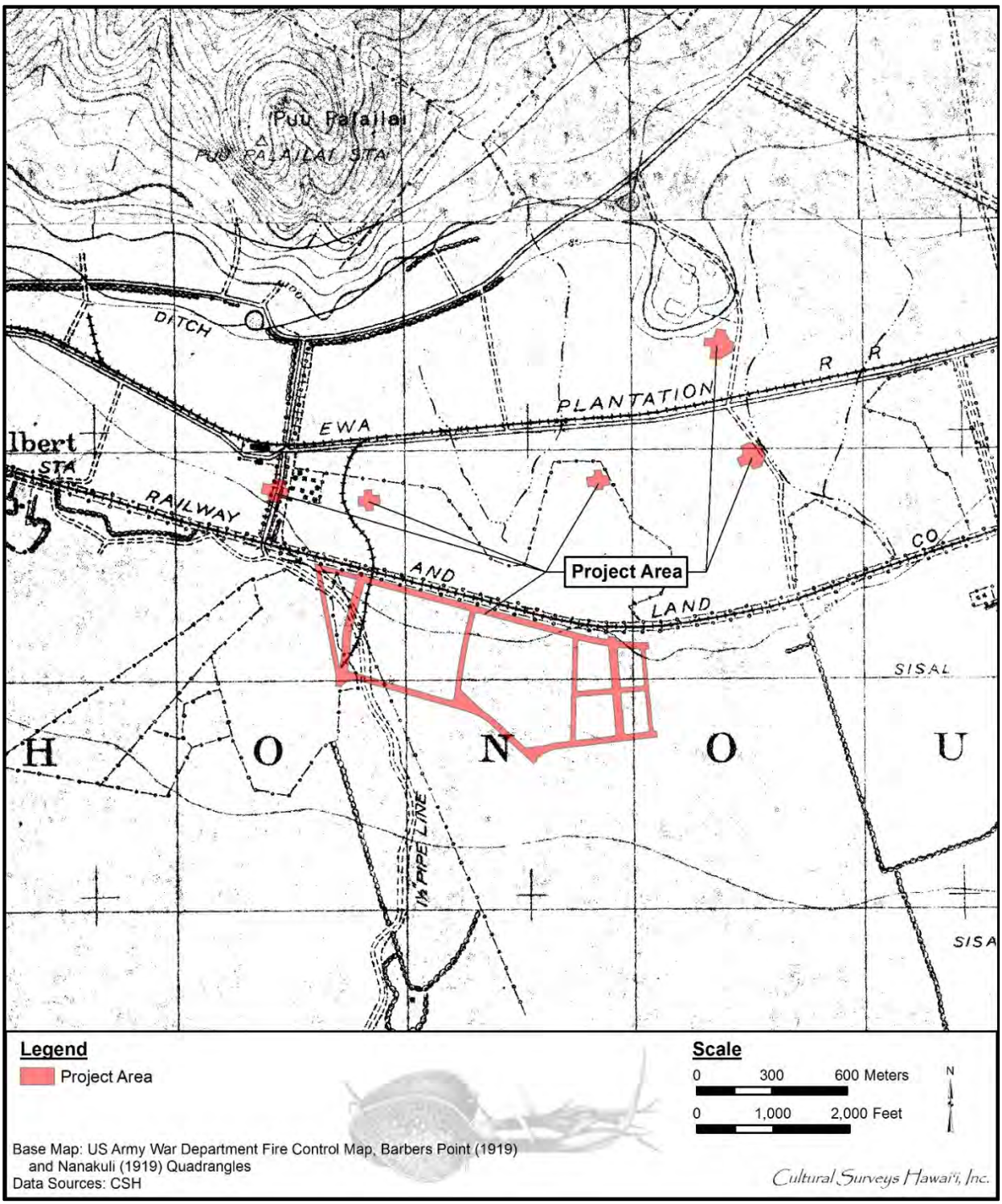

Figure 12. Portion of 1919 U.S. Army War Department fire control map, Barbers Point and Nanakuli quadrangles, showing the project area

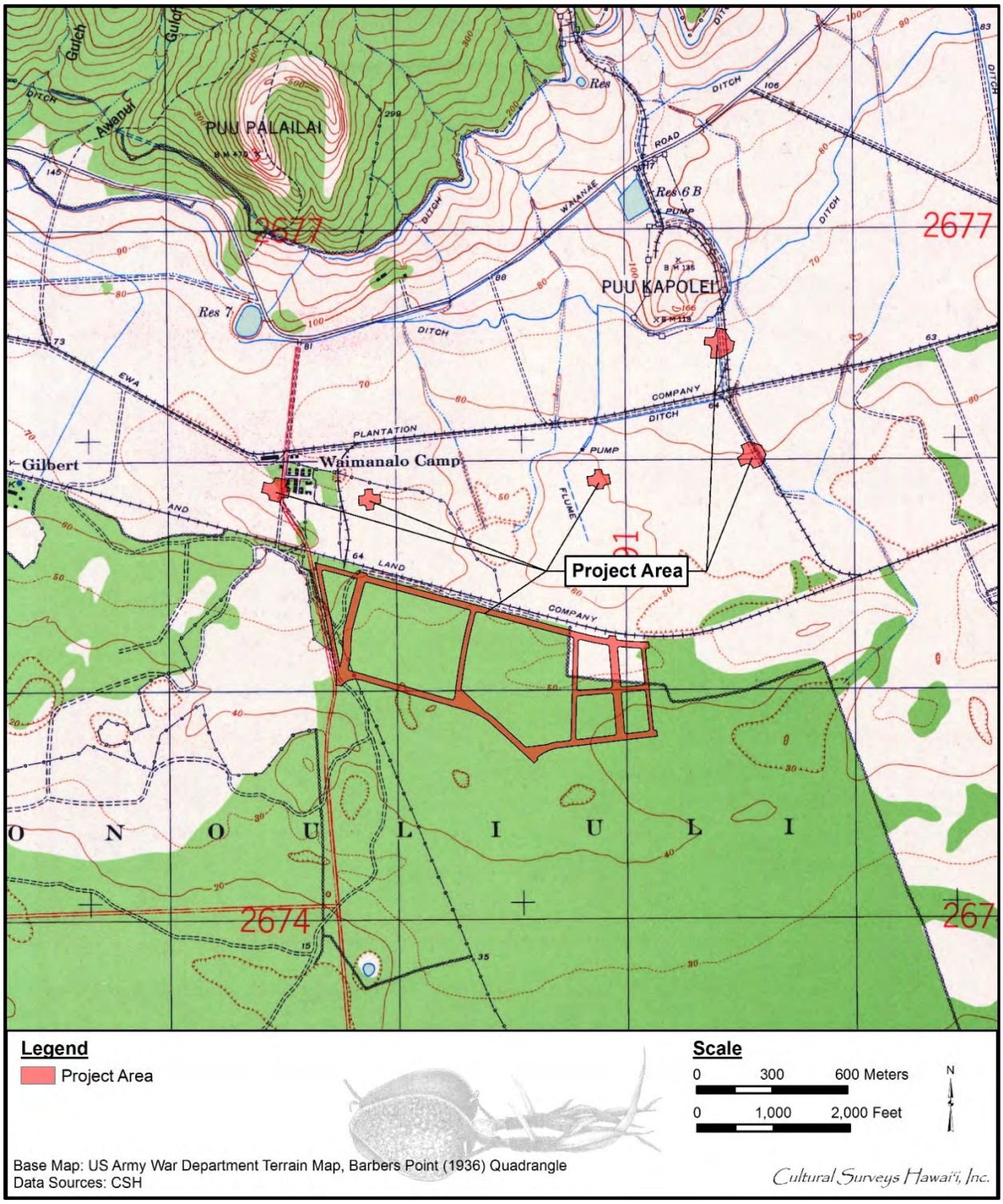

Figure 13. Portion of 1936 U.S. Army War Department terrain map, Barbers Point Quadrangle showing the project area

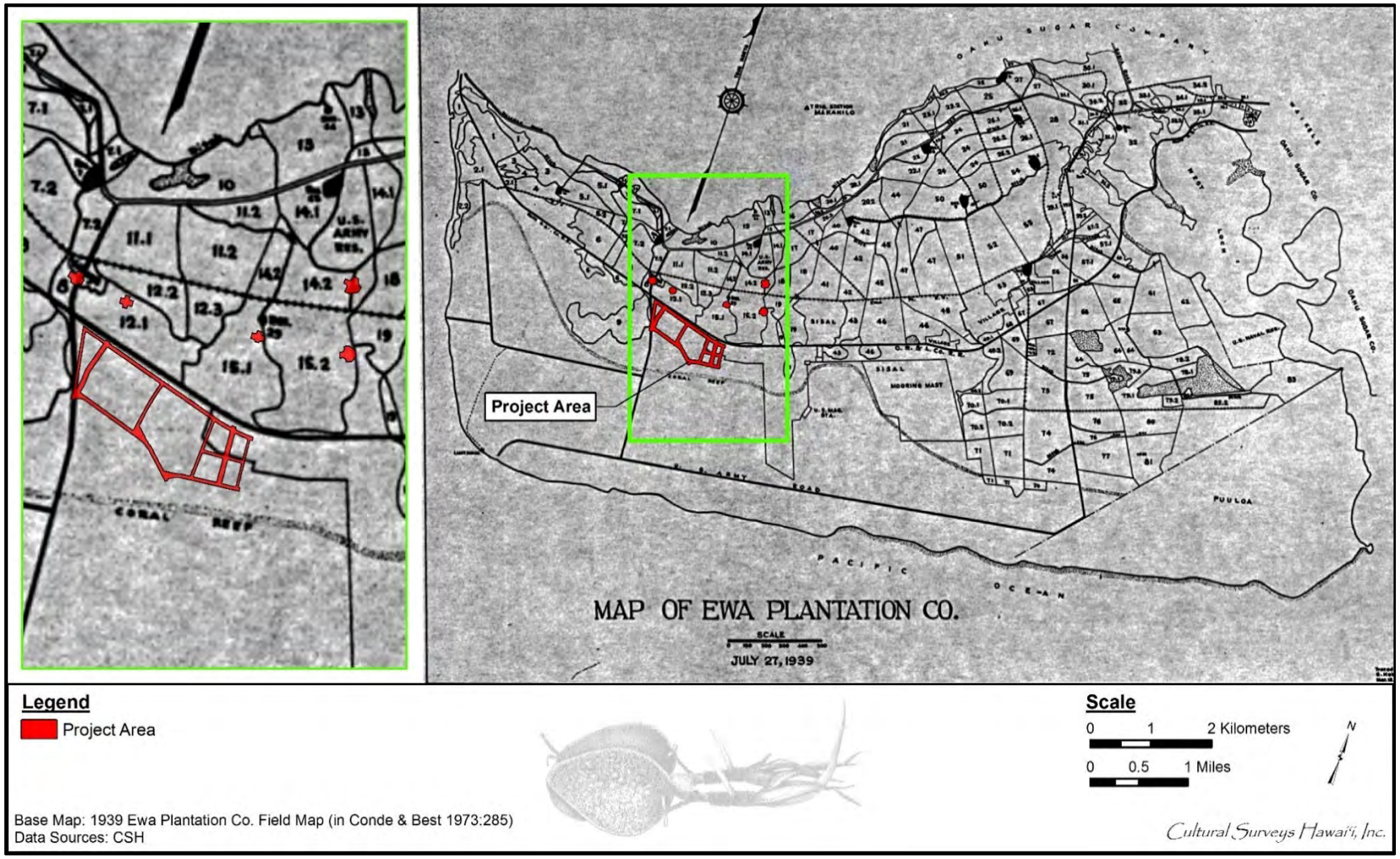

Figure 14. 1939 Ewa Plantation Company field map (from Condé and Best, 1973:285) showing project area (close-up inset at left)

Pālailai in Makakilo and was used from 1921 to house Battery Palailai and Fire Control Station B (Payette 2003). Fire Control Station A was atop Pu‘u Makakilo. From 1942 to 1945, the Pu‘u Makakilo Training Area, including lands in and around Pu‘u Makakilo, was used for military training during World War II.

The Naval Air Station Barbers Point Final Environmental Baseline Survey (Department of the Navy 1994) presents the following succinct history of the base:

> In 1930, the U.S. Navy leased 206 acres of land on the ‘Ewa Plain from the Campbell Estate for the purpose of building a mooring mast for the dirigible *Akron*. At the expiration of the lease in late 1939 or early 1940, the Navy acquired over 3,500 acres of land from the Estate. In 1941, the Marine Corps Ewa strip was completed on a portion of the land to serve as an auxiliary airfield for the Navy's Ford Island Facility. The Ewa Marine Corps Air Station was extensively damaged during the Japanese attack on Pearl Harbor on December 4, [*sic*] 1941. During World War II, the design capacity of the station was changed. The major construction of Barbers Point was completed from 1941 to 1945. [Department of the Navy 1994:3-20]

A 1943 War Department map shows a radically transformed landscape with a major east/west oriented road, presently known as Boxer Road, crossing the central portion of the project area, with a number of roads radiating off to the north (Figure 15). Note this this alignment of roads was apparently abandoned in favor of the alignment depicted on the 1953 Army map (Figure 17). In addition, a number of new structures are shown just south/southeast of the project area. These are understood to be brand new barracks office buildings and warehouses hastily erected to meet the needs of America's entry into World War II.

The 1953 Army Map Service map shows a much more developed military landscape with many new structures within and adjacent to the project area (see Figure 17). These structures, understood to be mostly military housing, including free-standing houses and duplex units, were part of the rapid development in the area during the last years of World War II. The 1943 (see Figure 15) and 1953 (Figure 18) maps suggest virtually the entire vicinity around the project area was grubbed and graded during World War II.

Grading and grubbing of the project area and its vicinity continued as the Barbers Point Naval Air Station remained operational even after 1953 (Figure 19). However, a 1977 aerial photograph (Figure 20) shows most of the 1940s-era buildings within and adjacent to the project area had been demolished by that time. The lands in the vicinity are reverting back into *kiawe* (*Prosopis pallida*) and *koa haole* (*Leaucaena leucocephala*) scrub, although the eastern portion of the project area is still shown as an active portion of the Naval Air Station.

The names of streets within and surrounding the project area typically reflect the history of U.S. naval air power, particularly ships related to U.S. Naval air power in the Southwest Pacific Theater of Operations in World War II. Roosevelt Avenue is named after the former American president and commander-in-chief who served throughout most of World War II. Copahee Avenue is named after the USS *Copahee*, a Bogue-class escort carrier, and Saratoga Avenue is named after the second aircraft carrier of the U.S. Navy. Both carriers were active in the Pacific through much of World War II. Kearsarge Avenue is named after the USS *Kearsarge* aircraft carrier, which was active in the Korean Conflict and Vietnam War. The USS *Boxer* was an Essex-class aircraft carrier

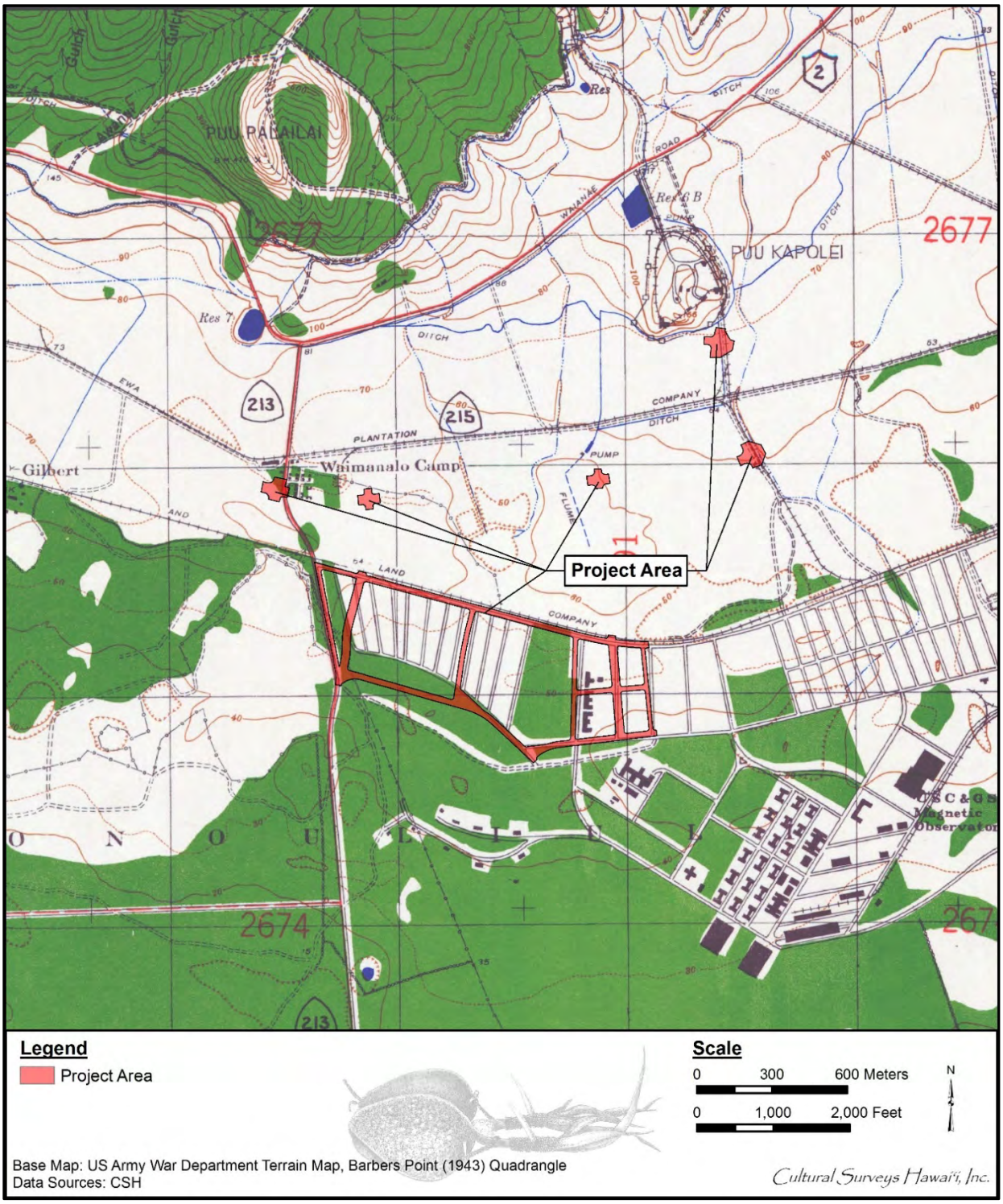

Figure 15. Portion of 1943 U.S. Army War Department terrain map, Barbers Point Quadrangle showing the project area

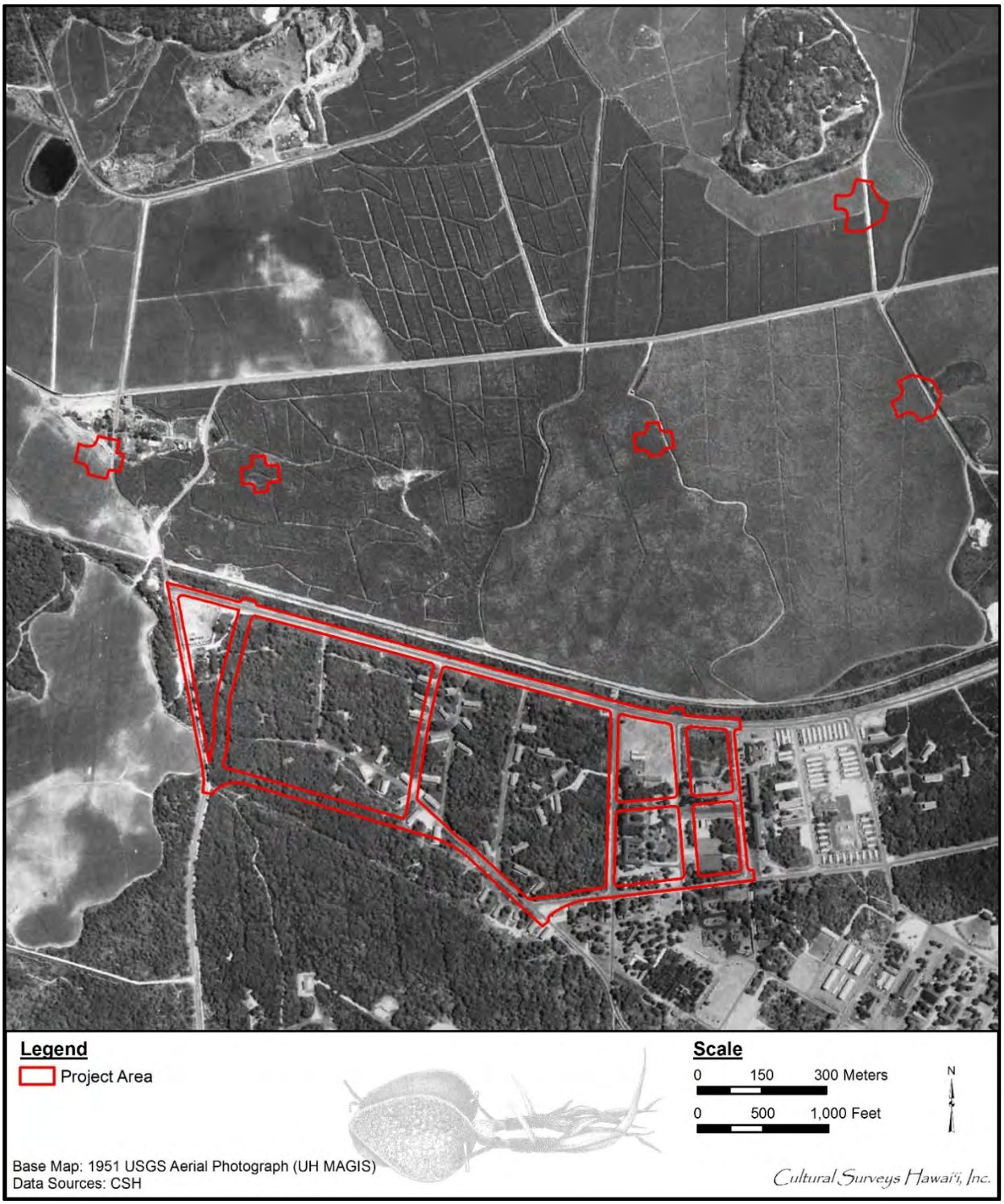

Figure 16. 1951 USGS aerial photograph (UH MAGIS) showing the project area

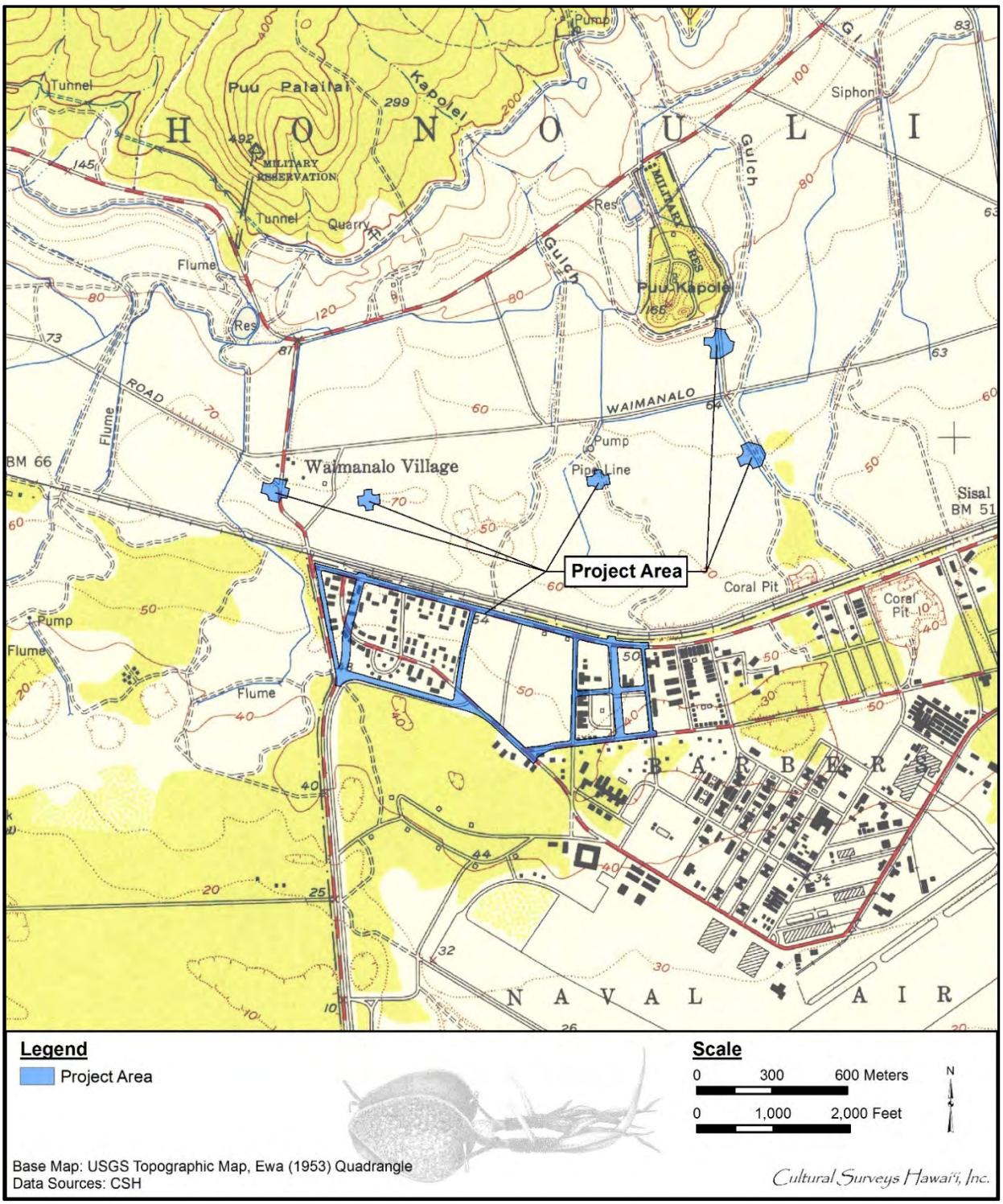

Figure 17. Portion of 1953 Ewa USGS topographic quadrangle showing the project area

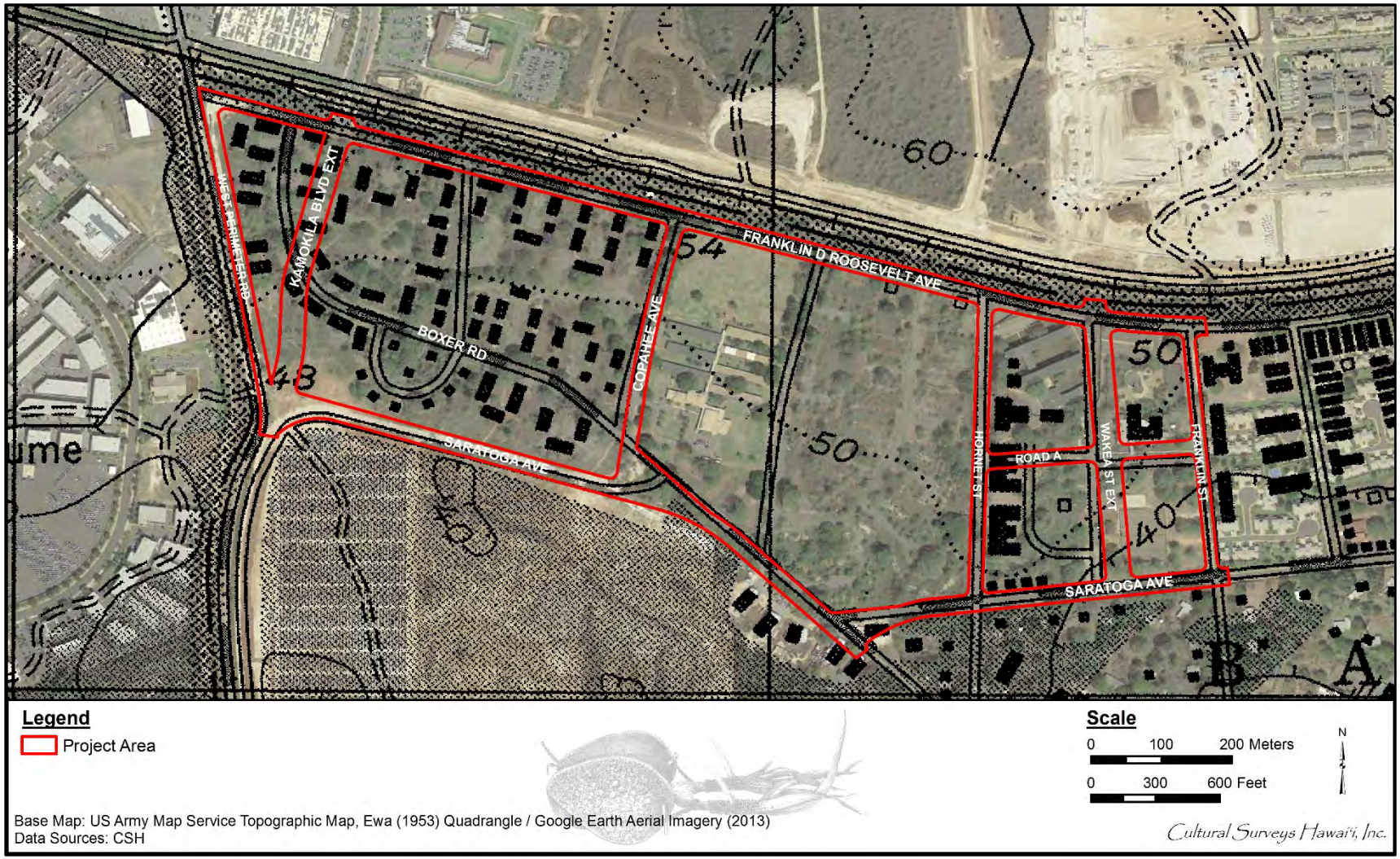

Figure 18. 1953 U.S. Army Map Service topographic map, Ewa topographic quadrangle, overlaid on a Google Earth aerial photograph (2013)

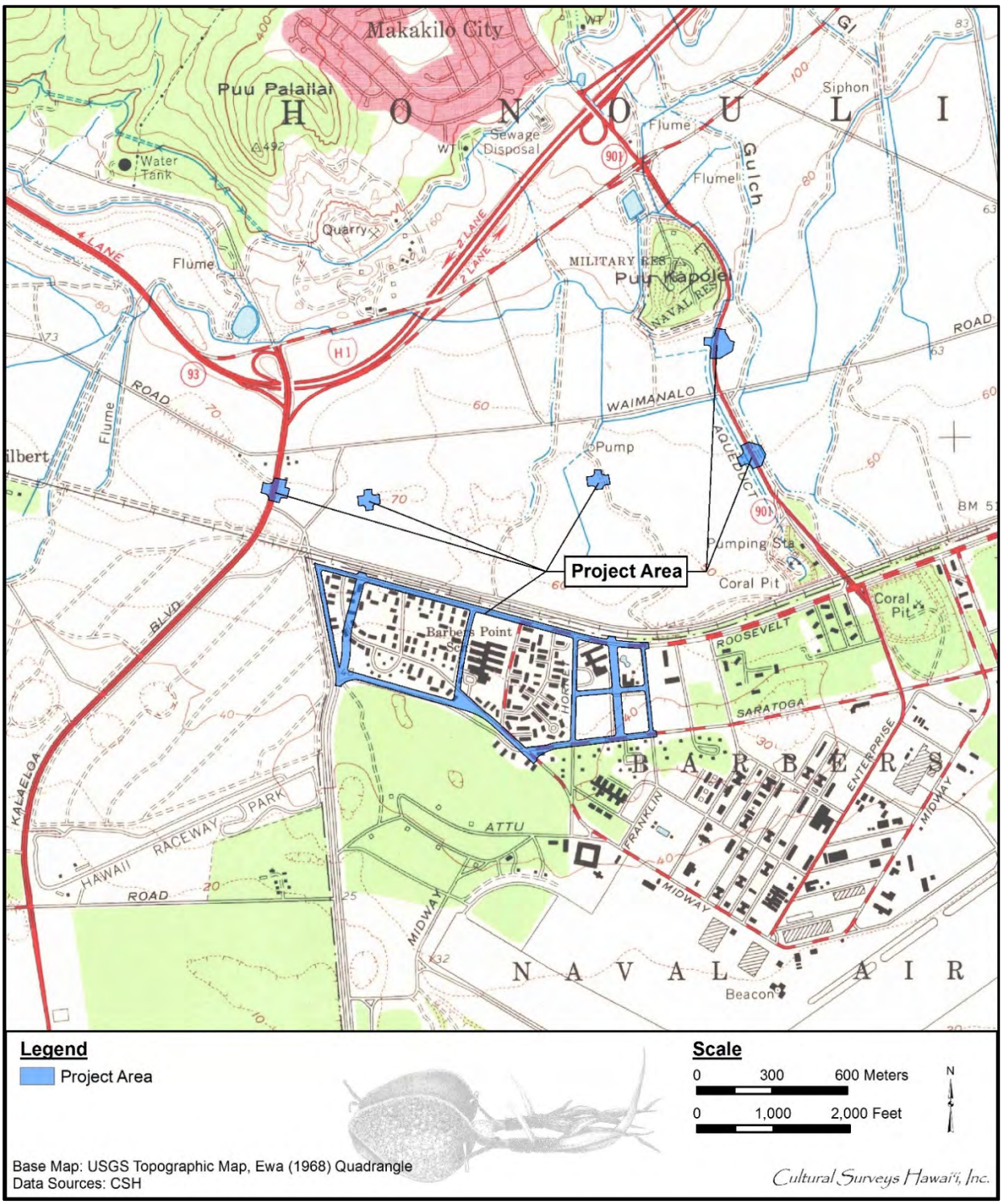

Figure 19. Portion of 1968 Ewa USGS topographic quadrangle, showing project area; note the roads going south off Roosevelt Avenue

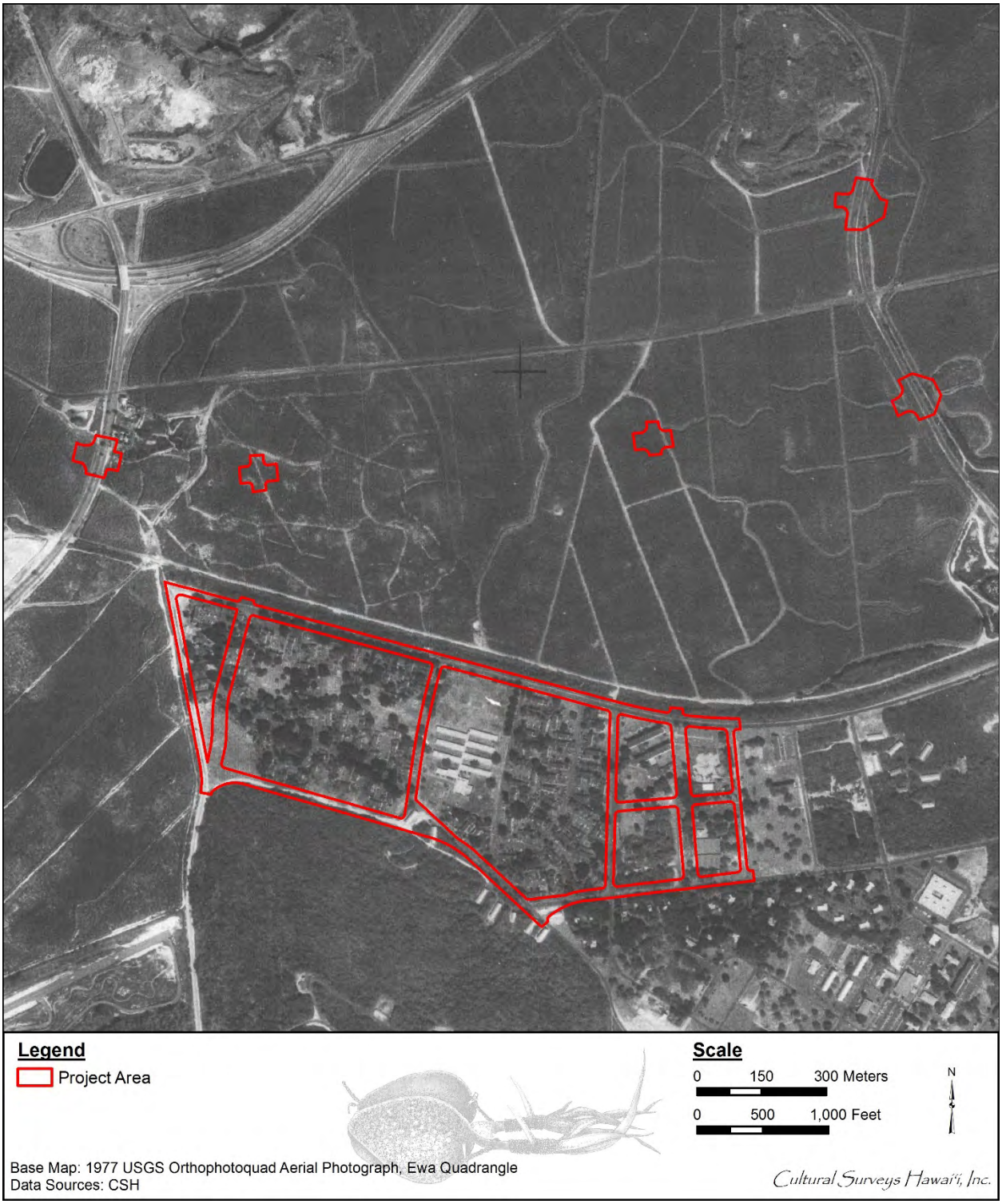

Figure 20. 1977 USGS orthophotoquad aerial photograph, Ewa Quadrangle showing the project area

(the fifth U.S. Navy ship to be so named) and was awarded eight battle stars for her service in the Korean Conflict.

3.3 Previous Archaeological Research

Archaeological studies conducted within and in the immediate vicinity of the current project area are discussed below. The studies most relevant to the current project are depicted on Figure 21 and are summarized in Table 1. Figure 22 shows archaeological sites in the vicinity of the project area; these are summarized in Table 2. Figure 23 shows historic structures of preservation concern in the vicinity of the project area.

The first effort to record historic properties in Honouliuli was by Thrum (1907:46), who references “a *heiau* on Kapolei hill, ‘Ewa—size and class unknown. Its walls thrown down for fencing.” The former *heiau* was on Pu‘u o Kapolei, northeast of the present study area.

In his 1930 surface survey of the island of O‘ahu, archaeologist McAllister recorded the specific locations of important archaeological and cultural sites and the general locations of some sites of lesser importance. McAllister (1933:107–108) recorded seven sites in Honouliuli (McAllister Sites 133–139), and these became the first seven sites in the Bernice Pauahi Bishop Museum’s (BPBM) Site Numbering System (OA-B6-1 through OA-B6-7). The nearest of these to the present project area is McAllister Site 138, which includes the Pu‘u o Kapolei *heiau* referenced by Thrum (see above) and an adjacent rock shelter approximately 2 km (1.2 miles) to the northeast (McAllister 1933:109).

Reports of the numerous sites resulted in a number of visits by Dr. Sinoto and student volunteers in late 1969 and early 1970. A University of Hawai‘i graduate student, Lewis, conducted a surface survey that located some 22 archaeological sites of the types typical for the Kalaeloa region, including various types of enclosures and mounds, and walls made of the locally available stacked limestone cobbles and boulders (Lewis 1970).

3.3.1 Oshima 1975

Oshima (1975) of the Bishop Museum Anthropology Department carried out an archaeological reconnaissance survey of a proposed drainage channel at the Campbell Industrial Park complex. Archaeological sites were encountered only in the relatively undisturbed segment between (the then) Hawaii Raceway Park and Malakole Road southwest of the current project area. These archaeological sites included a long wall about 1 m high, two small, broken walls, a small, crude, enclosed, circular platform, and the remnants of a low-walled enclosure. Little detail is provided.

3.3.2 Clark 1977

Clark (1977) conducted an archaeological reconnaissance survey at Pu‘uokapolei/Fort Barrette. Clark and colleagues surveyed the entire property and noted the extensive modification from the military development. Clark notes, “There are presently at least twenty abandoned, or partially abandoned, late historic military structures on the site, including bunkers, barracks, and a chapel.” The author notes that “Several basalt free-standing, and retaining, walls were seen which appear to have been built by army personnel” (Clark 1977:1). They did not find any evidence of pre-Contact use of the area including the *heiau* and rockshelter described by McAllister (1933). Clark concluded no further archaeological work was necessary within the project area.

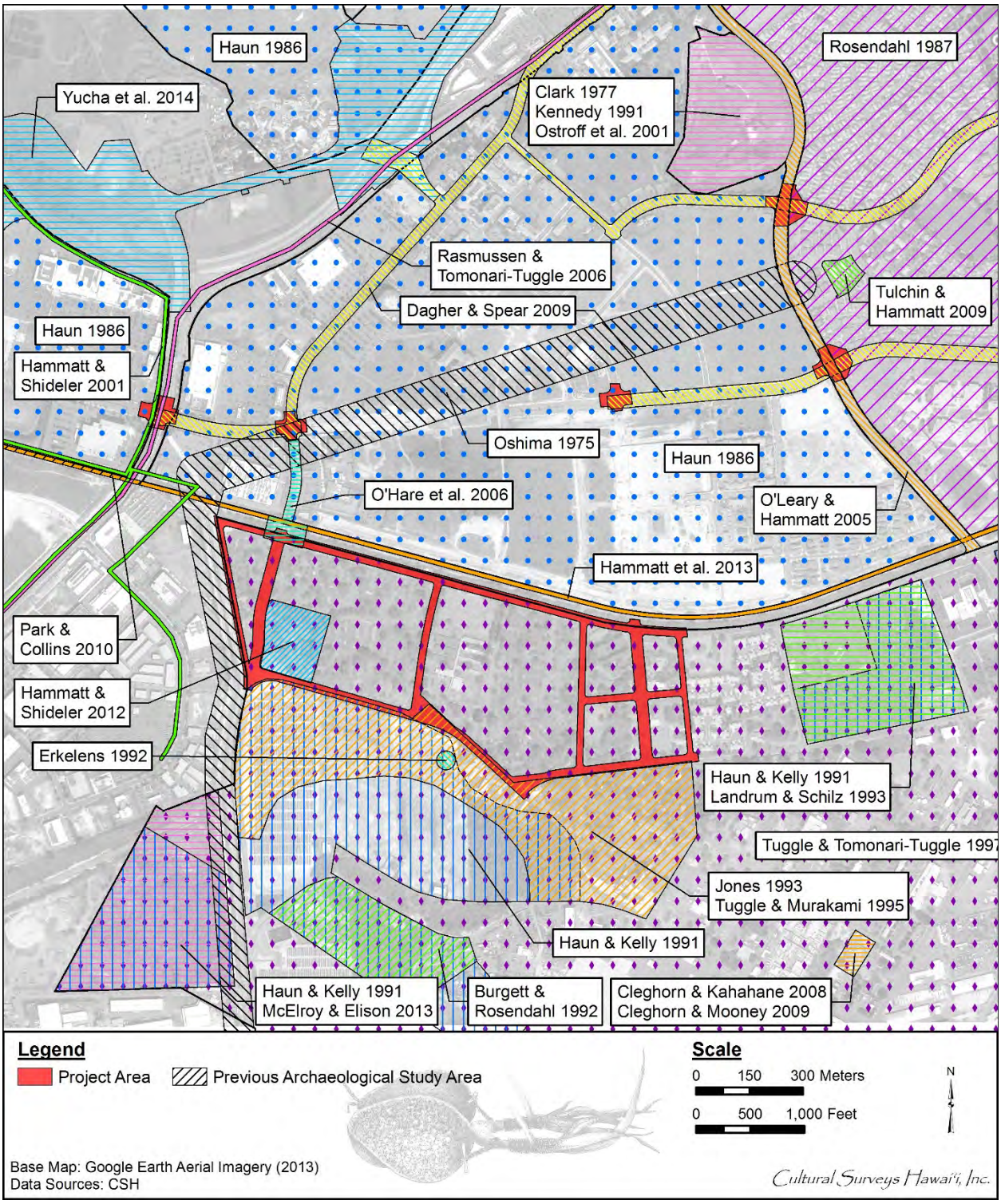

Figure 21. 2013 Google Earth aerial photograph showing archaeological studies in the vicinity of the project area

Table 1. Previous archaeological studies within and in the vicinity of the project area

Reference	Type of Study	Location	Results (SIHP # 50-80-12)
Oshima 1975	Archaeological reconnaissance survey	Proposed drainage channel at Campbell Industrial Park complex	Encountered archaeological sites only in relatively undisturbed segment between (the then) Hawaii Raceway Park and Malakole Rd southwest of current project area; included long wall about 1 m high, two small, broken walls, small, crude, enclosed, circular platform and remnants of a low-walled enclosure
Clark 1977	Archaeological reconnaissance survey	Pu‘uokapolei/Fort Barrette	Clark notes, “There are presently at least twenty abandoned, or partially abandoned, late historic military structures on the site, including bunkers, barracks, and a chapel” and that “several basalt free-standing, and retaining, walls were seen which appear to have been built by army personnel”
Haun 1986	Archaeological reconnaissance survey	‘Ewa Town Center/Secondary Urban Center, TMKs: [1] 9-1-015:004, 005, 017; 9-1-016:004, 006, 016, 018, 024, 030; 9-2-019:001	Two sites, an irrigation ditch and a WWII military structure, identified north of H-1; no sites identified in vicinity of present project area other than OR&L
Rosendahl 1987	Archaeological reconnaissance survey	Kapolei Village Master Plan project	No archaeological sites documented near project area other than OR&L Railroad line (SIHP # -9714)
Haun and Kelly 1991	Archaeological survey with notes on history of Honouliuli	1,230 acres at Naval Air Station, Barbers Point	Recorded 43 archaeological sites, comprised of 385 discrete features; approx. 73% likely pre-Contact sites, and 27% most likely historical; approx. 47% of pre-Contact sites evaluated as probably related to habitation activities
Kennedy 1991	Archaeological; surface survey and subsurface testing	Kapolei Park/Pu‘u Kapolei	Reports six features made out of basalt, but concluded they were of modern origin; observed Army infrastructure dated to early 1940s, but not designated as historic properties; no historic properties observed during subsurface testing

Reference	Type of Study	Location	Results (SIHP # 50-80-12)
Burgett and Rosendahl 1992	Archaeological inventory survey	Contaminated soil stockpile/ remediation facility at Naval Air Station, Barbers Point approx. 500 m south of present project area	Identified 21 sites comprising 71+ features including mound, modified sinkhole, wall, terrace, modified outcrop, cairn, enclosure, pavement, platform, alignment, cave, and cupboard formal types; site function included agriculture, temporary habitation, agriculture/temporary habitation, possible burial, marker, and possible storage; agriculture largest functional category, with 49 features (69%)
Erkelens 1992	Archaeological survey and interpretive trail development study	Site 1719 at Naval Air Station Barbers Point, just south of central portion of project area	Identified features included Feature A, a C-shape planting mound; Feature B a large enclosure (16 m by 12 m) with a 4 m by 4 m paved platform; Feature C an enclosure roughly equilateral triangle in shape with walls approximately 13 m long; Feature D low irregular pile of rock and rough alignment; Feature E a small vertical-sided mound constructed of stacked limestone
Jones 1993	Letter Report for Phase I archaeological inventory survey	Barbers Point Naval Air Station “Area A,” 55-acre area immediately adjacent and south of south side of present project area	Identified 274 archaeological features in Area A including five sites: SIHP # 50-80-08-1718, habitation complex including rectangular enclosure, elongate mound, two C-shape structures, and circular mound SIHP # 50-80-08-1719, included two enclosures, C-shape structure, circular mound, and cairn; numerous undocumented features noted nearby SIHP # 50-80-08-1720, described as small habitation/agricultural site containing circular mound and enclosure; C-shape structure also discovered SIHP # 50-80-08-1723 identified as habitation complex of six sinkholes SIHP # 50-80-08-1726 included a platform and mound within cleared area

Reference	Type of Study	Location	Results (SIHP # 50-80-12)
Landrum and Schilz 1993	Archaeological reconnaissance and limited subsurface testing	Proposed Family Housing Construction Area, Barbers Point Naval Air Station	Six archaeological sites identified; three (SIHP #s -1728, -4649, and -4653) are boundary walls of Hawaiian Fibre Co. sisal plantation which operated from AD 1898 until AD 1930; three sites (SIHP #s -4650, -4651, and-4652) contain eight features of traditional Hawaiian origin and two of undetermined origin; nine WWII era military structures (Buildings 446 through 454) documented in companion study (Yoklavich 1992)
Tuggle and Murakami 1995	Archaeological inventory survey	Family housing at Naval Air Station Barbers Point, immediately south of present project area (10.8-acre portion of Jones [1993] study area)	SIHP # -4701, sinkhole capped and modified sometime in first half of twentieth century for storage of items probably related to illegal alcohol production; three sites (SIHP #s -1723, -1724, and -1726) contained 132 features; 55 tests (shovel tests, test pits, and rock removal) indicate structures and sinkholes used for Hawaiian habitation, agriculture, and burial; human bone identified in three features, all sinkholes (SIHP #s -1724-19, -1724-54, and -1726-2); additional site (SIHP # -4702) consists of approx. 150 low stone piles and mounds that may represent Hawaiian dryland agricultural complex
Tuggle and Tomonari-Tuggle 1997	Survey and inventory summary	Naval Air Station Barbers Point	Provides data on numerous sites at Naval Air Station Barbers Point
Hammatt and Shideler 2001	Archaeological inventory survey	Along OR&L west of Kalaeloa Blvd and south from just east of Kalaeloa Blvd	Only OR&L alignment (SIHP # -9714) and certain Ewa Plantation sugar company irrigation infrastructure (SIHP # -4341) noted in vicinity of present project area

Reference	Type of Study	Location	Results (SIHP # 50-80-12)
Ostroff et al. 2001	Archaeological inventory survey with subsurface testing	Pu‘uokapolei/Fort Barrette	Two sites recorded: SIHP # -5918 includes stone mound and petroglyph of questionable age on western side of *pu‘u*; SIHP # -5919 includes 40 separate features associated with Army installation known as Fort Barrette; included pillboxes, terraces, stone walls, platforms, gun emplacements, and other military related structures
O’Leary and Hammatt 2005	Archaeological literature review and field inspection	Fort Barrette	Identified four historic properties: previously unrecorded disarticulated segment of concrete irrigation piping; wall segment and former railroad bed features of SIHP # -5919, historic remnant of Fort Barrett; SIHP # -138, Pu‘uokapolei; and SIHP # -9714, OR&L ROW
O’Hare et al. 2006	Archaeological inventory survey (recorded as an archaeological assessment) and cultural impact evaluation	Kamōkila Blvd extension from former southern termination (junction with Kapolei Pkwy) south to Franklin D. Roosevelt Ave at Kapolei, TMKs: [1] 9-1-016:001, 012, 032	Identified OR&L ROW; in addition to original main line track, discussed a siding and two railway cars on siding
Rasmussen and Tomonari-Tuggle 2006	Archaeological monitoring	Waiau Fuel Pipeline, TMK: [1] 9-1, 2, 4, 6, 7, and 8 (various parcels)	No on-site archaeological monitoring or field results near present project area
Cleghorn and Kahahane 2008	Archaeological assessment (literature review and field inspection study)	Proposed Ke Kama Pono facility, Yorktown Rd, TMK: [1] 9-1-013:024	This project area was vacant lot that appeared to have been extensively modified in past; any surface archaeological features present would have been bulldozed and destroyed; bulldozing activity may have also buried or collapsed any sink holes that may have been present

Reference	Type of Study	Location	Results (SIHP # 50-80-12)
Cleghorn and Mooney 2009	Archaeological monitoring	Ke Kona Pono facility, Yorktown Rd, TMK: [1] 9-1-013:024	Three potential sinkholes encountered but no associated cultural or paleontological remains identified; foundation remnants from a late historic military structure identified
Dagher and Spear 2009	Literature search and field inspection	Kapolei Computerized Traffic Control System, TMKs: [1] 9-1-various and 9-2-various	Surface structures and/or artifacts not expected to be recovered within roadway corridor due to massive landscape modifications during Plantation era and recent times; subsurface contexts not expected to yield traces of agricultural and habitation activities and/or artifacts associated with traditional times, also due to modern landscape modifications
Tulchin and Hammatt 2009	Archaeological inventory survey (recorded as an archaeological assessment)	The Villas at Malu‘ohai, 2-acre parcel in Kapolei, TMK: [1] 9-1-016:064 por.	No historic properties identified
Park and Collins 2010	Archaeological monitoring	4-mile Kahe Reverse Osmosis (RO) Water Pipeline, TMKs: [1] 9-1-015:002 and 9-2-003:011	No new subsurface archaeological sites or deposits
Hammatt and Shideler 2012	Archaeological literature review and field inspection	10-acre Rengo Packaging Inc., TMK: [1] 9-1-013-002 por.; overlaps present study area	Encountered 13 former foundation sites, briefly described with text and photographs; no historic properties designated
Hammatt et al. 2013	Archaeological inventory survey testing	Tracks Beach Park, TMK: [1] 9-2-003:011	No new significant finds; OR&L SIHP # -9714, further described

Reference	Type of Study	Location	Results (SIHP # 50-80-12)
McElroy and Elison 2013	Archaeological inventory survey	43-acre parcel for proposed solar farm in Kalaeloa, TMK: [1] 9-1-013:001	Two archaeological sites, SIHP # -1725 (traditional to early-historic multi-use complex) and NL-25 (twentieth century homestead) previously recorded on property; Site NL-25 not found; SIHP # 1725 first documented in Bishop Museum survey that recorded site as a complex of burials, terraces, walls, sinkholes, foundations, enclosures, pavements, cairns, and C-shaped structure (Haun 1991); all 17 features of SIHP # -1725 confirmed and ten new features found
Yucha et al. 2014	Supplemental archaeological inventory survey	Phase II Kapolei Interchange, TMKs: [1] 9-1-015:017 por. and 9-2-043:001–004 por.	Three historic properties: SIHP # -4341, ditch and flume system initially identified by Hammatt et al. (1991) SIHP # -4342, Ewa Plantation Co. Reservoir 7 initially identified by Hammatt et al. (1991) SIHP # -7669, quarry remnant related to former Palailai Quarry, newly identified during supplemental AIS investigation

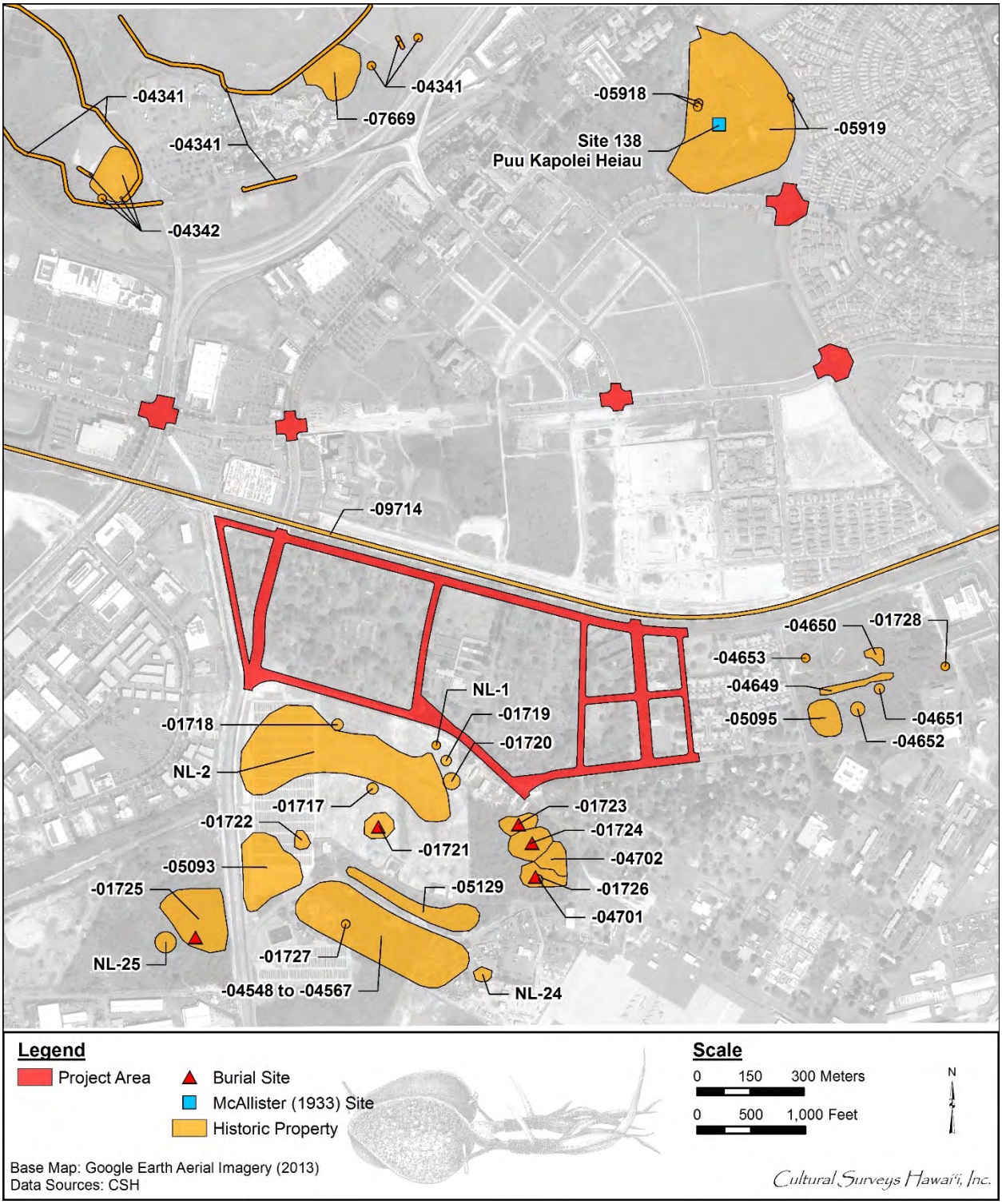

Figure 22. 2013 Google Earth aerial photograph showing relationship of the project area to known archaeological sites (adapted from NAS Barbers Point Final Environmental Baseline Survey June 1994 Figure 3-5 on page 3-24)

Table 2. NAS Barbers Point known cultural resources near present study area (adapted from NAS Barbers Point Final Environmental Baseline Survey June 1994 Table 3-2 on pages 3-22, 3-23)

SIHP # (50-80-12-)	Distance to Present Project Area	Description	Comments	Source(s)
Site 138	264 m (886 ft) to N	Pu‘u Kapolei Heiau	–	McAllister 1933
1717	239 m (784 ft) to S	Small habitation complex including L-shape, wall, circular platform and enclosure	Agriculture and habitation and possible burial function	Haun and Kelly 1991, Tuggle and Tomonari-Tuggle 1997
1718	250 m (820.2 ft) to ESE	Hawaiian habitation complex	Pre-Contact; good to poor condition; “L-shape missing, upright found 1992/1993”	Haun and Kelly 1991, Jones 1993, Tuggle and Tomonari-Tuggle 1997
1719	500 m (1,640.4 ft) to ESE	Hawaiian habitation complex	Pre-Contact; excellent to good condition, “five additional features identified 1992/1993”	Haun and Kelly 1991, Jones 1993, Tuggle and Tomonari-Tuggle 1997
1720	550 m (1,804.4) to SE	Hawaiian habitation /agricultural complex	Pre-Contact; fair to poor condition; “additional C-shape identified 1992/1993”	Haun and Kelly 1991, Jones 1993, Tuggle and Tomonari-Tuggle 1997
1721	350 m (1,148.3 ft) to SSE	Hawaiian habitation complex	Pre-Contact; fair to poor condition	Haun and Kelly 1991, Tuggle and Tomonari-Tuggle 1997
1722	300 m (984.2 ft) to SE	Hawaiian habitation complex	Pre-Contact; good to poor condition	Haun and Kelly 1991, Tuggle and Tomonari-Tuggle 1997
1723	650 m (2,132.5 ft) to SE	Hawaiian habitation complex	Pre-Contact; good to fair condition; “C-shape and platform not located 1992/1993”	Haun and Kelly 1991, Jones 1993, Tuggle and Tomonari-Tuggle 1997
1724	700 m (2,296.6 ft) to SE	Hawaiian habitation /agricultural complex	Pre-Contact; excellent to fair condition	Haun and Kelly 1991, Tuggle and Tomonari-Tuggle 1997

SIHP # (50-80-12-)	Distance to Present Project Area	Description	Comments	Source(s)
1725	650 m (2,132.5 ft) to S	Hawaiian habitation complex	Pre-Contact; condition not stated , associated shell midden	Haun and Kelly 1991, Tuggle and Tomonari-Tuggle 1997
1726	750 m (2,460.6 ft) to SE	Hawaiian habitation complex including platform, cairn, and wall	Pre-Contact; fair to poor condition, “wall not located 1992/1993”	Haun and Kelly 1991, Jones 1993, Tuggle and Tomonari-Tuggle 1997
1727	500 m (1,640.4 ft) to SE	Complex including cave and cultural sinkhole	Pre-Contact; good condition; also shell midden and historic artifacts	Haun and Kelly 1991, Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
1728	732 m (2,401.5 ft) to E	Walls (2)	Probably associated with ranching or sisal production	Haun and Kelly 1991, Landrum and Schilz 1993, Tuggle and Tomonari-Tuggle 1997
4341	1,000 m (3,280.8 ft) to N	Irrigation system	Plantation related	Huan 1987
4342	683 m (2,240.8 ft) to N	Reservoir	Plantation related	Yucha et al. 2014
4548	619 m (2,030.8 ft) to S	Complex including walls (5), mound (7), and terrace (1)	Agriculture function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4549	619 m (2,030.8 ft) to S	Terrace	Agriculture function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4550	619 m (2,030.8 ft) to S	Complex including wall and terrace	Agriculture function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997

SIHP # (50-80-12-)	Distance to Present Project Area	Description	Comments	Source(s)
4551	619 m (2,030.8 ft) to S	Complex including walls (2), modified sinkhole (2), modified outcrop, mound, and enclosure	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4552	619 m (2,030.8 ft) to S	Complex including modified outcrops (2), mounds (2), and a modified sinkhole	Agriculture function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4553	619 m (2,030.8 ft) to S	Complex including modified sinkholes (2), wall, and enclosure	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4554	619 m (2,030.8 ft) to S	Modified sinkhole	Agriculture function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4555	619 m (2,030.8 ft) to S	Mound	Agriculture function	Burgett and Rosendahl 1992
4556	619 m (2,030.8 ft) to S	Complex including terraces (2), modified sinkhole, mound, and cairn	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4557	619 m (2,030.8 ft) to S	Complex including cairn and wall	Possible storage and agriculture function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4558	619 m (2,030.8 ft) to S	Complex including L-shape wall and mound	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997

SIHP # (50-80-12-)	Distance to Present Project Area	Description	Comments	Source(s)
4559	619 m (2,030.8 ft) to S	Complex including walls (2), mounds (5), and platform	Agriculture and possible burial function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4560	619 m (2,030.8 ft) to S	Complex including mound, terrace, and modified sinkhole	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4561	619 m (2,030.8 ft) to S	Complex including mound, cupboard, and alignment	Agriculture and possible burial and possible storage functions	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4562	619 m (2,030.8 ft) to S	Complex including terraces (2), wall, mound, and modified sinkhole	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4563	619 m (2,030.8 ft) to S	Modified sinkhole	Agriculture function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4564	619 m (2,030.8 ft) to S	Complex including modified sinkhole, pavings (2), and platform	Agriculture and temporary habitation, and possible burial function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4565	619 m (2,030.8 ft) to S	Complex including modified sinkhole and terrace	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4566	619 m (2,030.8 ft) to S	Complex including L-shape wall and terrace	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997
4567	619 m (2,030.8 ft) to S	Complex including modified sinkhole and wall	Agriculture and temporary habitation function	Burgett and Rosendahl 1992, Tuggle and Tomonari-Tuggle 1997

SIHP # (50-80-12-)	Distance to Present Project Area	Description	Comments	Source(s)
4649	405 m (1,328.7 ft) to E	Wall (traceable over 260-m distance)	East-west oriented remnant of portions of Hawaiian Fibre Co boundary wall	Landrum and Schilz 1993, Tuggle and Tomonari-Tuggle 1997
4650	542 m (1,778.2 ft) to E	Traditional Hawaiian habitation complex	Including three pit caves, one with maximum interior dimensions 9 m long by up to 5 m wide with floor to ceiling height up to 1.4 m, rectangular enclosure, and slab faced mound	Landrum and Schilz 1993, Tuggle and Tomonari-Tuggle 1997
4651	536 m (1,758.5 ft) to E	Habitation site	Including walled terrace and mound	Landrum and Schilz 1993, Tuggle and Tomonari-Tuggle 1997
4652	496 m (1,627.3 ft) to E	Mounds (3)	Mounds may have recent military origin, or may be traditional Hawaiian features	Landrum and Schilz 1993, Tuggle and Tomonari-Tuggle 1997
4653	335 m (1,099.1 ft) to E	Wall remnant	Wall remnant oriented in same direction as SIHP # -4649 sisal plantation wall and may be of similar origin	Landrum and Schilz 1993, Tuggle and Tomonari-Tuggle 1997
4701	289 m (948.1 ft) to S	Modified sinkhole	SIHP # -4701, sinkhole capped and modified sometime in first half of twentieth century for storage of probably related to illegal alcohol production	Tuggle and Murakami 1995
4702	222 m (728.3 ft) to S	Mounds	Consists of approx. 150 low stone piles and mounds that testing suggests represent Hawaiian dryland agricultural complex	Tuggle and Murakami 1995

SIHP # (50-80-12-)	Distance to Present Project Area	Description	Comments	Source(s)
5093	502 m (1,646.9 ft) to S	WWII portable pillbox, roads, pads	WWII infrastructure	Tuggle and Tomonari-Tuggle 1997
5095	364 m (1,194.2 ft) to E	WWII bivouac	WWII infrastructure	Tuggle and Tomonari-Tuggle 1997
5129	404 m (1,325.5 ft) to S	Hawaiian habitation complex	–	Tuggle and Tomonari-Tuggle 1997
5918	360 m (1,181.1 ft) to N	Mound and petroglyph	–	Ostroff et al. 2001
5919	225 m (738.2 ft) to N	40 features associated with Fort Barrette	–	Ostroff et al. 2001
7669	998 m (3,274.3 ft) to N	Quarry remnant	–	Yucha et al. 2014
9714	Bisects project area	OR&L alignment	Placed on National Register of Historic Places (NRHP)	NRHP form (1974)
NL-1	66 m (216.5 ft) to S	WWII sentry post	–	Tuggle and Tomonari-Tuggle 1997
NL-2	130 m (426.5 ft) to S	Mixed complex of Hawaiian and ranching features	–	Tuggle and Tomonari-Tuggle 1997
NL-24	554 m (1,817.5 ft) to S	Jet “boneyard”	–	Tuggle and Tomonari-Tuggle 1997
NL-25	740 m (2,427.8 ft) to SSW	Early to mid-twentieth century homestead	–	Tuggle and Tomonari-Tuggle 1997

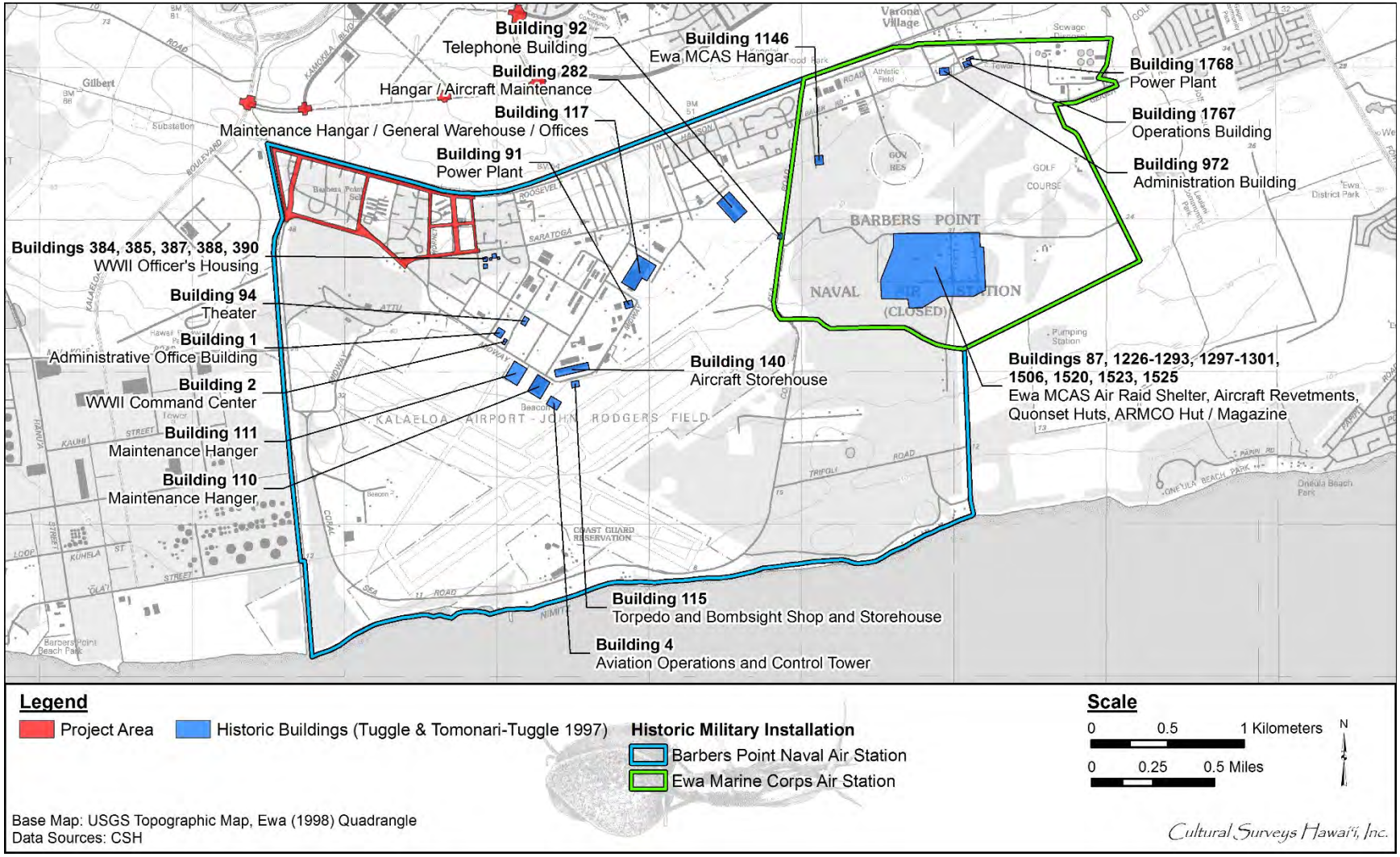

Figure 23. Map showing relationship of the project area to known historic structures of preservation concern (adapted from NAS Barbers Point Final Environmental Baseline Survey June 1994 Figure 3-6 on page 3-26)

3.3.3 Haun 1987

Paul H. Rosendahl, Inc. (PHRI) conducted an archaeological reconnaissance survey of approximately 1,400 acres in the Ewa Town Center (ETC)/Secondary Urban Center project area in Honouliuli (Haun 1987). Haun’s (1987) survey included the northern portion of the current project area, *mauka* of the OR&L. Haun (1987) found that most of the ETC project area had been extensively modified in the late nineteenth and twentieth centuries, particularly by sugarcane cultivation. Although no historic properties were previously identified within the ETC project area, one previously identified historic property is adjacent to it. The OR&L right-of-way (ROW), SIHP # 50-80-12-9714, bounds the ETC project area on the *makai* side, along present-day Renton Road.

Two sites, an irrigation ditch and a World War II military structure, were identified within the ETC project area during the reconnaissance survey. The ditch was constructed of concrete and stone. Associated features including the remains of two structures, a roadbed, and a wall were also noted. These are part of the irrigation system used to irrigate the sugarcane fields *mauka* of the current H-1 alignment well north of the present project area.

The multi-level, ferro-concrete, World War II military structure was identified on the summit of Pu‘u Palailai. It was interpreted as an observation point consisting of a staircase-like series of rooms, each with a large opening or window facing the ocean. An associated structure consisting of a circular, dry-laid stone masonry walled enclosure was also documented. This also appeared to be military related and was interpreted as a possible revetment for a small gun position for defense of the observation point. Because the ditch and military structure were less than 50 years old at the time of the survey, no further work was recommended.

3.3.4 Rosendahl 1987

Rosendahl (1987) conducted an archaeological reconnaissance survey of approximately 850 acres for the Kapolei Village project extending to the east edge of the present project area. The project area was bounded by Farrington Highway on the northwest, Fort Barrette Road on the southwest, the OR&L on the southeast, and O‘ahu Sugar Company lands adjacent to Kaloi Gulch on the northeast. No archaeological sites were documented near the project area other than the OR&L Railroad line (SIHP # -9714).

3.3.5 Haun and Kelly 1991

Haun and Kelly (1991) produced an archaeological survey of the Naval Air Station, Barbers Point with notes on the history of Honouliuli. The survey area totaled approximately 1,230 acres. A total of 43 archaeological sites, comprised of 385 discrete features, were recorded. Of these, approximately 73% were understood as most likely pre-Contact sites; 27% were regarded as most likely historical. Approximately 47% of the pre-Contact sites were evaluated as probably related to habitation activities. Designated Survey Area A was just south of the present project area and was judged to have a moderate density of cultural remains and Survey Area B was just to the east and was judged to have a low density of cultural remains. SIHP #s -1717 through -1727 were described in Area A and SIHP # -1728 was described in Area B.

3.3.6 Kennedy 1991

Kennedy (1991) conducted a surface survey as well as subsurface testing with a backhoe at Kapolei Park/Pu‘u o Kapolei. Kennedy (1991:17–20) reports six features made out of basalt, but

concluded they were of modern origin. Kennedy also observed Army infrastructure dated to the early 1940s, but did not designate them as historic properties. No historic properties were observed during subsurface testing. Like Clark (1977), Kennedy (1991) recommended that no further archaeological work was necessary.

3.3.7 Burgett and Rosendahl 1992

Burgett and Rosendahl (1992) reported on an archaeological inventory survey at a contaminated soil stockpile/remediation facility at Naval Air Station, Barbers Point approximately 500 m south of the present project area. A total of 21 sites comprising 71+ features were identified including mound, modified sinkhole, wall, terrace, modified outcrop, cairn, enclosure, pavement, platform, alignment, cave, and cupboard formal types. Site function included agriculture, temporary habitation, agriculture/temporary habitation, possible burial, marker, and possible storage. Agriculture was the largest functional category, with 49 features (69%).

3.3.8 Erkelens 1992

Erkelens (1992) produced an archaeological survey and interpretive trail development study for Site 1719 at Naval Air Station Barbers Point located just south of the central portion of the project area. Identified features included Feature A, a C-shape planting mound; Feature B, a large enclosure (16 m by 12 m) with a 4 m by 4 m paved platform; Feature C, an enclosure roughly equilateral triangle in shape with walls approximately 13 m long; Feature D, a low irregular pile of rock and a rough alignment; and Feature E, a small vertical-sided mound constructed of stacked limestone. Detailed plan view and cross-section maps are provided.

3.3.9 Jones 1993

Jones (1993) of the International Archaeological Institute Inc. (IARII) prepared a letter report for a Phase I archaeological inventory survey at Barbers Point Naval Air Station addressing three discrete project areas: a family housing project (H-208), an aviation maintenance training building (P-261), and a PATSWINGPAC addition (P-255). Designated “Area A” for a family housing project was a 55-acre area immediately adjacent to the south of the south side of the present project area. A total of 274 archaeological features were identified in Area A including five sites (SIHP #s 50-80-08-1718, 50-80-08-1719, 50-80-08-1720, 50-80-08-1723, and 50-80-08-1726) previously reported by the Bishop Museum survey (Haun 1991).

SIHP # -1718, was initially described as a habitation complex of six features, which included a rectangular enclosure, elongate mound, two C-shape structures, an L-shape structure, and a possible burial platform (Haun 1991:38–41). IARII identified all but one of these features. The L-shape structure (Feature C) could not be located, but an upright slab was recorded. The platform feature (Feature E) noted by Haun as a possible burial locus was described by the IARII archaeologists simply as a circular mound.

SIHP # -1719, included two enclosures, a C-shape structure, a circular mound, and a cairn, in excellent states of preservation. The discovery of numerous undocumented features nearby suggested the need for additional survey.

SIHP # -1720, was described as a small habitation/agricultural site containing a circular mound and enclosure (Haun 1991:43). Both the enclosure and platform were relocated. A C-shape

structure was also discovered among these features and arbitrarily included within the site boundary.

SIHP # -1723 was identified as a habitation complex of six sinkholes, a C-shape structure, and a possible burial platform (Haun 1991:47–48). The IARII survey confirmed all six sinkholes; however, neither a C-shape enclosure nor platform were found. It was thought possible the mound (Feature 20A) located 25 m to the east of the sinkhole complex may represent the platform noted in the Haun 1991 Bishop Museum survey.

SIHP # -1726 had been reported as a platform, wall, and mound cluster. The Jones (1993) IARII survey recorded a platform and mound within a cleared area, but could not discern a wall as noted in the Bishop Museum report (Haun 1991:52–53).

Jones summarizes,

> Feature types recorded in Area A included linear alignments, circular mounds, elongated mounds, modified outcrops, enclosures, sinkholes, C-shape, U-shape and L-shape structures, platforms, cairns, possible hearth, and linear stacked rock. Historic features included such common forms as wall sections, with occassional anomalies represented by a 1930s-era automobile, stone-lined irrigation ditch, concrete cistern, and stone cattle tank. Recent military-related structures were present, but rare. These feature types included trash scatters of cans and building materials, a concrete bunker, and a small building utilized as a washroom. Many features, particularly those described as modified bedrock features, were probably multicomponent in function, incorporating indistinct mounds, walls, and linear stacked rock. [Jones 1993:5]

3.3.10 Landrum and Schilz 1993

Landrum and Schilz (1993) wrote up an archaeological reconnaissance and limited subsurface testing at a proposed Family Housing Construction Area project at Barbers Point Naval Air Station. Six archaeological sites were identified. Three sites (SIHP #s 50-80-12-1728, -4649, and -4653) are boundary walls of the Hawaiian Fibre Company sisal plantation which operated from AD 1898 until AD 1930.

Three sites (SIHP #s -4650, -4651, and-4652) contain eight features of traditional Hawaiian origin and two of undetermined origin. SIHP #s -4650 and -4651 have habitation or habitation-related components. SIHP # -4652 contains one probable agriculturally related clearing mound and two mounds of undetermined function or origin. SIHP #s -4650, -4651, and -4652 (Feature 1), are remnant examples of late prehistoric traditional Hawaiian activity within undeveloped portions of the work area. SIHP # -4650 contains features and material remains indicating semi-permanent occupation of the area (Landrum and Schilz 1993).

Nine World War II era military structures (Buildings 446 through 454) were documented in a companion study (Yoklavich 1992).

3.3.11 Tuggle and Murakami 1995

Tuggle and Murakami (1995) produced an archaeological inventory survey for a Family Housing construction project at Naval Air Station Barbers Point immediately south of the present project area. This was an intensive survey of a 10.8-acre portion of the Jones (1993) study area.

One site stands apart from the rest, as unrelated to early Hawaiian use. SIHP # -4701 is a sinkhole that was capped and modified sometime in the first half of the twentieth century for storage of items that were probably related to illegal alcohol production. Three of the sites (SIHP #s -1723, -1724, and -1726) contained 132 features. Some 55 tests (shovel tests, test pits, and rock removal) indicate the structures and sinkholes were used for Hawaiian habitation, agriculture and burial. Human bone was identified in three of the features, all sinkholes (SIHP #s -1724-19, -1724-54, and -1726-2). An additional site (SIHP # -4702) consists of approximately 150 low stone piles and mounds that testing suggests represent a Hawaiian dryland agricultural complex.

3.3.12 Tuggle and Tomonari-Tuggle (1997)

Tuggle and Tomonari-Tuggle (1997) produced *A Cultural Resource Inventory of Naval Air Station Barbers Point* . . . that summarized and synthesized prior studies accomplished at the Naval Air Station. They addressed the entirety of the Naval Air Station lands including all of the present project area seaward of the OR&L alignment. They show a series of north/south (*mauka*/*makai*) trending strips cleared by bulldozer during the construction of NAS Barbers Point ca. 1942 crossing the present project area south of the OR&L (Tuggle and Tomonari-Tuggle (1997:37). They provide summaries of finds by inventory area but none of the inventory areas appears to overlap with the present project area.

3.3.13 Hammatt and Shideler 2001

The field investigation of this archaeological inventory survey conducted by Hammatt and Shideler (2001) indicated cable corridors going through areas intensively disturbed by prior sugarcane cultivation, by modern construction activity associated with transportation infrastructure, and by recent development. Based on background research and fieldwork results, no further archaeological research was recommended. Only two historic properties were identified within 50 m (164 ft) of a proposed fiber optic cable alignment: the OR&L Railroad (SIHP # -9714) and Ewa Plantation Sugar Company irrigation infrastructure (SIHP # -4341).

3.3.14 Ostroff et al. 2001

Ostroff et al. (2001) completed an inventory survey with subsurface testing of Pu‘uokapolei/Fort Barrette. The inventory survey included a complete surface survey, the excavation of 21 trenches with a backhoe, and the excavation of four controlled test units. Two sites were recorded during the investigations: SIHP #s -5918 and -5919. SIHP # -5918 includes a stone mound and a petroglyph of questionable age on the western side of the *pu‘u*, SIHP # -5919. SIHP # -5919 includes 40 separate features associated with the Army installation known as Fort Barrette; these included pillboxes, terraces, stone walls, platforms, gun emplacements, and other military related structures. Ostroff et al. concluded SIHP # -5918 would need further investigation if any construction activities were going to take place that might impact the site. The authors also concluded Fort Barrette (SIHP # -5919) was “an excellent candidate for placement on the National Register of Historic Places” (Ostroff et al. 2001:i). Ostroff et al. (2001) do not evaluate the traditional cultural significance of Pu‘uokapolei (SIHP # -138), or make any recommendations regarding the site’s eligibility for either the State or National Register of Historic Places.

3.3.15 O’Hare et al. 2006

O’Hare et al. (2006) carried out an archaeological assessment and cultural impact evaluation for a Kamōkila Boulevard extension project from the former southern termination (at its junction

with the Kapolei Parkway) south to Franklin D. Roosevelt Avenue at Kapolei, TMK: [1] 9-1-016:001, 012, 032. The only historic property identified was the OR&L right-of-way (SIHP # -9714) but in addition to the original main line track, a siding and two railway cars on the siding are discussed.

3.3.16 Rasmussen and Tomonari-Tuggle 2006

Rasmussen and Tomonari-Tuggle (2006) conducted archaeological monitoring for archaeological work on a Waiau Fuel Pipeline project (TMKs: [1] 9- 1, 3, 4, 6, 7, and 8). The fuel pipeline corridor extends from the HECO Barbers Point Tank Farm in Campbell Industrial Park to the Waiau Generating Station east of Pearl City Peninsula crossing the *ahupua‘a* of Honouliuli, Hō‘ae‘ae, Waikele, Waipi‘ o, Waiawa, Manana, Waimano, and Waiau. It appears there was no on-site archaeological monitoring or field results near the present project area.

3.3.17 Cleghorn and Kahahane 2008

Cleghorn and Kahahane (2008) produced an archaeological assessment (literature review and field inspection study) of the then proposed Ke Kama Pono facility at a Yorktown Road location on less than 0.25 acre of previously developed land within the former Barbers Point Air Station at Kalaeloa, (TMK: [1] 9-1-013:024). The study concluded this project area was a vacant lot that appeared to have been extensively modified in the past and that if any surface archaeological features were present, they would have been bulldozed and destroyed. It was thought that this bulldozing activity may have also buried or collapsed any sink holes that may have been present.

3.3.18 Cleghorn and Mooney 2009

Cleghorn and Mooney (2009) reported on archaeological monitoring for the development of the first of five 2,000 sq ft buildings of the Ke Kona Pono (“Children of Promise”) program facility located on Yorktown Road within the former Naval Air Station (NAS) Barbers Point (TMK: [1] 9-1-013:024). Three potential sinkholes were encountered but there were no associated cultural or paleontological remains identified. While foundation remnants from a late historic military structure demolished in the late 1980s were encountered and one historic bottle was found, no significant cultural remains were identified during excavations.

3.3.19 Dagher and Spear 2009

Dagher and Spear (2009) carried out a literature search and field inspection of the Kapolei Computerized Traffic Control System (TMK: [1] 9-1-various plats and parcels and 9-2-various plats and parcels). The study was of the area to be impacted by the construction of the North-South Roadway corridor, and the installation of 14.4 miles of underground fiber optic cable and conduits, and the installation of cameras and ancillary equipment at 22 intersections within existing ROWs in Kapolei and Makakilo. The study concluded that

> . . . surface structures and/or artifacts are not expected to be recovered within the roadway corridor due to the massive landscape modifications that have taken placed in the area during the Plantation-Era and recent times. In addition, subsurface contexts are not expected to yield traces of agricultural and habitation activities and/or artifacts associated with traditional times, this also due to modem landscape modifications, including the development of residential neighborhoods and the

various roads. Based on the findings of the literature search and field inspection, no archaeological work is recommended [Dagher and Spear 2009:15]

3.3.20 Tulchin and Hammatt 2009

Tulchin and Hammatt (2009) prepared an archaeological assessment (archaeological inventory survey with negative finds) for The Villas at Malu‘ohai, a 2-acre parcel in Kapolei (TMK: [1] 9-1-016:064 por.). The project area is located in Kapolei at 91-1001 Kama‘aha Avenue. It is bounded on the north by Kama‘aha Avenue, to the east by Kaiau Avenue, to the west by Fort Barrette Road, and to the south by a residential development. No historic properties were identified.

3.3.21 Park and Collins 2010

Park and Collins (2010) prepared an archaeological monitoring report in support of a Kahe Reverse Osmosis (RO) Water Pipeline project (TMKs: [1] 9-1-015:002 and 9-2-003:011). The 4-mile-long pipeline route lies immediately adjacent (*mauka*) to the OR&L Railroad tracks and within the OR&L ROW extending as far east as Kalaeloa Boulevard west of the present project area. Archaeological monitoring within the Kahe RO Water Pipeline project encountered no new subsurface archaeological sites or deposits.

3.3.22 Hammatt and Shideler 2012

Hammatt and Shideler 2012 produced an archaeological literature review and field inspection (LRFI) report for a 10-acre Rengo Packaging Inc. project (TMK: [1] 9-1-013-002 por.). The project area overlaps with the present study area. During pedestrian inspection of the project area 13 former foundation sites, understood as remnants of military housing and barracks constructed during the early 1940s and 1950s, were encountered and are briefly described with text and photographs. No historic properties were designated in this study.

3.3.23 Hammatt et al. 2013

CSH (Hammatt et al. 2013) produced an archaeological inventory survey testing report for work at Tracks Beach Park for a proposed Leeward Bikeway project, Phase II (TMK: [1] 9-2-003:011). For the purposes of the AIS the proposed project’s APE was defined as the entire 8.3-mile (13.4-km) 12.2-m (40-ft) wide corridor (total area of 16.35 ha or 40.4 acres) within which it was considered there may be direct impacts to historic properties. There were no new significant finds. OR&L, SIHP # -9714, previously placed on the National Register of Historic Places (National Register), is further described.

3.3.24 McElroy and Elison 2013

McElroy and Elison (2013) prepared an archaeological inventory survey for a 43-acre parcel for a proposed solar farm in Kalaeloa (TMK: [1] 9-1-013:001). Two archaeological sites, SIHP # -1725 (a traditional to early historic multi-use complex) and NL-25 (a twentieth century homestead) were previously recorded on the property. Site NL-25 was not found. SIHP # -1725 was first documented in a Bishop Museum survey that recorded the site as a complex of burials, terraces, walls, sinkholes, foundations, enclosures, pavements, cairns, and a C-shaped structure (Haun 1991). All 17 features of SIHP # -1725 were confirmedand ten new features were found. In addition to these archaeological features, two natural sinkholes were noted during the survey. The sinkholes showed no evidence of human modification or use, and they were not considered as archaeological sites.

3.3.25 Yucha et al. 2014

Yucha, et al. (2014) reported on a supplemental archaeological inventory survey for Phase II of the Kapolei Interchange project, TMKs: [1] 9-1-015:017 por. and 9-2-043:001-004 por. The project area was located at the Kapolei Interchange and included portions of the H-1 highway, off-ramp, and overpass, Farrington Highway, Kalaeloa Boulevard, and surrounding areas. The study addressed three historic properties:

- SIHP # -4341, a ditch and flume system initially identified by Hammatt et al. (1991)
- SIHP # -4342, the Ewa Plantation Company Reservoir 7 initially identified by Hammatt et al. (1991), and
- SIHP # -7669, a quarry remnant related to the former Palailai Quarry was newly identified during the supplemental AIS investigation.

3.4 Background Summary and Predictive Model

From the background research it is apparent that traditional Hawaiian activities would have occurred in the vicinity of the project area, including habitation, potentially some agriculture, and religious activities. This is indicated by the previous archaeology, which has identified numerous traditional Hawaiian sites surrounding the currently proposed project area. Of importance is the Pu‘u o Kapolei Heiau located north of the project area. However, no sites have been documented within the boundaries of the project area, which may be a result of later activities altering or destroying any potential sites. The areas in the project vicinity appear to be heavily utilized during the post-Contact period, particularly after the early 1900s with the development of the area for military use. These areas went out of use by the 1970s, but remnants of foundations and roads can be seen on aerial photographs today. Based on the background research and the location of the project corridors in the vicinity of historic military areas, the expected finds include primarily historic foundations and related features.

Section 4 Results of Fieldwork

The fieldwork component of this field inspection was completed during 17 and 18 October 2017, and 15 November 2017 by CSH archaeologists under the general supervision of Principal Investigator David Shideler, M.A. This work required approximately 5-person days to complete.

A pedestrian inspection and GPS data collection was conducted along nine current and proposed road segments and at six major intersections. Roosevelt Avenue, West Perimeter Road, Kamōkila Boulevard, Hornet Street, Franklin Street, Saratoga Avenue, and the intersection at Roosevelt Avenue and Kamōkila Boulevard were surveyed on 17 October 2017. Copahee Avenue and the remaining intersections were surveyed on 18 October 2017. The southern extension of Wākea Street and the to be created Road A were surveyed on 15 November 2017. The vegetation within and adjacent to the project area consisted of thick, 1- to 2-ft-tall grass, lowland coastal dry shrubs, manicured grasses, *kiawe*, *koa haole*, palm, and banyan. Where the ground was visible, limestone bedrock was visible, indicating minimal soil development in much of the area.

In many of the segments of the project area, historic debris was observed including those related to construction activities and former foundation areas. Three sites were identified during the field inspection (Table 3). All former foundation features are considered part of temporary site number CSH 1 (Figure 24 and Table 4). These former foundations were recorded via notes, photographs, and GPS points at the estimated center. They are all in poor condition with the concrete slabs having been removed and only remnants of the base course and concrete debris present. These recorded former foundation features correlate with historic buildings first depicted on the 1953 USGS topographic map (see Figure 17). They are no longer depicted on maps or aerial photographs as of the 1977 USGS Orthophotoquad aerial photograph (see Figure 20). The only feature not depicted on the 1953 map is CSH 1 Feature 1. In addition to CSH 1, two other sites were identified: CSH 2, a filled-in well of indeterminate age, and CSH 3, a historic road (see Figure 24). The results of the field inspection for the intersections and each of the linear segments are described below.

Table 3. Identified potential historic properties

Site	Location	Description	Condition
CSH 1	Feature 1 along Roosevelt Ave between Copahee Ave and Hornet St, Features 2 through 18 bounded by West Perimeter Rd, Saratoga Ave, Copahee Ave, and Roosevelt Ave	Historic former foundation features; concrete foundations removed, basecourse and debris remain	Poor
CSH 2	Along Roosevelt Ave just west of Copahee Ave	Filled-in well	Good
CSH 3	Along Saratoga Ave just east of Copahee Ave	Historic asphalt road	Good

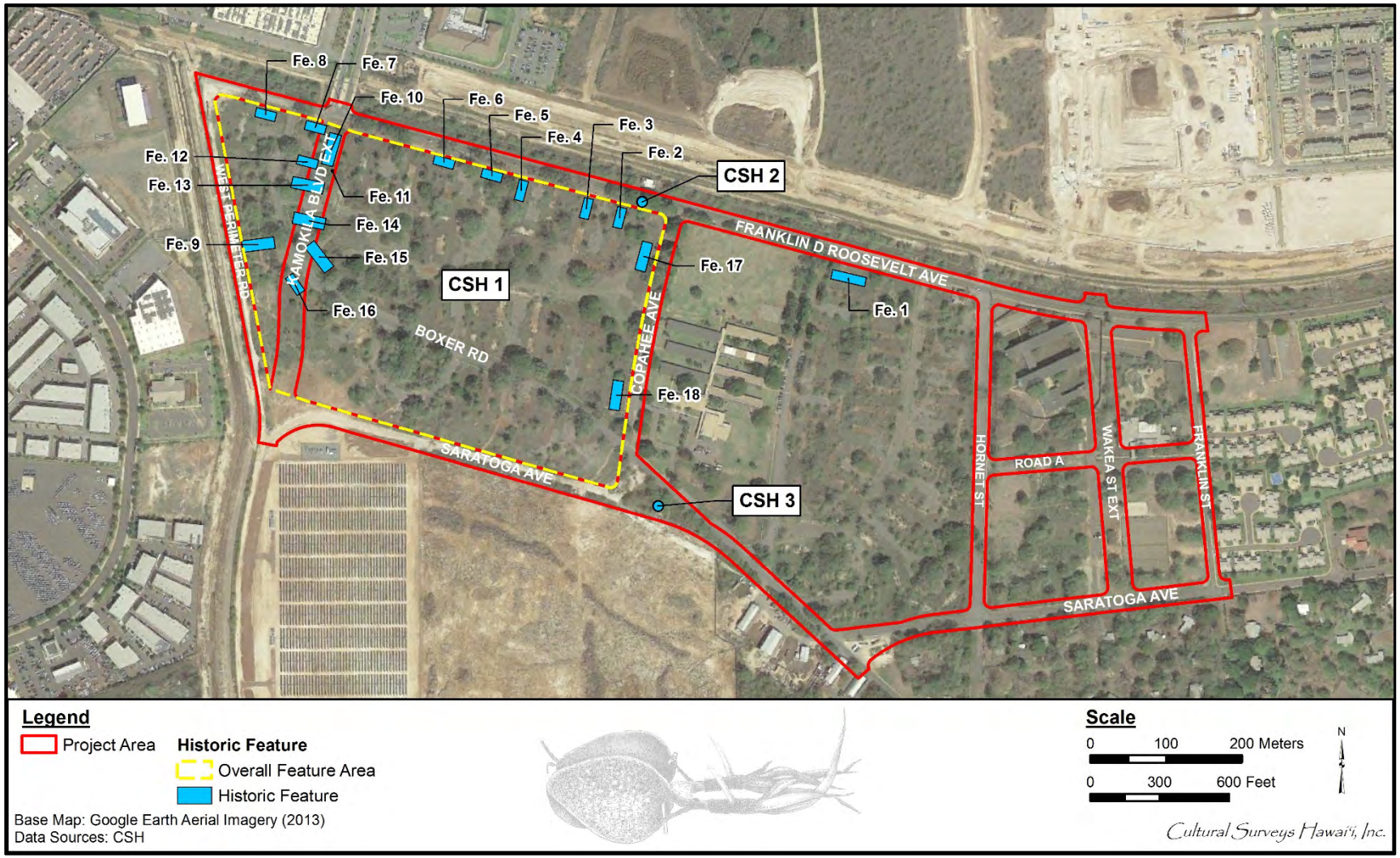

Figure 24. Aerial photograph showing the location of sites CSH 1, CSH 2, and CSH 3 (Google Earth 2013)

Table 4. CSH 1 features

Feature	Location	Orientation	Measurement	Associated Features/Artifacts	Condition
1	Roosevelt Ave	East-west	23 m by 8 m	Rusted metal debris	Poor
2	Roosevelt Ave	North-south	16 m by 6 m	Rusted metal debris	Poor
3	Roosevelt Ave	North-south	18 m by 6 m	Rusted metal debris	Poor
4	Roosevelt Ave	North-south	16 m by 6 m	Rusted metal debris	Poor
5	Roosevelt Ave	North-south	12 m by 6 m	Rusted metal debris	Poor
6	Roosevelt Ave	East-west	17 m by 6 m	Rusted metal debris	Poor
7	Roosevelt Ave	East-west	20 m by 5 m	Rusted metal debris	Poor
8	Roosevelt Ave	East-west	23 m by 10 m		Poor
9	West Perimeter Rd	North-south	17 m by 6 m		Poor
10	Kamōkila Blvd	North-south	30 m by 8 m		Poor
11	Kamōkila Blvd	N/A	2.5 m by 2.3 m		Poor
12	Kamōkila Blvd	East-west	21 m by 6 m	Rusted metal debris	Poor
13	Kamōkila Blvd	East-west	30 m by 8 m	Circular concrete depression, four concrete and metal postholes, rusted metal debris	Poor
14	Kamōkila Blvd	East-west	21 m by 6.5 m plus extension of 9 m by 6.5 m		Poor
15	Kamōkila Blvd	East-west	23.5 m by 8 m	Rusted metal debris	Poor
16	Kamōkila Blvd	East-west	20 m by 6.5 m	Rusted metal debris	Poor
17	Copahee Ave	North-south	8 m by 6 m	Rusted metal and ceramic utility debris	Poor
18	Copahee Ave	North-south	13 m by 6 m		Poor

4.1 The Intersections

None of the project areas at the six intersections contained potential historic properties. Each intersection and features in or near them are described below.

The intersection of Kapolei Parkway and Kalaeloa Boulevard is an asphalt-paved surface in a commercial area with landscaping and businesses in the area (Figure 25 and Figure 26). Both Kapolei Parkway and Kalaeloa Boulevard are divided six-lane roads with a concrete and grassy median. The *mauka* portion of Kalaeloa Boulevard does not have a median. There are four concrete triangles, one on each corner of the intersection that separate the right-hand turn lanes off Kapolei Parkway and Kalaeloa Boulevard. Crosswalks are on all four sides of the intersection. There is a concrete drainage canal on the *mauka* side of Kapolei Parkway and 10 m east of the intersection (Figure 27). In the grass off the *makai*/east corner of the intersection is a sign post for a petroleum pipeline (Figure 28).

The intersection of Kapolei Parkway and Kamōkila Boulevard is an asphalt-paved surface in a commercial area with decorative landscaping and several businesses in the area (Figure 29). Kapolei Parkway is a divided six-road on the western side of the intersection and a divided seven-lane road on the eastern side. Kamōkila Boulevard is a divided four-lane road on the *mauka* side of the intersection and a divided five-lane road on the *makai* side. Crosswalks are on the west, east, and *makai* sides of the intersection.

The intersection of Roosevelt Avenue and Kamōkila Boulevard is an asphalt-paved surface with commercial development on the *mauka* side of the intersection and undeveloped lands on the *makai* side (Figure 30 and Figure 31). Roosevelt Avenue is a two-lane road and Kamōkila Boulevard is a divided four-lane road with a concrete median. Crosswalks are on the west and *mauka* sides of the intersection.

The intersection of Kapolei Parkway and Wākea Street is an asphalt-paved surface in a commercial area with decorative landscaping and businesses in the area (Figure 32 and Figure 33). Kapolei Parkway is a divided five-lane road with a concrete and grassy median. Wākea Street is a divided four-lane road with a concrete and grassy median. There are four concrete triangles, one on each corner of the intersection that separate the right-hand turn lanes off Kapolei Parkway and Wākea Street. Crosswalks are on all four sides of the intersection. Approximately 10 m *makai* of the intersection is a concrete and mortared basalt drainage ditch with a concrete block on one side (Figure 34).

The intersection of Fort Barrette Road and Kapolei Parkway is an asphalt-paved surface in an area with a housing development and Kapolei High School (Figure 35 and Figure 36). Fort Barrette Road is a four-lane road. Kapolei Parkway is a divided five-lane road on the west side of the intersection and a divided six-lane road with a concrete and grassy median on the east side. There are two concrete triangles on the *mauka*/east and *makai*/east corners of the intersection that separate the right-hand turn lanes off Fort Barrette Road and Kapolei Parkway. Crosswalks are on the east and *makai* sides of the intersection. Approximately 15 m southeast of the intersection is a concrete drainage pipe in a concrete and mortared basalt drainage ditch (Figure 37).

The intersection of Fort Barrette Road and Kama‘aha Avenue is in an area with a housing development (Figure 38 and Figure 39). Fort Barrette Road and Kama‘aha Avenue are five-lane roads. Kama‘aha Avenue has a concrete and grassy median on the east side of the intersection.

Figure 25. General view of the intersection of Kapolei Parkway and Kalaeloa Boulevard, view to northeast

Figure 26. General view of the intersection of Kapolei Parkway and Kalaeloa Boulevard, view to southwest

Figure 27. Concrete drainage canal *mauka* of Kapolei Parkway and east of Kalaeloa Boulevard, view to north

Figure 28. Petroleum pipeline warning signpost off *makai*/east corner of Kapolei Parkway and Kalaeloa Boulevard intersection, view to southeast

Figure 29. General view of the intersection of Kapolei Parkway and Kamōkila Boulevard, view to northeast

Figure 30. General view of the intersection of Roosevelt Avenue and Kamōkila Boulevard, view to northeast

Figure 31. General view of the intersection of Roosevelt Avenue and Kamōkila Boulevard, view to northwest

Figure 32. General view of the intersection of Kapolei Parkway and Wākea Street, view to east

Figure 33. General view of the intersection of Kapolei Parkway and Wākea Street, view to northwest

Figure 34. Concrete and mortared basalt drainage ditch with concrete block *makai* of Kapolei Parkway and Wākea Street intersection, view to south

Figure 35. General view of the intersection of Fort Barrette Road and Kapolei Parkway, view to east

Figure 36. General view of the intersection of Fort Barrette Road and Kapolei Parkway, view to north

Figure 37. Concrete drainage pipe in concrete and mortared basalt drainage ditch southeast of Fort Barrette Road and Kapolei Parkway intersection, view to south

Figure 38. General view of the intersection of Fort Barrette Road and Kama‘aha Avenue, view to west

Figure 39. General view of the intersection of Fort Barrette Road and Kama‘aha Avenue, view to southeast

There are two concrete triangles on the *mauka*/east and *makai*/east corners of the intersection that separate the right-hand turn lanes off Fort Barrette Road and Kama‘aha Avenue. Crosswalks are on the west, east, and *mauka* sides of the intersection. Approximately 15 m *makai* and west of the intersection is a concrete culvert underneath a driveway (Figure 40).

4.2 A Western Portion of Roosevelt Avenue

The western portion of the Roosevelt Avenue segment is mostly undeveloped on either side of the road, with the exceptions of the Wākea Garden Apartments on the *mauka*/east corner of Roosevelt Avenue and Hornet Street Barbers Point Elementary School on the east side of Copahee Avenue, and Costco west of Kamōkila Boulevard and *mauka* of Roosevelt Avenue. Figure 41 and Figure 42 show the general area from either end of the segment. Along the *mauka* side of Roosevelt Avenue is the OR&L Railroad. Along the *makai* side of the road are various barricaded and disused asphalt roads that extend north to south. These roads are approximately located where roads are depicted on the 1943 U.S. Army War Department terrain map (see Figure 15), 1953 USGS topographic map (see Figure 17), and 1968 USGS topographic map (Figure 19). Associated with these roads are concrete and metal postholes, potentially for sign posts that have since been removed. The flora in this segment primarily consists of manicured grasses, 1- to 2-ft-tall grass, *kiawe*, and *koa haole*. The features of this segment are explained from east to west below.

CSH 1 Feature 1 (Figure 43) is a former foundation located *makai* of Roosevelt Avenue and east of Tulagi Avenue. It is oriented east to west and measures approximately 23 m by 8 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature’s surface is composed of red, silty, granular clay, base course gravel with pieces of concrete aggregate debris remaining on the surface. There is also rusted metal debris throughout the area (Figure 44). This is the only former foundation feature that does not appear on the 1953 USGS topographic map (see Figure 17).

CSH 1 Feature 2 (Figure 45) is a former foundation located *makai* of Roosevelt Avenue and west of Copahee Avenue. It is oriented north to south and measures approximately 16 m by 6 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature’s surface is composed of red, silty, granular clay, base course gravel with pieces of concrete aggregate debris remaining on the surface. There is also rusted metal debris throughout the area.

CSH 1 Feature 3 (Figure 46) is a former foundation located *makai* of Roosevelt Avenue and west of Copahee Avenue. It is oriented north to south and measures approximately 18 m by 7 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature’s surface is composed of red, silty, granular clay, base course gravel with pieces of concrete aggregate debris remaining on the surface. There is also rusted metal debris throughout the area.

CSH 1 Feature 4 (Figure 47) is a former foundation located *makai* of Roosevelt Avenue and west of Copahee Avenue. It is oriented north to south and measures approximately 16 m by 6 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature’s surface is composed of red, silty, granular clay, base course gravel with pieces of concrete aggregate debris remaining on the surface. There is also rusted metal debris throughout the area.

Figure 40. Concrete culvert underneath driveway *makai* and west of Fort Barrette Road and Kama‘aha Avenue intersection, view to south

Figure 41. General view of Roosevelt Avenue from Franklin Street, view to west

Figure 42. General view of Roosevelt Avenue from Saratoga Street, view to east

Figure 43. CSH 1 Feature 1 former foundation area, along Roosevelt Avenue segment, view to west

Figure 44. Example of rusted metal artifacts found in CSH 1 features

Figure 45. CSH 1 Feature 2 former foundation area, along Roosevelt Avenue segment, view to south

Figure 46. CSH 1 Feature 3 former foundation area, along Roosevelt Avenue segment, view to south

Figure 47. CSH 1 Feature 4 former foundation area, along Roosevelt Avenue segment, view to south

CSH 1 Feature 5 (Figure 48) is a former foundation located *makai* of Roosevelt Avenue and west of Copahee Avenue. It is oriented north to south and measures approximately 12 m by 6 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of red, silty, granular clay, base course gravel with pieces of concrete aggregate debris remaining on the surface. There is also rusted metal debris throughout the area.

CSH 1 Feature 6 (Figure 49) is a former foundation located *makai* of Roosevelt Avenue and west of Copahee Avenue. It is oriented east to west and measures approximately 17 m by 6 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of red, silty, granular clay, base course gravel with pieces of concrete aggregate debris remaining on the surface. There is also rusted metal debris throughout the area.

CSH 1 Feature 7 (Figure 50) is a former foundation located along the segment between Boxer Road and Roosevelt Avenue. It is oriented east to west and measures approximately 20 m by 5 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface. The area contains rusted metal debris, two concrete and metal postholes, and ground utility holes.

CSH 1 Feature 8 (Figure 51) is a former foundation located *makai* of Roosevelt Avenue between Kamōkila Boulevard and Saratoga Street. It is oriented east to west and measures approximately 23 m by 10 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface. The area around this feature contains concentrations of concrete debris and milled wood. The area appears to have been used as a refuse dump as there are various piles of trash, mostly organic, in the area.

CSH 2 (Figure 52) is a circular water well of indeterminate age located on the *makai* side of Roosevelt Avenue and west of Copahee Avenue. It has been filled in with basalt cobbles and has a water pipe coming up out of the ground just west of it. It has been cordoned off by a square metal pole enclosure.

4.3 A West Perimeter Road

The West Perimeter Road portion of the project area is the westernmost segment that extends from Roosevelt Avenue to Saratoga Avenue. The West Perimeter Road is currently an unimproved gravel road overgrown with grass in several places. Figure 53 and Figure 54 show the general area from either end of the segment. This transect is bisected along its length by a fence that separates the unimproved road, which also extends along the length of the transect and the canal to the west (Figure 55 and Figure 56). *Mauka* of Roosevelt Avenue and outside the project area is the OR&L Railroad and *mauka* of that is a Costco. The *mauka* end of the road is barricaded by limestone boulders. At various points along the segment there are concentrations of modern and historic refuse such as refrigerators, TVs, other appliances, and piles of broken concrete. The vegetation within this segment of the project is consistent with the other segments: tall grasses, *kiawe*, *koa haole*, and coastal dry shrubs.

Figure 48. CSH 1 Feature 5 former foundation area, along Roosevelt Avenue segment, view to west

Figure 49. CSH 1 Feature 6 former foundation area, along Roosevelt Avenue segment, view to west

Figure 50. CSH 1 Feature 7 former foundation area, along Roosevelt Avenue segment, view to east

Figure 51. CSH 1 Feature 8 former foundation area, along Roosevelt Avenue segment, view to east

Figure 52. CSH 2 filled-in well, along Roosevelt Avenue segment, view to west

Figure 53. General view of West Perimeter Road from Roosevelt Avenue, view to south

Figure 54. General view of West Perimeter Road from Saratoga Avenue, view to northeast

Figure 55. Fence bisecting West Perimeter Road segment, view to southwest

Figure 56. Canal west of unimproved road and fence, along West Perimeter Road segment view to southwest

CSH 1 Feature 9 (Figure 57) is a former foundation located along the segment between Roosevelt Avenue and Saratoga Avenue. It is oriented north to south and measures approximately 17 m by 6 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface.

At the southern end of this segment where the unimproved road meets the Saratoga Avenue segment is a modern concrete pillar lying on across the unimproved road and a large pile of concrete chunks.

4.4 A southern extension of Kamōkila Boulevard

The southern extension of Kamōkila Boulevard segment has thick 1- to 2-ft-tall grass throughout most of the segment. Figure 58 through Figure 60 show the general area of the segment. Where there was little or no grass cover, limestone bedrock was at the ground surface. Approaching Boxer Road from the south, a significant reduction in thick grassy vegetation was observed and concrete aggregate debris and limestone gravels were encountered in the dry silty ground surface substrate. The *mauka* side of Boxer Road was barren with only minimal shrub and dry grass cover, and the occasional *kiawe* and *koa haole* tree. Areas of use were indicated along the *makai* side of the southwestern bend of Boxer Road and between Boxer Road and Roosevelt Avenue by rectangular clearings and concentrated areas of debris. All but the asphalt surfaces were former foundation sites. The features are described from north to south below.

CSH 1 Feature 10 (Figure 61) is a former foundation located along the segment between Roosevelt Avenue and Boxer Road. It is oriented north to south and measures approximately 30 m by 8 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface.

CSH 1 Feature 11 (Figure 62) is a former foundation located along the segment between Boxer Road and Roosevelt Avenue. It is oriented east to west and measures approximately 21 m by 6 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface. There are also some rusted metal debris on the feature.

CSH 1 Feature 12 (Figure 63) is an irregularly shaped concrete slab located along the segment between Roosevelt Avenue and Boxer Road approximately 6 m east of Feature 11. It measures approximately 2.5 m by 2.3 m. The feature is in fair condition with the concrete slab present, but it is overgrown with grass.

CSH 1 Feature 13 (Figure 64) is a former foundation located along the segment between Roosevelt Avenue and Boxer Road. It is oriented east to west and measures approximately 30 m by 8 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface. A circular concrete and mortar depression is present off the southwest corner of the feature that contains rusted metal pipes and concrete debris (Figure 65). This depression has an outer diameter of approximately 78 cm and an inner diameter of approximately 53 cm. Along the northern perimeter of the feature are four concrete bases with metal postholes aligned east to west and evenly spaced (Figure 66). It is likely these postholes

Figure 57. CSH 1 Feature 9 former foundation area, along West Perimeter Road segment, view to east

Figure 58. General view of Kamōkila Boulevard from Roosevelt Avenue, view to south

Figure 59. General view of Kamōkila Boulevard from Boxer Road, view to north

Figure 60. General view of Kamōkila Boulevard from Saratoga Avenue, view to north

Figure 61. CSH 1 Feature 10 former foundation area, along Kamōkila Boulevard segment, view to north

Figure 62. CSH 1 Feature 11 former foundation area, along Kamōkila Boulevard segment, view to east

Figure 63. CSH 1 Feature 12 former foundation area, along Kamōkila Boulevard segment, view to northeast

Figure 64. CSH 1 Feature 13 former foundation area, along Kamōkila Boulevard segment, view to west

were used for flag poles or sign posts. An asphalt surface is located north of and adjacent to Feature 4. It measures approximately 22 m by 12 m. It is in fair condition and overlies a pre-existing sidewalk along Boxer Road. This surface is not depicted on historic maps and is considered likely to be modern.

An asphalt surface (Figure 67) is located between CSH 1 Feature 13 and Feature 14. It is oriented east to west and measures approximately 22 m by 12 m. It is in fair condition and overlies a pre-existing sidewalk along Boxer Road. This surface is not depicted on historic maps and is considered likely to be modern.

CSH 1 Feature 14 (Figure 68) is a former foundation located along the segment between Roosevelt Ave and Boxer Road. It is oriented east to west and measures approximately 21 m by 6.5 m with a rectangular extension from the northeast corner that measures approximately 9 m by 6.5 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature’s surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface.

CSH 1 Feature 15 (Figure 69) is a former foundation located north of the southwest bend of Boxer Road. This feature is oriented east to west and measures approximately 23.5 m by 8 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature’s surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface. The area also contains rusted metal debris, milled wood debris, and a few small in situ concrete slab remnants.

An asphalt surface (Figure 70) is located adjacent to the southwest bend of Boxer Road and is oriented east to west. It measures approximately 24 m by 15 m. It is in fair condition. The area contains large rectangular wooden beams measuring approximately 6 to 7 m long and 0.3 m thick (Figure 71). There is also metal hardware debris scattered on the surface of the asphalt. This feature is not depicted on historic maps and is considered likely to be modern.

CSH 1 Feature 16 (Figure 72) is a former foundation located south of the southwest bend of Boxer Road in a grassy area. It measures approximately 20 m by 6.5 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature’s surface is composed of base course gravel with pieces of concrete aggregate debris remaining on the surface. There are also some rusted metal debris on the feature.

4.5 **Copahee Avenue**

The Copahee Ave segment is fronted by the Barbers Point Elementary School to the east, and undeveloped lands to the west. Figure 73 and Figure 74 show the general area from either end of the segment. In the project area between the Barbers Point Elementary School’s fence and the road are remnants of an older fence, including concrete and metal postholes, as well as fire hydrants. Along the western side of the road are remnants of a potentially historic-style sidewalk (Figure 75). The flora in this segment is consistent with the rest of the project area.

CSH 1 Feature 17 (Figure 76) is a former foundation located along the segment on the west side of Copahee Ave. It is oriented north to south and is approximately 8 m by 6 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature’s surface is composed of red, silty, granular clay, base course gravel with pieces of concrete

Figure 65. Concrete depression off of southwest corner of CSH 1 Feature 13, along Kamōkila Boulevard segment, view to east

Figure 66. Concrete and metal postholes on north side of CSH 1 Feature 13, along Kamōkila Boulevard segment, view to east

Figure 67. Asphalt surface between CSH 1 Feature 13 and Feature 14, along Kamōkila Boulevard segment, view to west

Figure 68. CSH 1 Feature 14 former foundation area, along Kamōkila Boulevard segment, view to east

Figure 69. CSH 1 Feature 15 former foundation area, along Kamōkila Boulevard segment, view to northeast

Figure 70. Asphalt surface *makai* of southwest bend of Boxer Road, along Kamōkila Boulevard segment, view to south

Figure 71. Wooden beam on asphalt surface, along Kamōkila Boulevard segment, view to northwest

Figure 72. CSH 1 Feature 16 former foundation area, along Kamōkila Boulevard segment, view to west

Figure 73. General view of Copahee Avenue from Roosevelt Avenue, view to south

Figure 74. General view of Copahee Avenue from Saratoga Avenue, view to north

Figure 75. Potentially historic sidewalk, along Copahee Avenue segment, view to west

Figure 76. CSH 1 Feature 17 former foundation area, along Copahee Avenue segment, view to southeast

aggregate debris remaining on the surface. There are a few remnant in situ pieces of concrete that have been pushed up by *kiawe* roots (Figure 77). There are also some rusted metal and ceramic utility debris on the feature (Figure 78).

CSH 1 Feature 18 (Figure 79) is a former foundation located along the segment on the west side of Copahee Avenue. It is oriented north to south and measures approximately 13 m by 6 m. The former foundation is in poor condition with the concrete slab having been previously removed. The feature's surface is composed of red, silty, granular clay, base course gravel with pieces of concrete aggregate debris remaining on the surface. There are two in situ parallel concrete slabs with a 3 m gap between them (Figure 80).

4.6 A northern portion of Hornet Street

The northern portion of the Hornet St segment is mostly undeveloped with flora consistent with the rest of the project area. Figure 81 and Figure 82 show the general area from either end of the segment. A fence extends along the western side of the road, along which is modern trash. A historic-style curb is along the eastern side of Hornet Street at the *mauka* end of the segment (Figure 83). On the *mauka* end and east of Hornet Street is the modern Wākea Garden Apartments. No other potential historic properties were observed along this segment.

4.7 A southern extension of Wākea Street

The southern extension of Wākea Street segment consists of a disused asphalt road and tall grasses and trees. On the *mauka* end of the segment along Roosevelt Avenue is the Wākea Garden Apartments. On the *makai* end of the segment along Saratoga Avenue is a tennis court complex. Figure 84 through Figure 85 show the general area from either end of the segment. The apartment complex's parking lot is located within the project area. Just *makai* of the parking lot are two fences separating the apartment complex's property and another parcel of land to the east and another to the *makai* (Figure 86). One fence has black construction fabric on it and the other has view protectors woven into it. Both fences are within the project area in the *mauka* portion of the segment. Between the fence and the Road A segment is an asphalt surface with asphalt curbs that are associated with abandoned buildings facing the Road A segment (Figure 87). The asphalt surface and asphalt curbs appear to be of modern origin. Extending *makai* from *makai* of the apartment complex's property to Saratoga Avenue along the western boundary of the segment is a disused asphalt road (Wākea Street). *Makai* of the Road A segment, the grass is manicured due to the tennis courts which are along the eastern side of the segment. Within the project area between the tennis courts and the disused Wākea Street is a building associated with the tennis courts (Figure 88). The building appears to be of modern origin and the function is unknown, although it is clear that it is not the restroom facilities. *Makai* of the building is a basalt and concrete mortar planter that measures approximately 2.5 m by 2.5 m. On one edge there is an etching that reads "KANIELA MASONRY 5/18/87" (Figure 89). An unimproved extends at a diagonal from Wākea Street toward the tennis courts and ends *mauka* and to the east of the planter. At the *makai* end of the segment, the southwest corner of the tennis courts is within the project area.

4.8 A northern portion of Franklin Street

The *mauka* portion of Franklin Street segment is fronted by a housing development on the eastern side. Figure 90 and Figure 91 show the general area from either end of the segment. Near

Figure 77. In situ concrete in CSH 1 Feature 17, along Copahee Avenue segment, close-up view

Figure 78. Metal utility fragment in CSH 1 Feature 17, along Copahee Avenue segment, raised lettering on surface of fragment reads "…APCO"

Figure 79. CSH 1 Feature 18 former foundation area, along Copahee Avenue segment, view to north

Figure 80. In situ concrete in CSH 1 Feature 18, along Copahee Avenue segment, close-up view

Figure 81. General view of Hornet Street from Roosevelt Avenue, view to south

Figure 82. General view of Hornet Street from Saratoga Avenue, view to north

Figure 83. Potentially historic curb, along Hornet Street segment, close-up view

Figure 84. General view of Wākea Street segment, view to south

Figure 85. General view of Wākea Street segment, view to north

Figure 86. Two fences within project area along Wākea Street segment, view to north

Figure 87. Asphalt surface and asphalt curbs along Wākea Street segment, view to east

Figure 88. Building associated with tennis courts along Wākea Street segment, view to north

Figure 89. Basalt and concrete mortar planter along Wākea Street, note the engraving saying "KANIELA MASONRY 5/18/87," view to west

Figure 90. General view of Franklin Street from Roosevelt Avenue, view to south

Figure 91. General view of Franklin Street from Saratoga Avenue, view to north

Figure 92. General view *makai* half of Road A segment, view to west

the *mauka* end of the road on the western side is a historic flat-roofed building outside the project area. This building first appears on the 1953 USGS topographic map (see Figure 17). At the *makai* end of the road on the western side are the tennis courts also noted for the Saratoga Avenue segment. No other potential historic properties were observed along this segment.

4.9 A to-be-created Road A segment

The to-be-created Road A segment consisted of tall grasses, some *kiawe* and *koa haole*, and disused asphalt surfaces. Figure 92 through Figure 93 show the general area from either end of the segment. Where the segment meets Franklin Street, in the *makai* portion of the segment is a blocked and disused driveway and parking lot that extends west (see Figure 92). In the *mauka* portion of the segment are abandoned buildings associated with the driveway and parking lot (Figure 95 through Figure 97). These structures appear to be of modern origin. Between the buildings and the parking lot is an overgrown concrete sidewalk. To the west of Wākea Street, the project area is tall grasses and trees. In this area there are limestone bedrock outcroppings. According to the 1953 historic map (see Figure 17), there were once structures or a parking lot on the western end of the segment. These former structures were previously removed and no evidence of them were found during the field inspection. This may be a result of the tall grasses in this area or due to the remnant foundations having degraded beyond the point of recognition. No other potential historic properties were observed along this segment.

4.10 A northwestern portion of Saratoga Avenue including a to be created segment

The northwestern portion of Saratoga Avenue including a to-be-created segment consists of Saratoga Avenue, which is asphalt paved from Franklin Street to Boxer Road and unimproved from Saratoga Street to Copahee Avenue, and a section of Boxer Road between the two segments of Saratoga Road that are asphalt paved. Figure 98 and Figure 99 show the general area from either end of the segment. Along the asphalt-paved portion of Saratoga Avenue there is little development on the *makai* side with the occasional utility and unused road encountered. At the eastern end of the road are duplex-style housing and a tennis court to the *mauka* side. On the *makai* side of Saratoga Avenue near the intersection with Bennington Street is a series of modern concrete slabs interconnected by concrete sidewalks (Figure 100). There are PVC pipes coming up out of some of the slabs. There is also a modern light post next to one of the *makai*-most slabs and associated concrete and metal postholes in the vicinity. A large ornamental octopus tree (*Schefflera actinophylla*) is among the flora in the area, along with grasses, *kiawe*, and *koa haole*.

A concrete drainage ditch (Figure 101) of indeterminant age is located on the *makai* side of Saratoga Ave near the intersection with Bennington Street. It measures approximately 1.15 m by 0.7 m and is approximately 0.7 m deep. It is in fair condition, but has been covered by a boulder.

At the intersection with Boxer Road is an empty limestone ground surface at the *makai* and east corner. On the western side of Boxer Road is a complex of historic buildings (Figure 102 through Figure 104) that are still in use on Department of Hawaiian Home Lands (DHHL) property. These buildings are outside of the project area. Two are closed corrugated aluminum hangers and three are open-air corrugated aluminum and wooden hangers. These buildings first appear on the 1951 USGS aerial photograph (see Figure 16) and the 1953 U.S. Army Service topographic map (see Figure 18). The flora in this portion of the segment is consistent with that found in the other portion.

Figure 93. General view of *mauka* half of Road A segment, view to west

Figure 94. General view of western portion of Road A segment, view to west

Figure 95. Abandoned buildings along Road A segment, view to north

Figure 96. Abandoned buildings along Road A segment, view to northwest

Figure 97. Abandoned buildings along Road A segment, view to north

Figure 98. General view of Saratoga Avenue from Franklin Street, view to west

Figure 99. General view of Saratoga Avenue from Saratoga Street, view to east

Figure 100. Modern concrete slab interconnected with sidewalks, note modern light post, along Saratoga Avenue segment, view to north

Figure 101. Concrete drainage, along Saratoga Avenue segment, view to southwest

Figure 102. Historic gabled roof building with siding, west of Boxer Road, along Saratoga Avenue segment, view to west

Figure 103. Historic gabled roof buildings without siding, west of Boxer Road, along Saratoga Avenue segment, view to east

Figure 104. Historic Quonset hut building, west of Boxer Road, along Saratoga Avenue segment, view to southeast

CSH 3 (Figure 105) is a disused historic asphalt-paved road located along the Boxer Road portion of the segment. It extends from Boxer Road south to the fence and is approximately 4.15m wide. It is in fair condition and is overgrown with exotic succulents. The asphalt is approximately 10 cm thick and has a 10-cm-thick base course of crushed coral (Figure 106). This road appears on the 1953 U.S. Army Service topographic map (see Figure 18), but appears to have fallen out of use by the time the 1968 USGS topographic map (see Figure 19) was produced. There are associated concrete and metal postholes within the vicinity of the road, likely for sign posts that have since been removed.

Along the unimproved portion of Saratoga Avenue on the *makai* side of the segment is a fence with geo-mesh, which is lined with organic refuse and modern trash for the portion from Copahee Avenue to Saratoga Street. About 200 m west of Copahee Avenue is a mound of large limestone boulders that appear to act as a roadblock on Saratoga Avenue (Figure 107). On the *makai* side of the fence at the west end of the segment is a DHHL solar farm. The flora within and adjacent to this segment consists of 1- to 2-ft-tall grass and *kiawe*. East of Copahee Avenue, the *kiawe* is denser and there are exotic succulents in the area. In many areas of this segment the limestone bedrock is at the ground surface.

Figure 105. CSH 3 disused asphalt road, along Saratoga Avenue segment, view to south

Figure 106. Cross-section of CSH 3, along Saratoga Avenue segment, view to northwest

Figure 107. Limestone boulders blocking Saratoga Avenue west of Copahee Avenue, view to east

Section 5 Summary and Recommendations

5.1 Summary

Traditional and historic documentation of the Honouliuli area suggests it was significant in the pre-Contact period. It was associated with several gods, including the Pele sisters, lost souls of the deceased, Hawaiian *ali‘i*, irrigated lowlands for wetland taro cultivation, and rich marine resources off the coast. However, there was little settlement on the coral plains and coast of southwest Honouliuli Ahupua‘a in the vicinity of the project area as it was a less productive resource area. The nearest pre-Contact archaeological site to the present project area is Pu‘u o Kapolei Heiau. In the early historic period, domestic animals and vegetation were brought into this area and the animals were allowed to freely graze. Pre- and early post-Contact land use in this area appears to have been very limited. The general area in the vicinity of the project began to be drastically altered during the early 1900s when the OR&L Railroad and the various military complexes on Barbers Point were constructed. Many of the military buildings became disused and are no longer visible except as foundations on maps or aerial photos as of 1977. Currently, the town of Kapolei is primarily located north of Roosevelt Avenue where there are housing and commercial districts.

During the field inspection, several remnants of historic foundations were documented and labeled as part of temporary site CSH 1. These features correspond with the historic military buildings built in the 1940s to 1950s. While these features are older than 50 years of age, they lack integrity due to the buildings and foundations having been removed and only remnants of base course and debris remaining. A former road (CSH 3) was also documented along Saratoga Avenue near the area of CSH 1. CSH 3 corresponds with a road seen on historic maps (see Figure 18). Consultation with SHPD is recommended regarding formal historic property designations for these remnant foundations and former road. CSH’s informed opinion is that the CSH 1 features do not fulfill the criterions pursuant to HAR §13-275-6. These criterions are as follows:

a Be associated with events that have made an important contribution to the broad patterns of our history;

b Be associated with the lives of persons important in our past;

c Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value;

d Have yielded, or is likely to yield, information important for research on prehistory or history; or

e Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity.

A filled-in well (CSH 2) of indeterminate age was documented along Roosevelt Avenue. Consultation with SHPD is recommended regarding formal historic property designation for this well due to the historic nature of artesian well drilling in the area.

A potentially historic and still in use concrete and mortar curb was documented along the east side of Hornet Street. Consultation with SHPD is recommended regarding formal historic property designation for this curb. All of the road segments in the project area align with roads on historic maps going back to the 1951 aerial photograph (see Figure 16), with Roosevelt Avenue, the eastern portion of Saratoga Avenue, and Franklin Street appearing even earlier on a 1943 map (see Figure 15). All of these roads have been repaved on multiple occasions. The roads are named after people or ships of importance to the Navy. No other potential historic properties were observed during the field inspection.

5.2 Recommendations

While the features of CSH 1 are older than 50 years of age, they appear to lack integrity due to the buildings and foundations having been removed and only remnants of base course and debris remaining. Consultation with SHPD is recommended regarding formal historic property designations for these remnant foundations and the former road (CSH 3). CSH's informed opinion is that the CSH 1 features do not fulfill the criteria pursuant to HAR §13-275-6. Consultation with SHPD is recommended regarding formal historic property designation for the filled-in well (CSH 2) due to the historic nature of artesian well drilling in the area.

Based on the results of this study, early consultation with SHPD is recommended to determine what (if any) further archaeological study is indicated. CSH recommends a combination of on-site and on-call monitoring with on-site monitoring limited to the southern extension of Kamōkila Boulevard, the Wākea Street Extension, and "Road A" and on-call monitoring for all other areas of the project that are current roadways. Reasoning for this recommended monitoring plan is due to the potential for historic surface and subsurface sites to be encountered within the areas previously utilized by the Barbers Point Naval Air Station. Due to the heavily disturbed nature at the intersections, it is unlikely that historic properties would be encountered.

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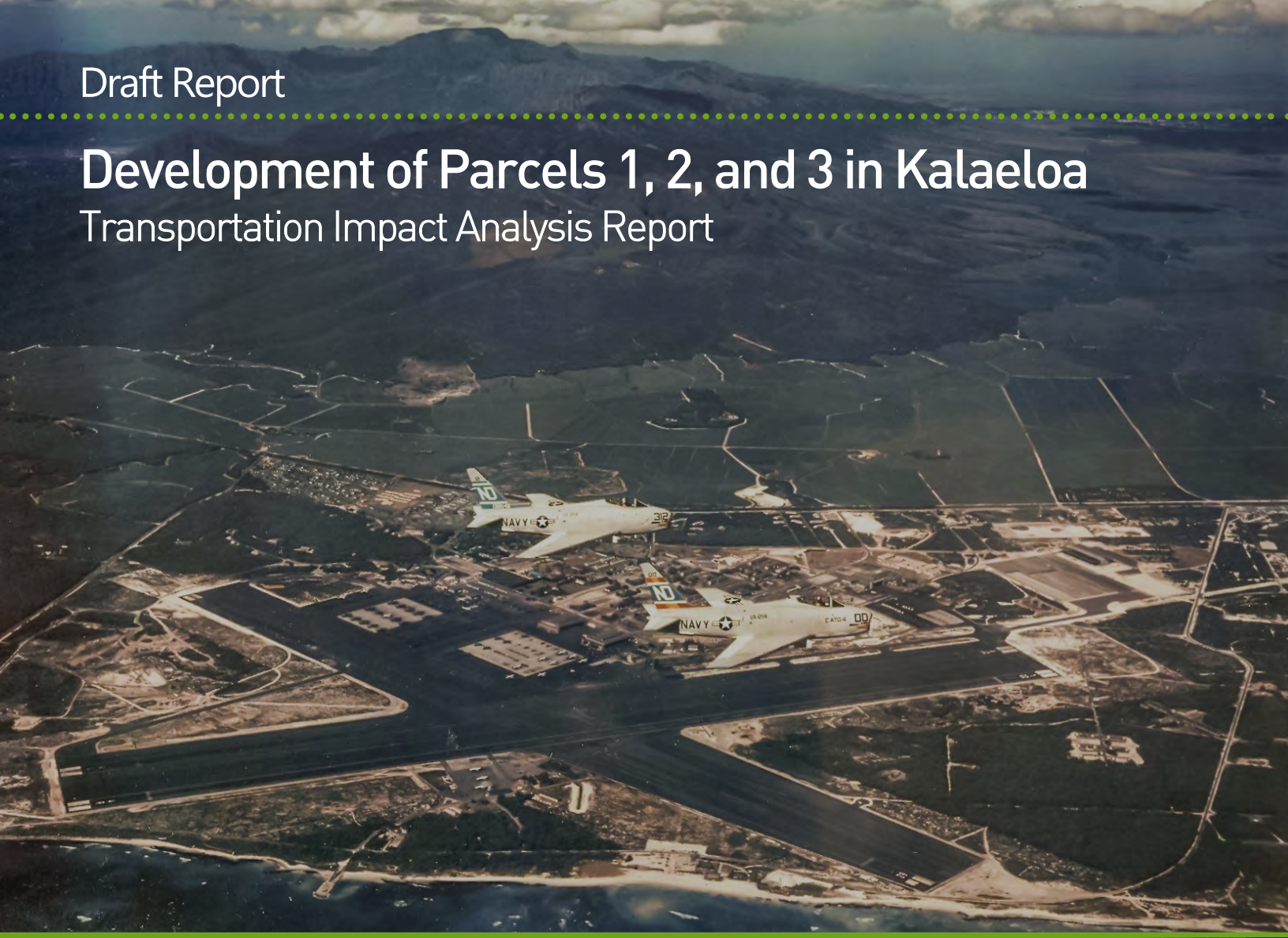
Appendix E

Draft Report: Traffic Impact Analysis Report for the Development of Parcels 1, 2, and 3 in Kalaeloa. Fehr & Peers, December 29, 2017

Draft Report

Development of Parcels 1, 2, and 3 in Kalaeloa

Transportation Impact Analysis Report



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DRAFT REPORT

Transportation Impact Analysis for the Development of Parcels 1, 2, and 3 in Kalaeloa

Parcel 1 TMK: 91013002

Parcel 2 TMK: 91013004

Parcel 3 TMK: 91013128 & 91013129

Prepared for:
R.M. Towill Corporation

December 29, 2017

SD15-0169

FEHR PEERS

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1.0 EXECUTIVE SUMMARY

This report presents the results of the transportation impact analysis report (TIAR) for the proposed residential development complex located within the Kalaeloa area of West Oahu. The proposed project will be either all residential units or a mixed-use development comprising 251 fewer residential units, supporting retail uses, and a Veterans Affairs (VA) Clinic. The project will be developed on three distinct parcels located on the makai side of Roosevelt Avenue between Kamokila Blvd and Franklin Street within the Kalaeloa Master Plan area. In addition, the development is expected to be fully constructed and occupied by Year 2020. This study analyzed the following two project alternatives to be constructed on the three parcels:

- **1,500 Residential Unit -** A total of 496 single family and 1,004 multi-family units are proposed on Parcels 1, 2, and 3 according to the following layout: Parcel 1 will include 126 single family and 404 multi-family dwelling units; Parcel 2 will include 370 single family dwelling units; and Parcel 3 will include 600 multi-family dwelling units, or
- **Mixed-Use Development** – Includes a total of 139 single family and 1,110 multi-family units, 169,000 square feet (s.f.) of retail uses, and an 80,000 square foot VA Clinic. Parcel 1 will include 82 single family and 351 multi-family units, the VA Clinic, and 51,000 s.f. of retail uses. Parcel 2 will include 57 single family and 345 multi-family units, and 28,000 s.f. of retail uses. Parcel 3 will include 414 multi-family units and 90,000 s.f. of retail uses.

The impacts of the proposed project to the surrounding transportation system were evaluated following guidelines established by the City & County of Honolulu Department of Planning & Permitting (DPP) Traffic Review Branch (TRB) and the Hawaii Depart of Transportation – Highways Division (HDOT). The operations of 12 existing key intersections were evaluated during the weekday morning (AM) and evening (PM) peak hours for Existing (2017), as well as for Near Term (2020) conditions without and with the project. Impacts were identified assuming sequential and cumulative development of the three parcels: Parcel 1 only, Parcels 1 and 2, and Parcels 1 through 3.

The project is anticipated to generate the following trips for each alternative development scenario:

1,500 Residential Units

- Parcel 1: a total of 4,299 daily trips, including 274 trips during the AM peak hour (64 inbound/210 outbound) and 332 trips during the PM peak hour (209 inbound/123 outbound).
- Parcels 1 & 2: a total of 7,764 daily trips, including 542 trips during the AM peak hour (131 inbound/411 outbound) and 689 trips during the PM peak hour (434 inbound/255 outbound).
- Parcels 1, 2, and 3: a total of 12,259 daily trips, including 804 trips during the AM peak hour (191 inbound/613 outbound) and 980 trips during the PM peak hour (617 inbound/363 outbound).

Mixed-Use Development

- Parcel 1: a total of 9,740 daily trips, including 647 trips during the AM peak hour (373 inbound/274 outbound) and 765 trips during the PM peak hour (351 inbound/414 outbound).
- Parcels 1 & 2: a total of 14,880 daily trips, including 936 trips during the AM peak hour (503 inbound/460 outbound) and 1,139 trips during the PM peak hour (560 inbound/579 outbound).
- Parcels 1, 2, and 3: a total of 22,454 daily trips, including 1,186 trips during the AM peak hour (582 inbound/604 outbound) and 1,702 trips during the PM peak hour (855 inbound/847 outbound).

These estimates do not include vehicle reductions associated with transit trips anticipated to use the planned extension of the Honolulu Rail Transit system to West Kapolei as some residents are expected to use the rail transit line via the East Kapolei station after its opening in 2019, but trips to the station would be made by automobile and bus transit. Additionally, non-auto reductions accounting for bicycle and pedestrian project trips were also not included to provide a more conservative traffic analysis. A non-auto trip reduction of about a five (5) percent is reasonable given the existing and planned adjacent facilities and the nearby complementary land uses. A five (5) percent vehicle reduction would only decrease project peak hour traffic by 59 and 85 trips in the AM and PM peak hours, respectively, under the Parcel 1, 2, and 3 Mixed-Use scenario (i.e. the higher of the two buildout scenarios). Although encouraging non-auto travel is important from a community and sustainability perspective, this reduction is not significant enough to eliminate any of the project impacts identified in this analysis.

The project is expected to a total of five (5), seven (7), and seven (7) intersection impacts under the Parcel 1, Parcels 1 and 2, and Parcels 1, 2, and 3 development scenarios, respectively, under the Mixed-Use development alternative. One less intersection is expected to be significantly impacts under each of the development scenarios for the 1,500 Residential Unit alternative. **Table ES-1** shows the intersection impacts and under which parcel scenario those impacts would be triggered. Note that the impacts identified in **Table ES-1** are for the Mixed-Use development alternative with the higher trip generation estimate unless otherwise noted.

All of the impacts at intersections can be reduced to a less than significant level through the following improvements listed in **Table ES-2. Table ES-2** shows the LOS for each impacted intersection without and with the proposed mitigations under both project alternatives, as well as the level of project responsibility for each improvement.

The Kamokila Boulevard extension, makai of Roosevelt Avenue, and Roosevelt Avenue Diamond Head of Kamokila Boulevard are assumed to be two-lane roadways with the proposed project. Project traffic is expected to be accommodated on these two-lane roadways, but would be constrained at the adjacent intersections (i.e., Roosevelt Avenue/Kamokila Boulevard and Fort Barrette Road-Enterprise

Street/Roosevelt Avenue). However, the project mitigation to install a traffic signal at each intersection will improve operations on Kamokila Boulevard, Roosevelt Avenue, and Fort Barrette Road and enhance vehicular flow through the study area.

With the project's proposed mitigation measures at the impacted intersections, additional roadway capacity and access to the Kalaeloa area is not needed. However, as traffic continues to grow in the overall area from subsequent development, traffic volumes at two key locations (the Fort Barrette Road-Enterprise Street/Roosevelt Avenue intersection and the Kamokila Boulevard/Kapolei Parkway intersection) will cause LOS E or worse operations, and additional intersection improvements would be difficult to implement due to right-of-way constraints and/or the need for non-standard configurations. Accordingly, new capacity via the Wakea Street extension between Kapolei Parkway and Roosevelt Avenue would likely be needed to provide an additional route for motorists to access Kalaeloa and to balance vehicle delay and peak hour congestion on the surrounding roadway network

Overall, the proposed project is not expected to substantially increase the walking, biking, or transit demand to a level where it could not be accommodated by existing or planned facilities. In addition, the project is expected to enhance multi-modal facilities and services, especially with the promotion of the use of passive and active spaces and non-motorized modes. The project is also expected to not conflict with any existing facilities and planned improvements. Thus, the project's impacts to pedestrian, bicycle, and transit facilities and services are therefore considered less than significant.

TABLE ES-1: NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVELS OF SERVICE (IMPACTED LOCATIONS WITHOUT MITIGATION)

Intersection	Traffic Control[1]	Peak Hour	Near Term LOS[2] (Mixed-Use Development unless otherwise noted)			
			Baseline	Parcel 1	Parcels 1 & 2	Parcels 1,2, and 3
5. Kapolei Pkwy / Kalaeloa Blvd	Signal	AM	C	C	C	C
		PM	**F**	***F***	***F***	***F***
6. Kapolei Pkwy / Kamokila Blvd	Signal	AM	C	D	***E***	***F (E)****
		PM	C	D (C)*	D	***E*** (D)*
7. Kapolei Pkwy / Wakea St	SSSC	AM	**E**	***F (E)****	***F***	***F***
		PM	**E**	***F***	***F***	***F***
	Signal	AM	**F**	***F***	***F***	***F***

TABLE ES-1: NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVELS OF SERVICE (IMPACTED LOCATIONS WITHOUT MITIGATION)

Intersection	Traffic Control[1]	Peak Hour	Near Term LOS[2] (Mixed-Use Development unless otherwise noted)			
			Baseline	Parcel 1	Parcels 1 & 2	Parcels 1,2, and 3
8. Fort Barrette Rd / Kapolei Pkwy		PM	**F**	***F***	***F***	***F***
9. Roosevelt Ave / Kamokila Blvd	AWSC	AM	C	***E*** (C)*	***F (E)****	***F***
		PM	C	***E*** (D)*	***F***	***F***
10. Roosevelt Ave / Copahee Ave	SSSC	AM	C	D (C)	***F*** (D)	***F*** (D)
		PM	B	C	***F*** (C)	***F*** (D)
12. Fort Barrette Rd-Enterprise St / Roosevelt Ave	AWSC	AM	**F**	***F***	***F***	***F***
		PM	**F**	***F***	***F***	***F***
TOTAL INTERSECTION IMPACTS			**-**	**4**	**7**	**7**

Source: Fehr & Peers, 2017

Notes:

[1] AWSC = All-way stop controlled; SSSC = Side-street stop controlled
[2] LOS calculations performed using the *Highway Capacity Manual (HCM) 2010* method. LOS for side street stop-controlled (SSSC) intersections is worst-case movement. For the remaining control types, the overall average delay and LOS is reported.
LOS E and F operations are highlighted in **bold.** ***LOS*** represent project impact.
* LOS is different between development alternatives. LOS in parentheses is for the 1,500 Residential Unit alternative.

TABLE ES-2: NEAR TERM (2020) PLUS PROJECT WITH MITIGATIONS INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Baseline	Plus Parcel 1	Plus Parcel 1 w/ Mit.	Plus Parcels 1 & 2	Plus Parcels 1 & 2 w/ Mit.	Plus Parcels 1, 2, & 3	Plus Parcels 1, 2, & 3 w/ Mit.	Proposed Mitigation	Project Responsibility **
5. Kapolei Pkwy / Kalaeloa Blvd	AM	C	C	C	C	C	C	C	Construct a second Diamond Head-bound left turn lane on Kapolei Parkway	Fair Share Contribution
	PM	**F**	***F***	E (D)*	***F***	E	***F***	E		
6. Kapolei Pkwy / Kamokila Blvd	AM	C	D	N/A	***E***	C	***F (E)****	C	Construct a second mauka-bound left turn lane on Kamokila Boulevard	100%
	PM	C	D (C)*		D	C	***E*** (D)*	D (C)*		
7. Kapolei Pkwy / Wakea St	AM	**E**	***F (E)****	A	***F***	A	***F***	A	Install a traffic signal	Fair Share Contribution
	PM	**E**	***F***	A	***F***	A	***F***	A		
8. Fort Barrette Rd / Kapolei Pkwy	AM	**F**	***F***	E	***F***	E	***F***	E	Restripe Kapolei Parkway to provide 2 through lanes in both directions. Provide left-turn protected signal phasing on Kapolei Parkway and optimize timing.	Fair Share Contribution
	PM	**F**	***F***	D	***F***	E (D)*	***F***	E		
9. Roosevelt Ave / Kamokila Blvd	AM	C	***E*** (C)*	N/A	***F (E)****	B	***F***	B (C)*	Install a traffic signal	100%
	PM	C	***E*** (D)*		***F***	C (B)*	***F***	C		
10. Roosevelt Ave / Copahee Ave	AM	C	D (C)	N/A	***F*** (D)	C	***F*** (D)	D	Widen Roosevelt Avenue ewa of Copahee Avenue to provide a refuge island median for the mauka-bound left-turn movement. Install an ewa-bound left turn lane.	100%
	PM	B	C		***F*** (C)	C	***F*** (D)	D		
12. Fort Barrette Rd-Enterprise St / Roosevelt Ave	AM	**F**	***F***	C	***F***	D (C)*	***F***	D	Install a traffic signal	Fair Share Contribution
	PM	**F**	***F***	C	***F***	C	***F***	D (C)*		

Source: Fehr & Peers, 2017

TABLE ES-2: NEAR TERM (2020) PLUS PROJECT WITH MITIGATIONS INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Baseline	Plus Parcel 1	Plus Parcel 1 w/ Mit.	Plus Parcels 1 & 2	Plus Parcels 1 & 2 w/ Mit.	Plus Parcels 1, 2, & 3	Plus Parcels 1, 2, & 3 w/ Mit.	Proposed Mitigation	Project Responsibility **

Notes:

N/A = Not Applicable. No significant impact under this scenario, thus mitigation is not needed.
LOS calculations performed using the *Highway Capacity Manual (HCM) 2010* method. LOS for side street stop-controlled (SSSC) intersections is worst-case movement. Other uncontrolled movements generally operate well with limited delay.
Undesired LOS and corresponding seconds of delay per vehicle are highlighted in **bold.** ***LOS*** represent project impact.
* LOS is different between alternatives. LOS in parenthesis is for the 1,500 Residential alternative.
**Project responsibility: Yes = impact is project-specific and project is responsible for implementing mitigation. Fair Share Contribution = contributing to cumulative impact and project is responsible to a fair-share contribution of mitigation

2.0 INTRODUCTION

This transportation impact analysis report (TIAR) presents the results of the study conducted by Fehr & Peers for new residential development proposed for Parcels 1, 2, and 3 in the Kalaeloa area on the island of Oahu. The purpose of this analysis is to identify the impacts of the proposed project on the surrounding transportation system. The TIAR includes a description of the assumptions and methods used to conduct the study, as well as a discussion of the results. This TIAR was conducted in accordance with the guidelines and standards of the affected government agencies. **Figure 1** illustrates the study area, and **Figures 2, 3, and 4** illustrates the location and vehicular access points for Parcels 1, 2, and 3. Detailed site plans for the 1,500 Residential Unit alternative was not available at the time of this study, but **Figure 5** shows the site plan for the Mixed-Use Development alternative.

2.1 PROJECT DESCRIPTION

The proposed project will be either all residential units or a mixed-use development comprising residential units, a shopping center, and a Veteran's Affair (VA) Clinic. The project will be developed on three distinct parcels and is expected to be fully constructed by Year 2020 and is located on the makai side of Roosevelt Avenue between Kamokila Blvd and Franklin Street within the Kalaeloa Master Plan area. This study analyzed the following two project alternatives to be constructed in the three parcels:

- **1,500 Residential Unit -** A total of 496 single family and 1,004 multi-family units are proposed on Parcels 1, 2, and 3 according to the following layout: Parcel 1 will include 126 single family and 404 multi-family dwelling units; Parcel 2 will include 370 single family dwelling units; and Parcel 3 will include 600 multi-family dwelling units.

- **Mixed-Use Development** – Includes a total of 139 single family and 1,110 multi-family units, 169,000 square feet (s.f.) of shopping center, and an 80,000 square foot VA Clinic. Parcel 1 will include 82 single family and 351 multi-family units, the 80,000 s.f. VA Clinic, and 51,000 s.f. of shopping center. Parcel 2 will include 57 single family and 345 multi-family units, and 28,000 s.f. of shopping center. Parcel 3 will include 414 multi-family units and 90,000 s.f. of shopping center.

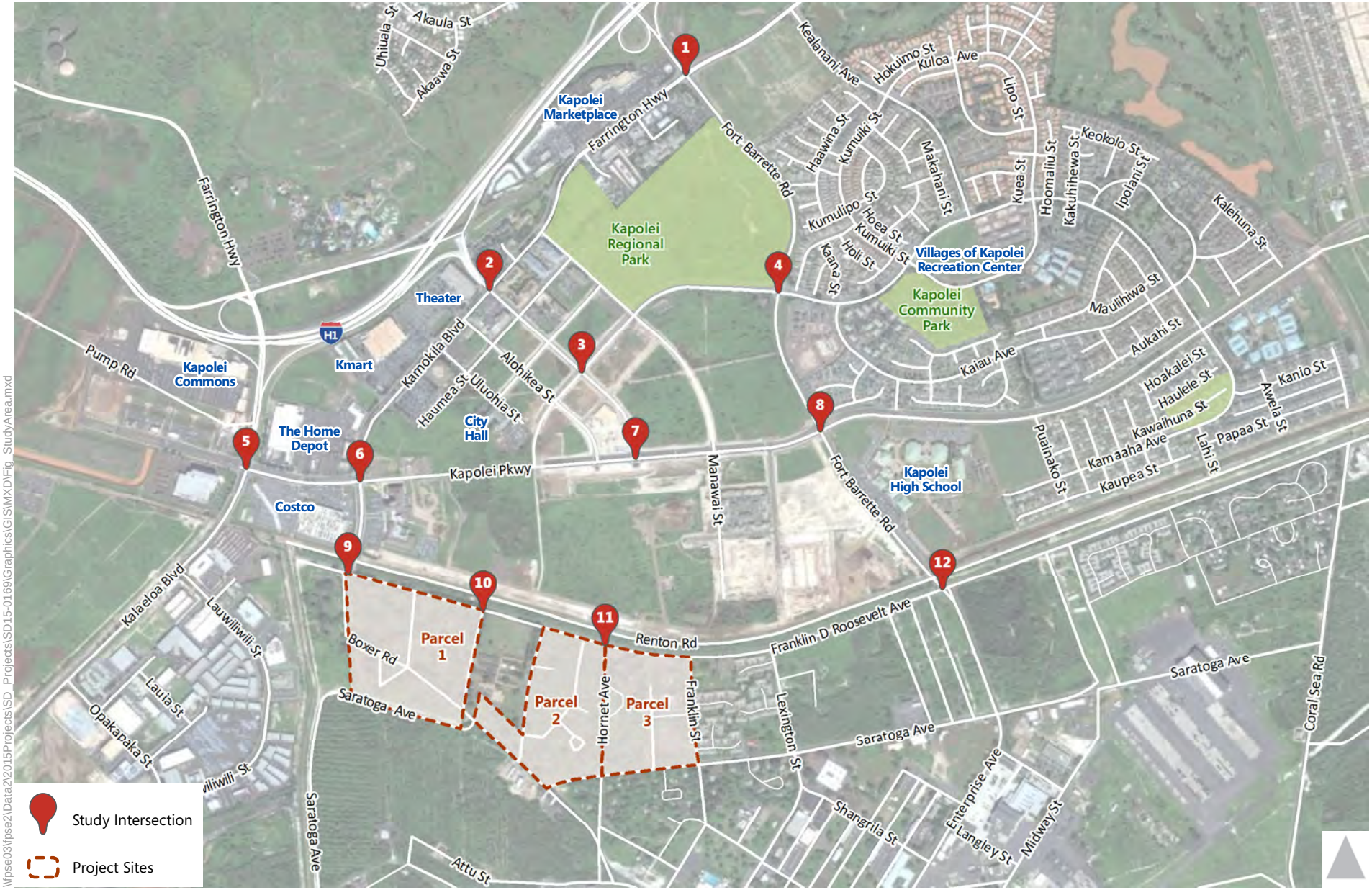

Figure 1

Study Area and Analyzed Intersections

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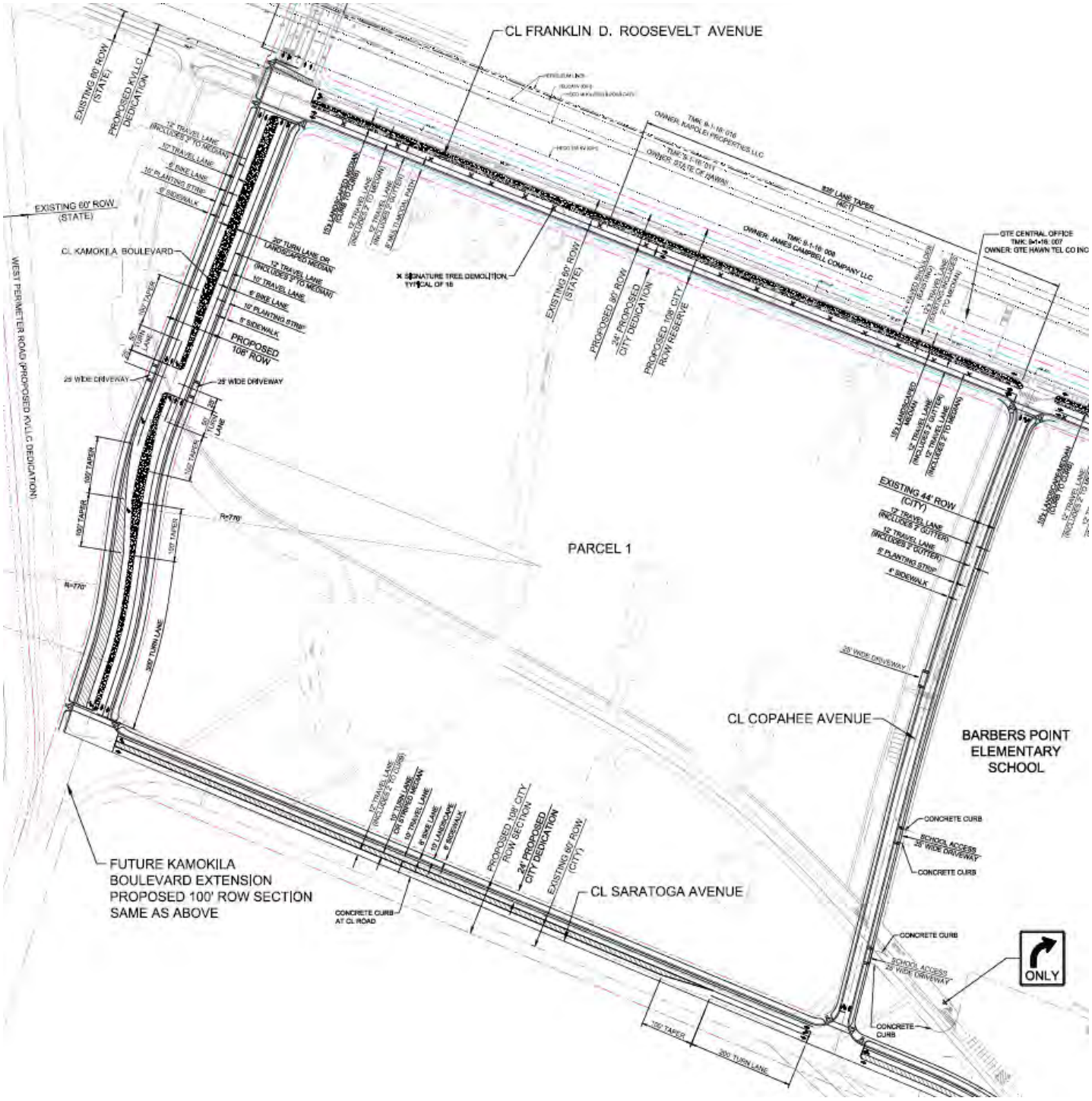
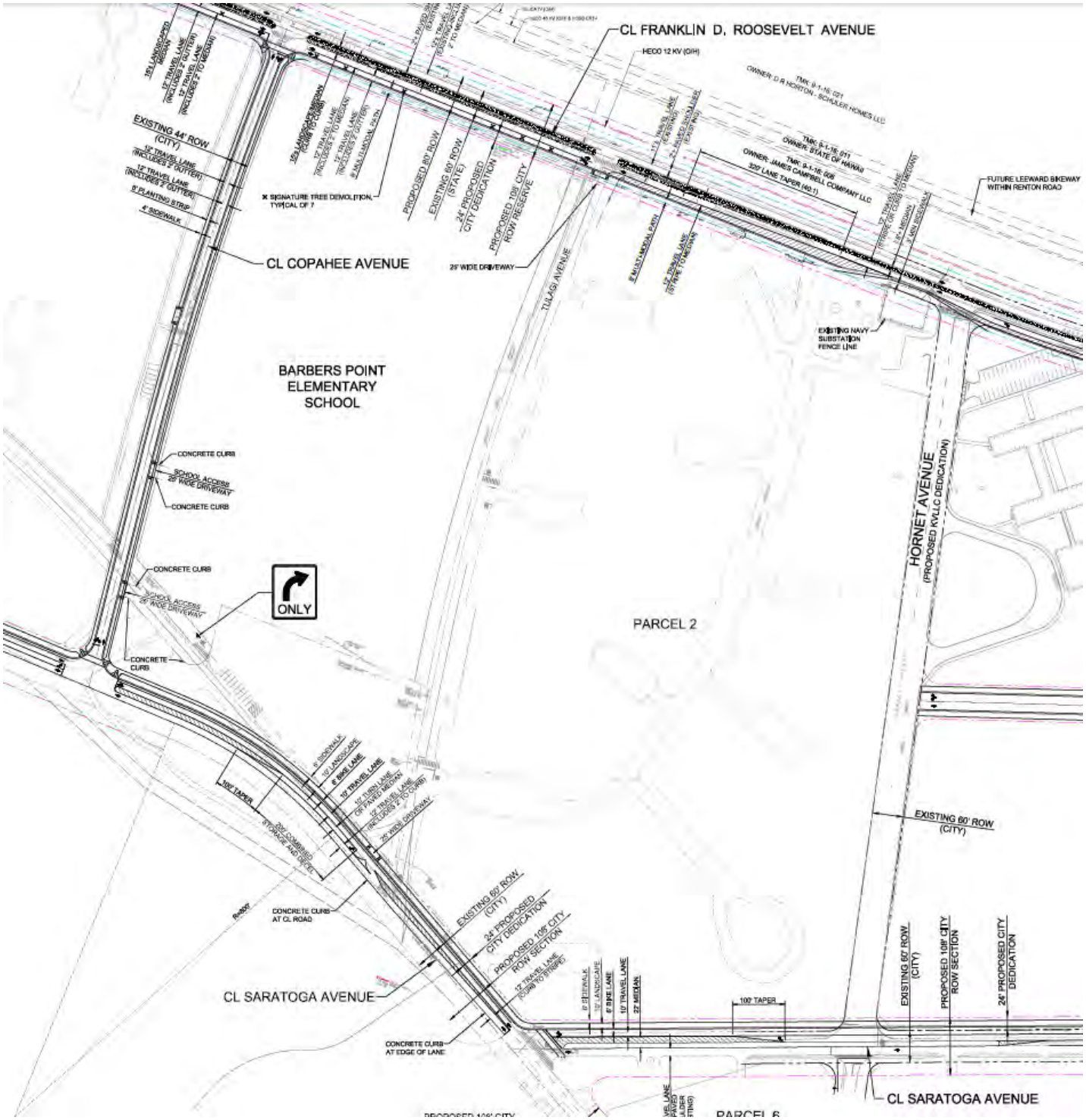


Source: Belt Collins

Figure 2

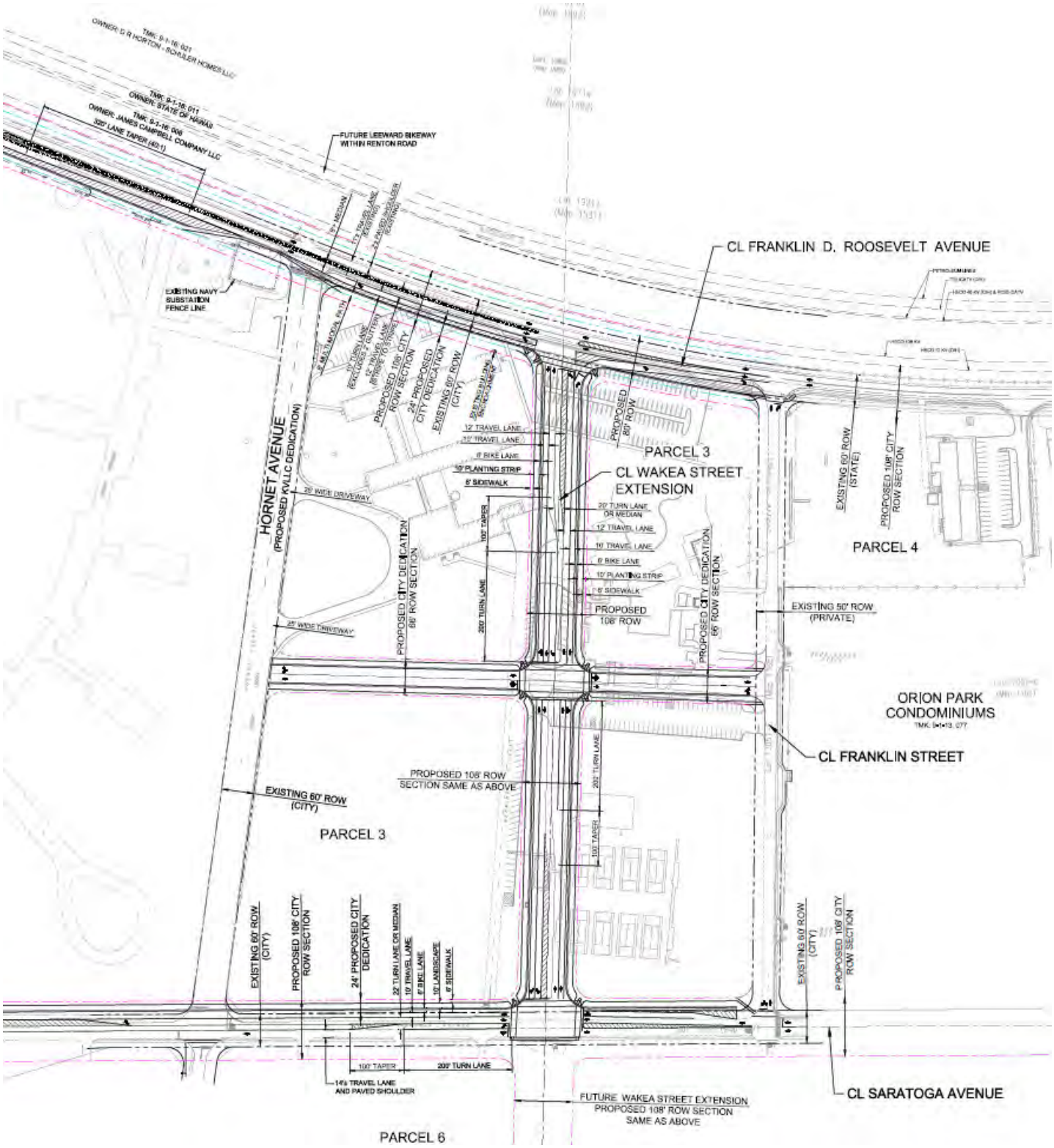
Parcel 1 Location and Access



Source: Belt Collins

Figure 3

Parcel 2 Location and Access



Source: Belt Collins

Figure 4

Parcel 3 Site Location and Access

Land Use

This conceptual plan strategically maximized the 1,200 dwelling units which were allowed for development at the time of this study. Four hundred (400) units were equally allocated to Parcels 1, 2 and 3.

Aligned with the HCDA Transect Zones, Parcel 1 and 2, are Transect 3 are lower density and with a higher emphasis on housing. Residential density in these parcels range from 10-20 units/acre. A corner retail complex and a potential Veterans Administration (VA) Clinic is located at the corner of Kamokila Blvd. and Saratoga Ave.

Parcel 3 is designated by HCDA as Transect 4. Residential density within this parcel ranges form 20-30 units/acre. Blocks within these parcels have been designed with street retail specifically focused along the area's main street, Saratoga Avenue. Wakea Garden Apartments, and newly renovated rental apartment building has been maintained on Parcel 3a and improved with a new parking lot and neighborhood park.

Description		Residential Units Existing	Residential Units New	Commercial Retail	Commercial Institutional
Total for Parcels 1/2/3		100 du	1,249 du	169,000 sf	80,000 sf
Parcel 1	**Density 10-25 du/acre**		**433 du**	**51,000 sf**	**80,000 sf**
1 a Corner Retail	3.49 ac			31,000 sf	
1 b Neighborhood Park	1.24 ac				
1 c VA Clinic	8.39 ac				80,000 sf
1 d Live-Work / Multi-Family	7.01 ac		116 du	20,000 sf	
1 e Garden Apartments	9.92 ac		235 du		
1 f Multi-family / Single-family	2.29 ac		30 du		
1 g Cluster / Single-family	2.95 ac		30 du		
1 h Neighborhood Park	1.14 ac				
1 i Cluster / Single-family	2.51 ac		22 du		
Parcel 2	**Density 10-23 du/acre**		**402 du**	**28,000 sf**	**sf**
2 a Neighborhood Park					
2 b Cluster	2.01 ac		23 du		
2 c Single-family	3.28 ac		34 du		
2 d Multi-family around Open Space	5.13 ac		92 du		
2 e Multi-family	3.69 ac		77 du		
2 f Mixed-use apartments	7.79 ac		176 du	28,000 sf	
Parcel 3	**Density 25-35 du/acre**	**100 du**	**414 du**	**90,000 sf**	**sf**
3 a Wakea Garden Apartments	6. ac	100 du			
3 b Neighborhood Park					
3 c TOD Development 1	6.47 ac		206 du	50,000 sf	
3 d TOD Development 2	3.59 ac		104 du	10,000 sf	
3 e TOD Development 3	3.99 ac		104 du	30,000 sf	

0' 200' 400' 800'

Figure 5

Mixed-Use Development Site Plan

2.2 PROJECT STUDY AREA

The study analyzed the potential project-related traffic impacts under typical weekday AM and PM peak hour traffic conditions at full build-out in 2020. The transportation analysis evaluated the operations at twelve intersections in the vicinity of the proposed project. The analyzed intersections are listed below and are shown on **Figure 1**:

1. Farrington Highway/Makakilo Drive-Fort Barrette Road
2. Kamokila Drive/Wakea Street
3. Wakea Street/Kama`aha Avenue
4. Fort Barrette Road/Kama`aha Avenue
5. Kapolei Parkway/Kalaeloa Boulevard
6. Kapolei Parkway/Kamokila Boulevard
7. Kapolei Parkway/Wakea Street
8. Kapolei Parkway/Fort Barrette Road
9. Roosevelt Avenue/Kamokila Boulevard
10. Roosevelt Avenue/Copahee Avenue
11. Roosevelt Avenue/Hornet Street
12. Roosevelt Avenue/Fort Barrette Road-Enterprise Road

The operations of the study intersections were evaluated during the weekday morning (AM) and evening (PM) peak hours for the following scenarios:

- **Existing (2017) Conditions** – The analysis of existing traffic conditions was based on 2017 counts collected for the analyzed peak hours. The existing conditions analysis also includes a description of key area roadways and an assessment of bicycle, pedestrian, and transit facilities and services near the site.
- **Near Term (2020) Baseline Conditions** – Future volumes in the anticipated completion year of the full project build-out were projected by increasing traffic volumes using an annual growth factor to account for ambient growth *plus* adding traffic generated from approved but not yet constructed and pending developments in the study area.
- **Near Term (2020) Plus Project Conditions** – This traffic scenario provides projected traffic volumes and an assessment of operating conditions under Near Term Baseline Conditions with the addition of project-generated traffic. The near term impacts of the proposed project on future traffic conditions were identified.

The long-term infrastructure needs for roadways serving the study parcels will be addressed in an update to the Kalaeloa Roadway Infrastructure Plan presented in a separate document

2.3 TRAFFIC ANALYSIS METHODS

The analysis of roadway operations performed for this study is based on procedures presented in the *Highway Capacity Manual* (HCM), published by the Transportation Research Board in 2010. The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, with the least congested operating conditions, to LOS F, with the most congested operating conditions. LOS E represents "at-capacity" operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions. The methodologies for signalized and unsignalized intersections are described below.

2.3.1 SIGNALIZED INTERSECTIONS

The method described in Chapter 18 of the *Highway Capacity Manual 2010* was used to prepare the LOS calculations for the signalized study intersections. This LOS method analyzes a signalized intersection's operation based on average control delay per vehicle. Control delay alone is used to characterize LOS for the entire intersection or an approach. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections is calculated using Synchro 9.0 analysis software and is correlated to a LOS designation as shown in **Table 1**.

TABLE 1: SIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Delay in Seconds
A	Progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10.0
B	Progression is good, cycle lengths are short, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10.0 to 20.0
C	Higher congestion may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.	> 20.0 to 35.0
D	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35.0 to 55.0
E	This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0
F	This level is considered unacceptable with oversaturation, which is when arrival flow rates exceed the capacity of the intersection. This level may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to such delay levels.	> 80.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2010

2.3.2 UNSIGNALIZED INTERSECTIONS

The operations of the unsignalized intersections were evaluated either using the method contained in Chapter 19: Two-Way Stop-Controlled Intersections or Chapter 20: All-Way Stop-Controlled Intersections of the *HCM 2010*. LOS ratings for stop-sign-controlled intersections are based on the average control delay expressed in seconds per vehicle. At all-way stop-controlled intersections the overall intersection delay and LOS is reported, and the LOS is characterized solely on control delay. At two-way or side-street-controlled (TWSC) intersections, the average control delay is calculated for each minor-street stopped movement and the major-street left turns, not for the intersection as a whole. For approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. For approaches with multiple lanes, the control delay is computed for each movement; the movement with the worst (i.e., longest) delay is presented for TWSC. As shown in the **Table 2**, LOS F is assigned to the movement if the volume-to-capacity (V/C) ratio for the movement exceed 1.0 regardless of control delay. The average control delay for unsignalized intersections is calculated using Synchro 8.0 analysis software and is correlated to a LOS designation as shown in **Table 2**.

TABLE 2: UNSIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service (v/c ≤ 1.0)	Level of Service (v/c > 1.0)[1]	Description	Average Control Delay Per Vehicle (Seconds)
A	F	Little or no delay.	≤ 10.0
B	F	Short traffic delay.	> 10.0 to 15.0
C	F	Average traffic delays.	> 15.0 to 25.0
D	F	Long traffic delays.	> 25.0 to 35.0
E	F	Very long traffic delays.	> 35.0 to 50.0
F	F	Extreme traffic delays with intersection capacity exceeded.	> 50.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2010

Notes:
[1] For approach-based and intersection-wide assessments, such as that used for AWSC intersections, LOS is defined solely by control delay.

2.3.3 SIGNIFICANT IMPACT CRITERIA

The analysis of Near Term Conditions compares future baseline operations with conditions when the project is fully built out to determine whether or not project traffic is expected to result in a significant impact on the surrounding roadways. Based on previous studies conducted for the City & County of Honolulu Department of Planning and Permitting (DPP) Traffic Review Branch (TRB), the minimum desired operating standard for a signalized intersection is typically LOS D. Additionally, the Hawaii Department of Transportation (HDOT) strives to maintain LOS D intersection operations. Both agencies usually define a significant intersection impact when the operation of an intersection or turning movement changes from LOS D or better to LOS E or F. Impacts are also defined to occur when the addition of project traffic exacerbates locations already operating or projected to operate at LOS E or F. When evaluating intersection operations at any location, other factors are considered in the analysis, such as traffic volumes, volume-to-capacity (V/C) ratios (should ideally be less than 1.00), and secondary impacts to pedestrian, bicycle, and transit travel.

Each of the identified significant impacts is categorized as either a project-related or cumulative impact. If the addition of project traffic is expected to degrade LOS D or better operations to LOS E or F at a signalized intersection, then the project is considered to have a project-specific impact. An impact is considered a

cumulative impact at a signalized intersection if the addition of project trips exacerbates LOS E or F operations.

For unsignalized intersections, the project is determined to have a significant project-specific impact if the addition of project traffic causes an unsignalized intersection to degrade from LOS D or better to LOS E or F and if the peak hour signal warrant is satisfied. An impact is considered a cumulative impact when it adds traffic to a study location that includes a controlled approach that operates at an undesired level (i.e., LOS E or F) and if the peak hour signal warrant is satisfied.

The City & County of Honolulu does not publish impact criteria for pedestrian, bicycle, and transit impacts. However, these impacts are generally evaluated based on whether a proposed project would: 1) conflict with existing or planned pedestrian, bicycle, or transit facilities, or 2) create walking, bicycling, or transit use demand without providing adequate and appropriate facilities for non-motorized mobility. The existing amenities for pedestrians, bicycles, and transit users were inventoried to evaluate the quality of the facilities in place today. The assessments of planned facilities outlined in planning documents, such as the *Oahu Bike Plan,* the *Ewa Roadway Connectivity Study,* and the *Honolulu High-Capacity Transit Corridor Project Final Environmental Impact Statement*, were used to evaluate future conditions for non-automobile modes. For these modes, if the proposed project is expected to conflict with existing or planned improvements to pedestrian and bicycle facilities, or if the project is expected to generate a substantial demand which could warrant additional transit service, then the project is expected to have a project-specific impact.

2.4 REPORT ORGANIZATION

This report is divided into eight chapters. The existing transportation system serving the project site and the current operating conditions of the key intersections are described in **Chapter 3** Existing Conditions. **Chapter 4** summarizes the methodologies used to forecast future cumulative project traffic volumes and the resultant forecasts, and presents the analysis for Near Term (2020) Baseline Conditions. **Chapter 5** describes the project trip generation, distribution, and assignment used in the transportation impact analysis. **Chapter 6** presents the analysis of the Near Term (2020) Plus Project Conditions, assesses any traffic impacts at study intersections, and identifies mitigation measures to address any project impacts. **Chapter 7** contains an assessment of the site access and on-site circulation of the proposed project, while **Chapter 8** includes an assessment of the potential future effect of the project on existing and future transit, bicycle, and pedestrian facilities.

3.0 EXISTING CONDITIONS

This chapter describes the existing roadway network and includes a discussion of the bicycle, pedestrian, and transit facilities located in the project study area. This chapter also includes a discussion of the existing intersection LOS results.

3.1 EXISTING TRANSPORTATION FACILIITIES

A comprehensive data collection effort was undertaken to identify existing transportation conditions in the vicinity of the proposed project. The assessment of existing conditions relevant to this study includes an inventory of the street system, traffic volumes on these facilities, and operating conditions at key intersections. Existing public transit service and bicycle and pedestrian facilities are also described.

3.1.1 EXISTING ROADWAY SYSTEM

The key roadways providing access to or in the vicinity of the site are described below. **Figure 1** illustrates the proposed project location and the surrounding roadway system.

3.1.1.1 Key Mauka/Makai Roadways

Kalaeloa Boulevard begins at Olai Street at the makai end and extends mauka of H-1 to Farrington Highway. Kalaeloa Boulevard is located ewa of the project site and generally contains four lanes (two in each direction) with a raised landscaped median. The speed limit on this facility 25 mph. Regional access is provided via the Kalaeloa Boulevard and H-1 interchange.

Fort Barrette Road that extends from Farrington Highway in the makai direction to Roosevelt Avenue and is generally bounded by residential units on the Diamond Head side of the road.. Within the study area, it generally includes two travel lanes with a posted speed limit of 35 mph. The roadway widens at intersections to provide separate turn lanes. Fort Barrette is proposed to be widened to four-lanes from Farrington Highway to the Barbers Point Gate.

Wakea Street connects H-1 and Farrington Highway to Kapolei Parkway. This roadway has four lanes, two lanes in each direction, and is separated by a landscaped median, with a posted speed limit of 25 mph. Additionally, the Wakea Street and H-1 interchange will be expanded to include new ramp connections, an off-ramp from ewa-bound H-1, a frontage road from Makakilo Drive to Wakea Street, and a new connection to ewa-bound Farrington Highway. These improvements are part of Phase 2B of the Palailai Interchange

Complex and are expected to be completed by 2018. A discontinuous segment of Wakea Street exists makai of Kapolei Parkway which will eventually connect Kapolei Parkway to Roosevelt Avenue.

3.1.1.2 Key Ewa/Diamond Head Roadways

Farrington Highway is a ewa-Diamond Head major arterial that provides connection from Waipahu to Kapolei. It begins at H-2 in Waipahu and extends ewa-bound to Kapolei where it turns at Kamokila Boulevard Diamond Head of Manawai Street. Within the study area, Farrington Highway is generally a four-lane divided roadway and has a posted speed limit of 35 mph.

Kamokila Boulevard is generally a ewa-Diamond Head roadway that is located mauka of the project site and extends between Kapolei Parkway and Farrington Highway (approximately 350 feet Diamond Head of Manawai Street). The roadway has four lanes, two in each direction, and a raised landscaped median for most of its length. The roadway becomes Farrington Highway further Diamond Head. Within the study area, Kamokila Boulevard is generally fronted by retail on the mauka side of the roadway.

Kama'aha Avenue is located mauka of the project site. For most of the roadway, there are four travel lanes (two in each direction) with a raised landscaped median. The speed limit is 25 mph. Kama'aha Avenue is currently built from Kapolei Parkway in the ewa side to Kapolei Parkway in the Diamond Head side. However, the segment of Kama'aha between Wakea Street and Kapolei Parkway is currently closed to traffic.

Roosevelt Avenue starts at Kamokila Boulevard at the ewa end and extends Diamond Head where it transitions to Geiger Road at Essex Road. It has a posted speed limit of 25 miles per hour (mph) with unsignalized intersections at all cross streets. Roosevelt Avenue is the mauka boundary of the project site.

Saratoga Avenue is a two lane local road that starts at Boxer Road on the ewa side and extends Diamond Head bound to its current terminus at Independence Avenue. It has a posted speed limit of 25 mph and is immediately makai of the project site.

3.1.2 EXISTING TRANSIT SERVICES

"The Bus" is Oahu's primary form of public transit. This system provides access within the greater urban area of Honolulu, as well as in communities on the Ewa plain, North Shore, Leeward Coast, and Windward Coast. **Figure 6** illustrates the existing and planned transit facilities and services within the greater study area of the rapidly developing western Kapolei. There are currently no bus stops or transit services directly serving the project site. The closest bus stop is located approximately 0.4 miles from the project site in the mauka-ewa direction, near the intersection of Kapolei Parkway and Kalaeloa Boulevard. Additional transit services are provided on Haumea Street, Kamokila Boulevard, Fort Barrette Road, Kalaeloa Boulevard,

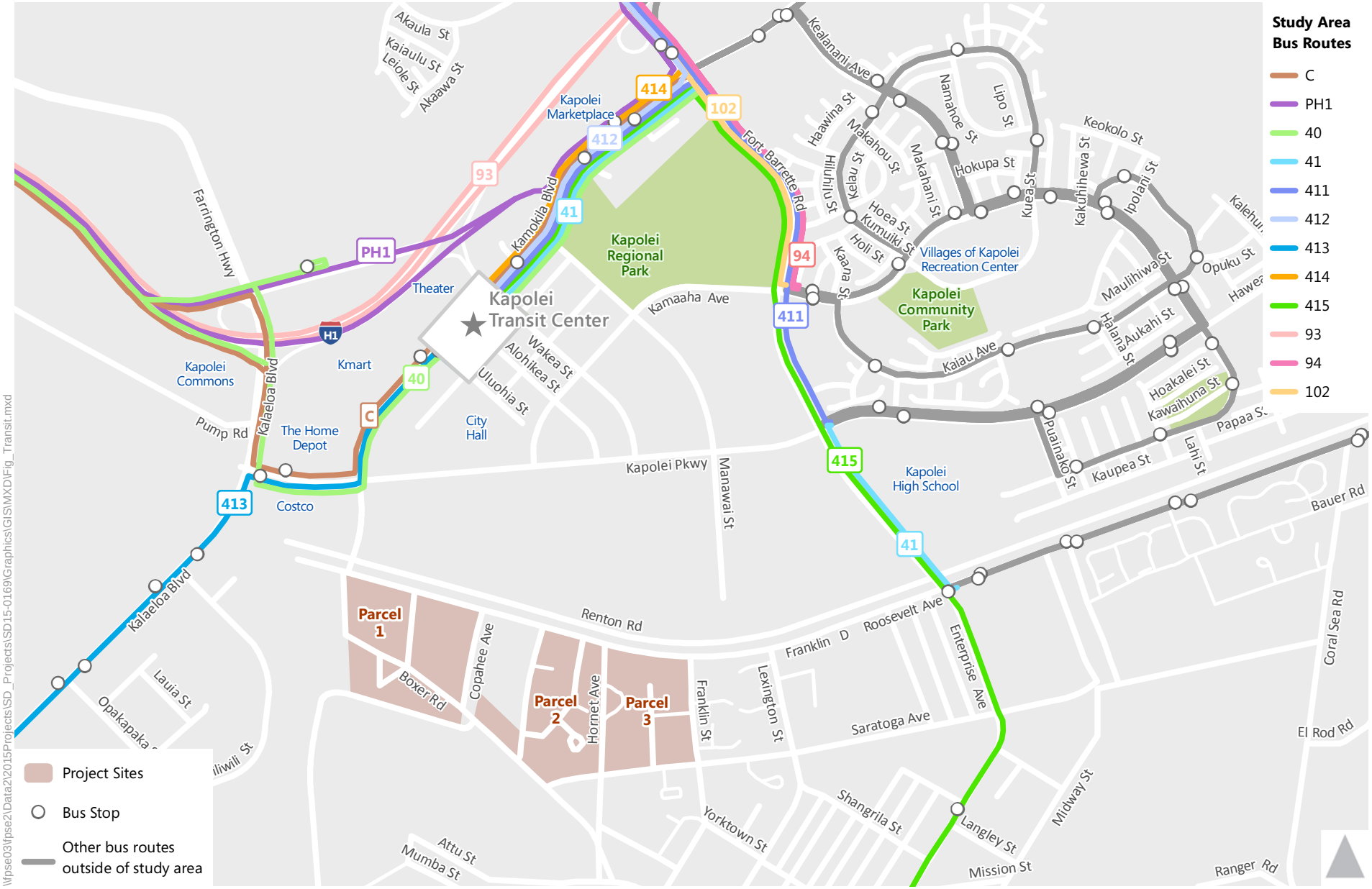


Figure 6

Existing and Planned Transit Facilities

Roosevelt Avenue east of Fort Barrette Road, and Kapolei Parkway east of Fort Barrette Road. Transit service is expected to be expanded with increased adjacent development, especially with the future expansion of the HART rail project.

There are eight (8) fixed-route bus lines that serve the study area:

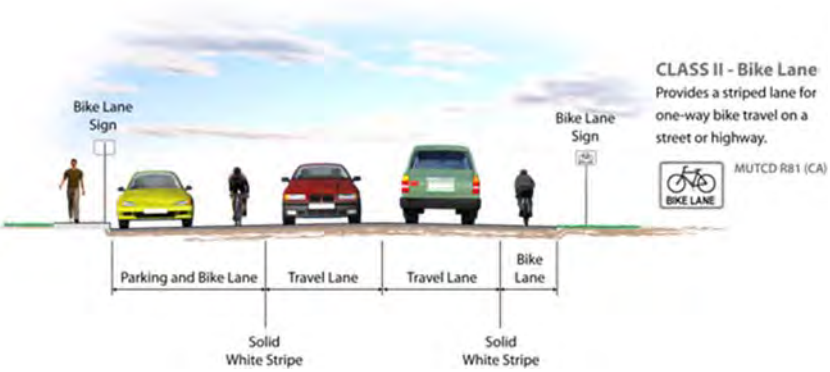
- Route C
- Route 40
- Route 41
- Route 411
- Route 412
- Route 413 (peak periods only)
- Route 414
- Route 415 (peak periods only)

3.1.3 EXISTING BICYCLE FACILITIES

Bicycle facilities generally consist of three types of facilities, which are outlined below:

- *Bike or Shared Use Paths* provide a completely separate right-of-way and is designated for the exclusive use of bicycles and pedestrians with vehicle and pedestrian cross-flow minimized. Generally, the recommended pavement width for a two-directional shared use path is ten (10) feet.

- *Bike Lanes* provide a restricted right-of-way and are designated for the use of bicycles with a striped lane on a street or highway. Bicycle lanes are generally five (5) feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted.



- *Bike Route or Signed Shared Roadways* provide for a right-of-way designated by signs or shared lane pavement markings, or "sharrows," for shared use with pedestrians or motor vehicles.

As depicted in **Figure 7**, no bicycle infrastructure is provided within the direct proximity of the project site, though existing bicycle facilities do serve adjacent community areas. Class II bike lanes are currently provided on Kapolei Parkway, Wakea Street, Kama'aha Avenue, and Kamokila Boulevard. Similar to transit, bicycle infrastructure will be expanded and developed as planned land uses are built and occupied.

3.1.4 EXISTING PEDESTRIAN FACILITIES

Pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals at signalized intersections. Pedestrian facilities do not currently exist within the project site since Parcel 1, 2, and 3 consist of vacant and/or underutilized land. However all the study intersections have pedestrian facilities and connect to the sidewalk network on one or more of the approaches. However, the one exception is the intersection of Roosevelt Avenue and Copahee Avenue. There are no sidewalks or crosswalks present at this intersection.

\\fpse03\fpse2\Data2\2015Projects\SD_Projects\SD15-0169\Graphics\GIS\MXD\Fig_BicycleFacilities.mxd

Figure 7

Existing and Proposed Bicycle Facilities

3.2 EXISTING INTERSECTION VOLUMES AND LANE CONFIGURATIONS

The operations of the 12 existing study intersections were evaluated during weekday morning (6:30 to 8:30 AM) and evening (3:30 to 5:30 PM) peak-period conditions. Traffic counts were collected during the weekday AM and PM peak periods at the study intersections in December 2017, when local schools were in session. The weekday AM peak hour of traffic for the study area generally occurs between the hours of 7:15 AM and 8:15 AM. During the weekday evening, the PM peak hour of traffic generally occurs between the hours of 3:45 PM and 4:45 PM.

Existing lane configurations and signal controls were obtained through field observations. **Figure 8** presents the existing AM and PM peak-hour turning movement volumes, corresponding lane configurations, and traffic control devices. Raw traffic count data sheets are provided in **Appendix A**.

3.3 EXISTING INTERSECTION LEVELS OF SERVICE

Existing peak-hour volumes and lane configurations were used to calculate levels of service for each of the study intersections. The results of the existing LOS analysis are presented in **Table 3** and the corresponding LOS calculation sheets are included in **Appendix B**.

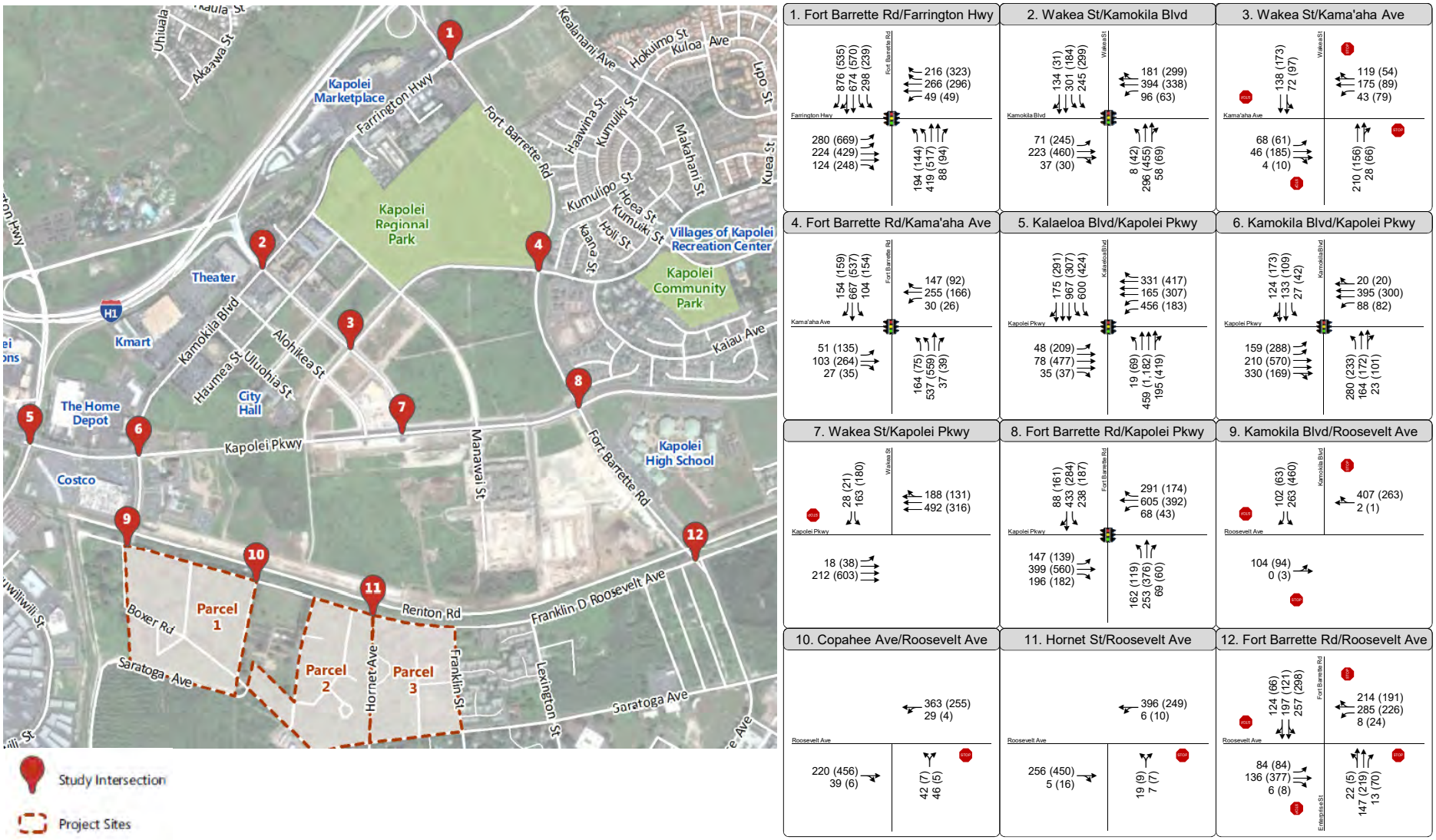


Figure 8
Peak Hour Traffic Volumes and Lane Configurations
Existing (2017) Conditions

TABLE 3: EXISTING (2017) INTERSECTION LEVELS OF SERVICE

Intersection	Traffic Control[1]	Peak Hour	Delay (sec/veh)[2]	LOS[3,4]
1. Farrington Hwy / Fort Barrette Rd	Signal	AM	27.1	C
		PM	31.6	C
2. Kamokila Blvd / Wakea St	Signal	AM	21.5	C
		PM	31.5	C
3 Wakea St / Kama'aha Ave	AWSC	AM	13.5	B
		PM	12.7	B
4. Fort Barrette Rd / Kama'aha Ave	Signal	AM	30.4	C
		PM	31.9	C
5. Kapolei Pkwy / Kalaeloa Blvd	Signal	AM	24.4	C
		PM	**86.4**	**F**
6. Kapolei Pkwy / Kamokila Blvd	Signal	AM	23.8	C
		PM	23.2	C
7. Kapolei Pkwy / Wakea St	SSSC	AM	23.1	C
		PM	20.5	C
8. Fort Barrette Rd / Kapolei Pkwy	Signal	AM	**162.5**	**F**
		PM	**165.4**	**F**
9. Roosevelt Ave / Kamokila Blvd	AWSC	AM	15.1	C
		PM	21.8	C
10. Roosevelt Ave / Copahee Ave	SSSC	AM	15.4	C
		PM	13.9	B
11. Roosevelt Ave / Hornet St	SSSC	AM	14.3	B
		PM	13.7	B
12. Fort Barrette Rd-Enterprise St / Roosevelt Ave	AWSC	AM	**77.3**	**F**
		PM	**75.5**	**F**

Source: Fehr & Peers, 2017

Notes:

TABLE 3: EXISTING (2017) INTERSECTION LEVELS OF SERVICE

Intersection	Traffic Control[1]	Peak Hour	Delay (sec/veh)[2]	LOS[3,4]

[1]AWSC = All-way stop controlled, SSSC = Side-street stop controlled
[2] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. The vehicular delay for the worst movement is reported for side-street stop-controlled intersections.

[3] LOS calculations performed using the *Highway Capacity Manual (HCM) 2010* method. LOS for side street stop-controlled (SSSC) intersections is worst-case movement. Other uncontrolled movements generally operate well with limited delay.

[4] Undesired LOS and corresponding seconds of delay per vehicle are highlighted in **bold.**

The results of the LOS calculations indicate that all study intersections operate at an overall desirable service level (LOS D or better), with the exception of the following three intersections:

- 5. Kapolei Parkway/Kalaeloa Boulevard – During the PM peak hour, the Kapolei Parkway/Kalaeloa Boulevard intersection operates at undesirable LOS F conditions. Kalaeloa Boulevard serves heavy mauka-bound volumes during the PM peak hour as vehicles departing from the Campbell Industrial Park are traveling mauka-bound to reach the H-1/Kalaeloa Boulevard interchange. Extensive mauka-bound queues on Kalaeloa Boulevard were observed during field observations. Vehicles at the end of this queue typically needed to wait for more than one signal cycle to pass the intersection.
- 8. Fort Barrette Road/Kapolei Parkway – This intersection operates at undesirable LOS F during both the AM and PM peak hours. Long mauka-bound and makai-bound queues on Fort Barrette Road were observed during both peak hours. Additionally, the signal currently operates at split phasing for the Diamond Head-bound and ewa-bound directions, which is typically inefficient use of green time in the signal cycle and results in queue build-ups on all approaches.
- 12. Fort Barrette Road-Enterprise Street/Roosevelt Avenue – This intersection operates at undesirable LOS F in both the AM and PM peak hours. During the AM and PM peak hours, the ewa-bound through and the makai-bound left-turn/through movements operate at LOS F. This is primarily due to the all-way stop-controlled operation serving heavy traffic volumes for multiple approaches, which results in high conflicting volumes and longer vehicle delays.

The remaining nine study intersections operate at a desirable LOS (LOS D or better) at an overall intersection-level during both peak hours. However, it should be noted that it is possible for individual turning movements/approaches to operate below LOS D (the HDOT desired minimum operating level) even when the overall intersection is operating at a desirable LOS.

4.0 NEAR TERM (2020) BASELINE CONDITIONS

To evaluate the potential impacts of traffic generated by the proposed project on the surrounding street system, it was necessary to first develop estimates of future traffic conditions in the area without the project. Future traffic conditions without the project reflect traffic increases due to regional growth and development, as well as traffic increases generated by other specific developments near the project site. These conditions are referred to as the baseline condition (i.e., "no project" condition). The forecasted future or cumulative baseline traffic volumes were then used to identify impacts on the roadway system. Development of these future traffic scenarios is described in this chapter.

4.1 NEAR TERM (2020) TRAFFIC ESTIMATES

Future baseline traffic projections include two elements: 1) growth in the existing background traffic volumes reflecting the effects of overall regional growth and development in and around the study area (referred to as ambient growth); and 2) traffic generated by specific cumulative projects located in the vicinity of the project site.

4.1.1 AREAWIDE OR AMBIENT TRAFFIC GROWTH

The Oahu Regional Transportation Plan (ORTP) uses land use and socioeconomic attributes in Traffic Analysis Zones (TAZs) to generate and assign traffic across the roadway network and further provide AM and PM volume projections along major facilities throughout Oahu. Significant employment and housing growth is projected in the ORTP between 2007 and 2035, especially for the Ewa-Kapolei region. By 2020, the project's study area will have experienced significant residential growth and development of new commercial, industrial, business, and institutional land uses. The model growth rates derived between the base year (2007) and the horizon year (2035) traffic projections provided by a revised ORTP Travel Demand Forecasting Model (TDFM) were applied linearly to the existing traffic counts. The calculated growth rate of the Kapolei region obtained from the model was a 0.6 percent annual growth. This annual growth factor was applied to existing intersection traffic volumes collected in December 2017 to account for some level of regional growth. This growth rate was compounded over the three-year timeframe (2017 to 2020) up to full development of the proposed project.

4.1.2 CUMULATIVE PROJECT TRAFFIC GENERATION AND ASSIGNMENT

Future base traffic forecasts also include the effects of individual planned/approved development projects, expected to be constructed with the project's five-year development timeframe and expected to add traffic

in the vicinity of the project site. Based on input from DPP staff, a total of seven (7) applicable cumulative projects were identified in the study area (see **Table 5**) and traffic from these projects were subsequently added to the cumulative base traffic projections for 2020.

Trip generation estimates and trip assignments for the approved/pending were calculated using a combination of previous studies and publicly available environmental documentation. The use of a growth factor from the regional model and the addition of cumulative project traffic results in a conservative estimate of total baseline traffic volumes for this impact analysis.

4.1.3 FUTURE TRANSPORTATION IMPROVEMENTS

The following roadway improvement is planned to be implemented by the year 2020 and were assumed under Near Term (2020) Baseline Conditions:

- *Wakea Street Interchange* will be expanded to include new ramp connections: an off-ramp from ewa-bound H-1 and frontage road from Makakilo Drive to Wakea Street, plus a new connection to ewa-bound Farrington Highway. These improvements are part of Phase 2b of the Palailai Interchange Complex and are expected to be completed within the next two years.

The traffic volumes at the Fort Barrette Drive/Farrington Highway and Kamokila Boulevard/Wakea Street, intersections have been adjusted to represent the shift in traffic due to the transportation project identified above. Several other transportation improvement projects are planned in the Kapolei area, including the Fort Barrette Road widening, Farrington Highway widening, and Kalaeloa East-West Spine Road; however, those projects were not assumed under 2020 conditions given that the current schedule for completion is unknown.

Figure 9 shows the peak hour traffic volumes for the Near Term (2020) Baseline Conditions.

TABLE 4: FUTURE DEVELOPMENTS IN KAPOLEI AND KALAELOA TRIP GENERATION

Project	Location	Land Use[1]
Kapolei Mixed-Use	1020 Wakea Street, Kapolei, HI 96707	429 Apartment du's, 154 Senior Apartments du's, 18,000 s.f. Shopping Center, 3,385 s.f. Day Care
Ka Makana Ali'I Shopping Center Phase 2[2]	91-5431 Kapolei Pkwy, Kapolei, HI 96707	200,000 s.f. Office
Mehana[3]	840 Kakala St, Kapolei, HI 96707	1,100 Low-density and medium density du's, 30 accres of Mixed Use Development, 5 acres of Park
Hoopili[4]	Diamond Head of Kualaka'i Pkwy and makai of Farrington Hwy	2,300 Single Family du's, 9,520 Apartments/Condominiums du's, 3 million s.f. of Industrial Space, 70 acres of Parks, 200 acres of Commercial Farm, 3 Elementary Schools, Middle School, High School

Source: Fehr & Peers, 2017

Notes:

[1]du's = dwelling units; s.f. = square feet

[2]Ka Makana Ali'i Shopping Center only includes Phase 1. Construction of Phase 2 is unknown at this time and is assumed to occur after 2020.

[3]Approximately half of the Mehana development has been built and included in the existing counts. The completion and occupation of the remaining half of the development is anticipated to occur by 2018.

[4]The full buildout of Hoopili is assumed to be completed by 2035. The full buildout trips in 2035 was interpolated to yield 2020 trips.

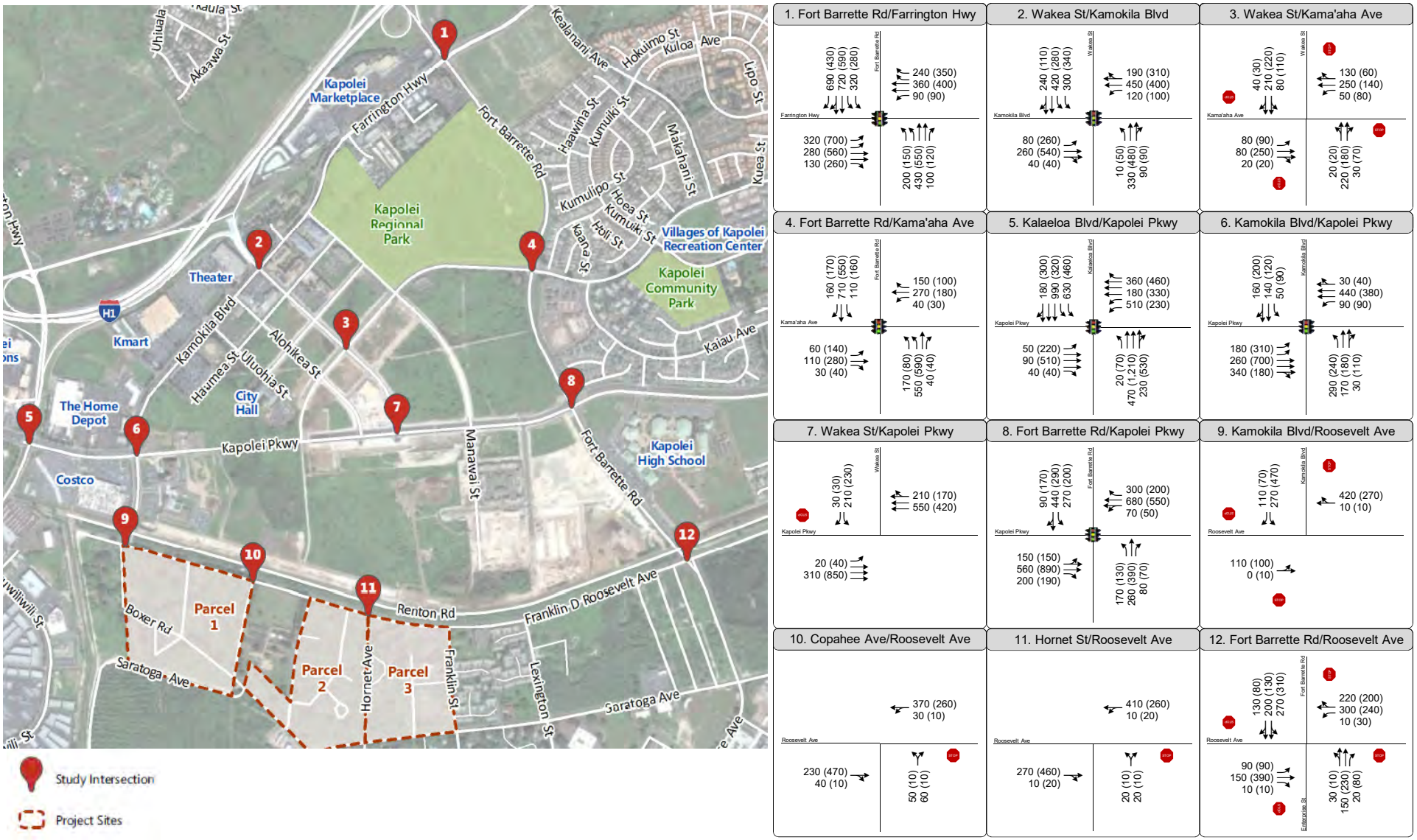


Figure 9
Peak Hour Traffic Volumes and Lane Configurations
Near Term (2020) Baseline Conditions

4.2 NEAR TERM (2020) BASELINE LEVELS OF SERVICE

Levels of service calculations were conducted to evaluate the operating levels of the study intersections under Near Term (2020) Baseline Conditions based on the projected growth in traffic and the anticipated roadway improvements. The results of the LOS analysis for the study intersections under Existing and Near Term (2020) Baseline Conditions are presented in **Table 6**. The corresponding LOS Calculation sheets are included in **Appendix C**.

TABLE 5: EXISTING AND NEAR TERM (2020) BASELINE INTERSECTION LEVELS OF SERVICE

Intersection	Traffic Control	Peak Hour	Existing		Near Term (2020) Baseline	
			Delay (sec/veh)[2]	LOS[3,4]	Delay (sec/veh)[2]	LOS[3,4]
1. Farrington Hwy / Fort Barrette Rd	Signal	AM	27.1	C	29	C
		PM	31.6	C	35.8	D
2. Kamokila Blvd / Wakea St	Signal	AM	21.5	C	26.2	C
		PM	31.5	C	36.7	D
3 Wakea St / Kama'aha Ave	AWSC	AM	13.5	B	19.1	C
		PM	12.7	B	16.6	C
4. Fort Barrette Rd / Kama'aha Ave	Signal	AM	30.4	C	37	D
		PM	31.9	C	37.2	D
5. Kapolei Pkwy / Kalaeloa Blvd	Signal	AM	24.4	C	26.3	C
		PM	**86.4**	**F**	**91.0**	**F**
6. Kapolei Pkwy / Kamokila Blvd	Signal	AM	23.8	C	27.6	C
		PM	23.2	C	26.1	C
7. Kapolei Pkwy / Wakea St	SSSC	AM	23.1	C	**41.5**	**E**
		PM	20.5	C	**44.1**	**E**
8. Fort Barrette Rd / Kapolei Pkwy	Signal	AM	**162.5**	**F**	**140.4**	**F**
		PM	**165.4**	**F**	**185.5**	**F**

TABLE 5: EXISTING AND NEAR TERM (2020) BASELINE INTERSECTION LEVELS OF SERVICE

Intersection	Traffic Control	Peak Hour	Existing		Near Term (2020) Baseline	
			Delay (sec/veh)[2]	LOS[3,4]	Delay (sec/veh)[2]	LOS[3,4]
9. Roosevelt Ave / Kamokila Blvd	AWSC	AM	15.1	C	16.3	C
		PM	21.8	C	23.9	C
10. Roosevelt Ave / Copahee Ave	SSSC	AM	15.4	C	16.5	C
		PM	13.9	B	14.1	B
11. Roosevelt Ave / Hornet St[4]	SSSC	AM	14.3	B	13.7	B
		PM	13.7	B	14.1	B
12. Fort Barrette Rd-Enterprise St / Roosevelt Ave	AWSC	AM	**77.3**	**F**	**95.2**	**F**
		PM	**75.5**	**F**	**91.4**	**F**

Source: Fehr & Peers, 2017

Notes:

[1]AWSC = All-way stop controlled; SSSC = Side-street stop controlled
[2] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. The vehicular delay for the worst movement is reported for side-street stop-controlled intersections.

[3] LOS calculations performed using the *Highway Capacity Manual (HCM) 2010* method. LOS for side street stop-controlled (SSSC) intersections is worst-case movement. Other uncontrolled movements generally operate well with limited delay.

[4] Undesired LOS and corresponding seconds of delay per vehicle are highlighted in **bold.**

The analysis results indicate that eight (8) study intersections are forecasted to operate at LOS D or better under Near Term (2020) Baseline Conditions. The changes in operations are the result of the addition of ambient traffic growth, additional traffic from planned/approved projects, and the rerouting of traffic attributed to improvements at the Wakea Street interchange and the extension of Kama'aha Avenue,. The remaining four (4) study intersections are expected to operate at LOS E or F for at least one peak hour:

5. Kapolei Parkway / Kalaeloa Boulevard – LOS F (PM Peak Hour)
7. Kapolei Parkway / Wakea Street – LOS E (AM peak hour and PM peak hour)
8. Fort Barrette Road / Kapolei Parkway - LOS F (AM peak hour and PM peak hour)
12. Fort Barrette Road / Roosevelt Avenue –LOS F (AM peak hour and PM peak hour)

Similar to Existing Conditions, the majority of the poorly operating movements are left-turn movements. This is attributed by the signal timing allocating more green time to the through movements, which in

most cases, will cause the left-turn movements to operate at LOS E or F in at least one of the peak hours. For left-turns operating poorly at unsignalized intersections, this is primarily due to the high traffic volume on the major streets (e.g. Kapolei Parkway) and limited number of gaps for vehicles at the stop-controlled movement to make left-turns.

5.0 PROJECT TRAFFIC PROJECTIONS

This chapter describes the anticipated number of vehicle trips and directionality of those trips that would result from implementation of the proposed project. Future traffic added to the roadway system by the project is estimated using a three-step process: (1) project trip generation, (2) trip distribution, and (3) trip assignment. The first step estimates the amount of project-generated traffic will be added to the roadway network by each development alternative. The second step estimates the direction of travel to and from the project site. The new trips are assigned to specific street segments and intersection turning movements during the third step. This process is described in more detail in the following sections.

5.1 PROJECT TRIP GENERATION ESTIMATES

Vehicle trip rates presented in the *Trip Generation Manual* (10th Edition, Institute of Transportation Engineers (ITE), 2017) were used to estimate the number of trips to and from the proposed project site for the 1,500 Residential Unit development alternative. The specific trip generation rates used and the estimated new number of trips generated for Parcels 1, 2, and 3 of the residential only alternative are summarized in **Table 6**.

For the Mixed-Use Development alternative, the trip generation was estimated using the *Trip Generation Manual* and the Fehr & Peers' mixed-use development (MXD+) methodology. The MXD+ trip generation methodology accurately captures the trip-reducing benefits of mixed-use development projects and is used throughout the United States to help developers, agencies, and the public to quantify these trip reductions. The MXD+ trip generation model is promoted by the United States Environmental Protection Agency (EPA) and has been adopted by numerous public entities including the San Diego Association of Governments (SANDAG), American Society of Civil Engineers (ASCE), American Planning Association (APA), as a recommended resource for trip generation of smart-growth developments. The MXD+ model uses ITE trip generation rates and applies additional variables to those rates. Some of the additional variables include:

- Employment
- (Population + Employment) per square mile
- Land area
- Total jobs / population diversity
- Retail jobs / population diversity
- Number of intersections per square mile
- Employment within a mile
- Employment within a 30-minute trip by transit
- Average household size

- Vehicles owned per capita

The trip generation estimation for the Mixed-Use Development alternative does not include a non-auto reduction to account for bicycle and pedestrian traffic to provide a conservative analysis. However, it is reasonable to assume a 5% non-auto reduction due to the close proximity to corresponding land uses and existing and planned bicycle and pedestrian facilities.

The ITE land use category for Clinic was used for the proposed VA Clinic on Parcel 1 under the Mixed-Use development alternative. The ITE Clinic rate is most likely overstating vehicle trips for the VA Clinic since it will not be open to the public and will have more limited patient base.

As shown in **Table 6**, under Parcel 1 conditions, the project would generate a total of 4,299 daily trips, including 274 trips during the AM peak hour (64 inbound/210 outbound) and 332 trips during the PM peak hour (209 inbound/123 outbound). Under Parcel 1 & 2 conditions, the project would generate a total of 7,764 daily trips, including 542 trips during the AM peak hour (131 inbound/411 outbound) and 689 trips during the PM peak hour (434 inbound/255 outbound). Under Parcel 1, 2, and 3 conditions, the project would generate a total of 12,259 daily trips, including 804 trips during the AM peak hour (191 inbound/613 outbound) and 980 trips during the PM peak hour (617 inbound/363 outbound).

It is likely that the project trip generation estimates developed using the ITE methodology underestimate the influence of nearby land uses (i.e. the elementary schools and retail centers nearby the project site and the future East Kapolei rail transit station located three miles away) on internal trip-making characteristics and non-motorized mode shifts. However, trip estimates in this analysis were not reduced for complimentary uses given that majority of uses are located more than half a mile away. Additionally, while some residents from the project are expected to use the future rail transit, it is anticipated that they will still drive their vehicle to the East Kapolei station. Therefore, for purposes of providing a more conservative analysis, no reductions related to non-motorized trips, such as transit, was assumed in this analysis.

TABLE 6: PROJECT TRIP GENERATION ESTIMATES – 1,500 RESIDENTIAL UNITS

Land Use	Quantity	Units[1]	Daily[2]	AM Peak Hour[2]			PM Peak Hour[2]		
				In	Out	Total	In	Out	Total
Parcel 1									
Single-Family Residential	126	du's	1,286	23	71	94	80	47	127
Apartment	404	du's	3,013	41	139	180	129	76	205
Parcel 2									
Single-Family Residential	370	du's	3,465	67	201	268	225	132	357
Parcel 3									
Apartment	600	du's	4,495	60	202	262	183	108	291
TOTAL NEW VEHICLE TRIPS									
Parcel 1 Vehicle Trips			**4,299**	**64**	**210**	**274**	**209**	**123**	**332**
Parcel 1 & 2 Vehicle Trips			**7,764**	**131**	**411**	**542**	**434**	**255**	**689**
Parcels 1, 2, & 3 Vehicle Trips			**12,259**	**191**	**613**	**804**	**617**	**363**	**980**

Source: Fehr & Peers, 2017

Notes:

[1] du's = Dwelling Units
[2] Based on best fit equation rates from *ITE Trip Generation (*10th Edition)

As shown in **Table 7**, under Parcel 1 conditions with the Mixed-Use Development, the project would generate a total of 9,740 daily trips, including 647 trips during the AM peak hour (373 inbound/274 outbound) and 765 trips during the PM peak hour (351 inbound/414 outbound). Under Parcel 1 & 2 conditions, the project would generate a total of 14,880 daily trips, including 963 trips during the AM peak hour (503 inbound/460 outbound) and 1,139 trips during the PM peak hour (560 inbound/579 outbound). Under Parcel 1, 2, and 3 conditions, the project would generate a total of 22,454 daily trips, including 1,186 trips during the AM peak hour (582 inbound/604 outbound) and 1,702 trips during the PM peak hour (855 inbound/847 outbound).

TABLE 7: PROJECT TRIP GENERATION ESTIMATES – MIXED-USE DEVELOPMENT

Land Use	Units[1]	Daily[2]	AM Peak Hour[2]			PM Peak Hour[2]		
			In	Out	Total	In	Out	Total
Parcel 1								
Single-Family Residential	82 du's	866	16	47	63	53	31	84
Multi-Family Housing	351 du's	2,614	36	121	157	114	67	181
VA Clinic	80 ksf	3,054	230	65	295	76	186	262
Retail	51 ksf	3,804	110	67	177	158	172	330
	Gross Total	*10,338*	*392*	*300*	*692*	*401*	*456*	*857*
	Internalization[3]	*-598*	*-19*	*-26*	*-45*	*-50*	*-42*	*-92*
	Net New Vehicle Trips (B)	*9,740*	*373*	*274*	*647*	*351*	*414*	*765*
Parcel 2								
Single-Family Residential	57 du's	620	11	34	45	37	22	59
Multi-Family Housing	345 du's	2,568	36	119	155	112	66	178
Retail	28 ksf	2,530	103	63	166	102	110	212
	Gross Total	*5,718*	*150*	*216*	*366*	*251*	*198*	*449*
	Internalization[3]	*-578*	*-20*	*-30*	*-50*	*-42*	*-33*	*-75*
	Net New Vehicle Trips (C)	*5,140*	*130*	*186*	*316*	*209*	*165*	*374*
Parcel 3								
Multi-Family Housing	414 du's	3,090	42	142	184	132	77	209
Retail	90 ksf	5,596	53	32	85	241	262	503
	Gross Total	*8,686*	*95*	*174*	*269*	*373*	*339*	*712*
	Internalization[3]	*-1,112*	*-16*	*-30*	*-46*	*-78*	*-71*	*-149*
	Net New Vehicle Trips (D)	*7,574*	*79*	*144*	*223*	*295*	*268*	*563*
TOTAL NEW VEHICLE TRIPS								

TABLE 7: PROJECT TRIP GENERATION ESTIMATES – MIXED-USE DEVELOPMENT

Land Use	Units[1]	Daily[2]	AM Peak Hour[2]			PM Peak Hour[2]		
			In	Out	Total	In	Out	Total
Parcel 1 Vehicle Trips		**9,740**	**373**	**274**	**647**	**351**	**414**	**765**
Parcel 1 & 2 Vehicle Trips		**14,880**	**503**	**460**	**963**	**560**	**579**	**1,139**
Parcels 1, 2, & 3 Vehicle Trips		**22,454**	**582**	**604**	**1,186**	**855**	**847**	**1,702**

Source: Fehr & Peers, 2017
Notes:
[1] du's = Dwelling Unit; ksf = 1,000 square feet
[2] Single-Family Residential uses Single-Family Detached Housing Best Fit equation
Daily: Ln(T) = 0.92Ln(X) + 2.71; AM: T = 0.71(X) + 4.80; PM: Ln(T) = 0.96Ln(X)+0.20
Multi-Family Housing uses Multifamily Housing (Low-Rise) Best Fit equation
Daily: T = 7.56(X) – 40.86; AM: Ln(T) = 0.95Ln(X) – 0.51; PM: Ln(T) = 0.89Ln(X) – 0.02
VA Clinic uses Clinic Average Rates
Daily: 38.16; AM: 3.69; PM: 3.28
Retail uses Shopping Center Best Fit Equation (Daily and PM) and Average Rates (AM)
Daily: Ln(T) = 0.68Ln(X)+5.57; AM: 0.94; PM: Ln(T) = 0.74Ln(X) = 2.89
[3] The MXD model (MXD+) was used to obtain these non-auto-oriented and internalization trip reduction.
Parcel 1 – Daily: 8%; AM: 11%; PM: 16%
Parcel 2 – Daily: 10%; AM: 14%; PM: 17%
Parcel 3 – Daily: 13%; AM: 17%; PM: 21%

5.2 PROJECT TRIP DISTRIBUTION

An initial trip distribution estimate was based on a "select zone" analysis using the OahuMPO Regional Travel Demand Forecasting Model (TDFM). This process identifies the number of trips on each roadway segment included in the model that is generated by the single traffic analysis zone (TAZ) representing the project area. The distribution was further refined and adjusted based on:

- Existing traffic volumes
- The level of accessibility of route to and from the project site
- The location of complementary land uses (retail centers and schools from which residents would be drawn)
- Locations of other similar land uses

Based on these factors, the vehicle trip distribution of the project-generated traffic under Near Term (2020) Conditions for residential land uses is estimated to be:

- 30% to/from the East (to/from Town) along H-1
- 5% to/from the West (to/from the Leeward Coast) along H-1
- 5% to/from the West along Kapolei Parkway
- 15% to/from the South along Kalaeloa Boulevard
- 2% to/from the East along Farrington Highway
- 15% to/from the East along Kapolei Parkway
- 10% to/from the East along Roosevelt Avenue
- 18% to/from nearby developments within the Kapolei Community, located mauka of the project site

The vehicle trip distribution of the project-generated traffic under Near Term (2020) Conditions for the retail land use is estimated to be:

- 5% to/from the East (to/from Town) along H-1
- 20% to/from the West (to/from the Leeward Coast) along H-1
- 1% to/from the West along Kapolei Parkway
- 2% to/from the South along Kalaeloa Boulevard
- 7% to/from the East along Farrington Highway
- 30% to/from the East along Kapolei Parkway
- 20% to/from the East along Roosevelt Avenue
- 15% to/from nearby developments within the Kapolei Community, located mauka of the project site

The vehicle trip distribution of the project-generated traffic under Near Term (2020) Conditions for the VA Clinic land use is estimated to be:

- 40% to/from the East (to/from Town) along H-1
- 15% to/from the West (to/from the Leeward Coast) along H-1
- 0% to/from the West along Kapolei Parkway
- 0% to/from the South along Kalaeloa Boulevard
- 8% to/from the East along Farrington Highway
- 28% to/from the East along Kapolei Parkway
- 5% to/from the East along Roosevelt Avenue
- 4% to/from nearby developments within the Kapolei Community, located mauka of the project site

Figure 10 and **Figure 11** illustrates the project trip distribution pattern described above for the 1,500 Residential Units and Mixed-Use Development alternatives, respectively.

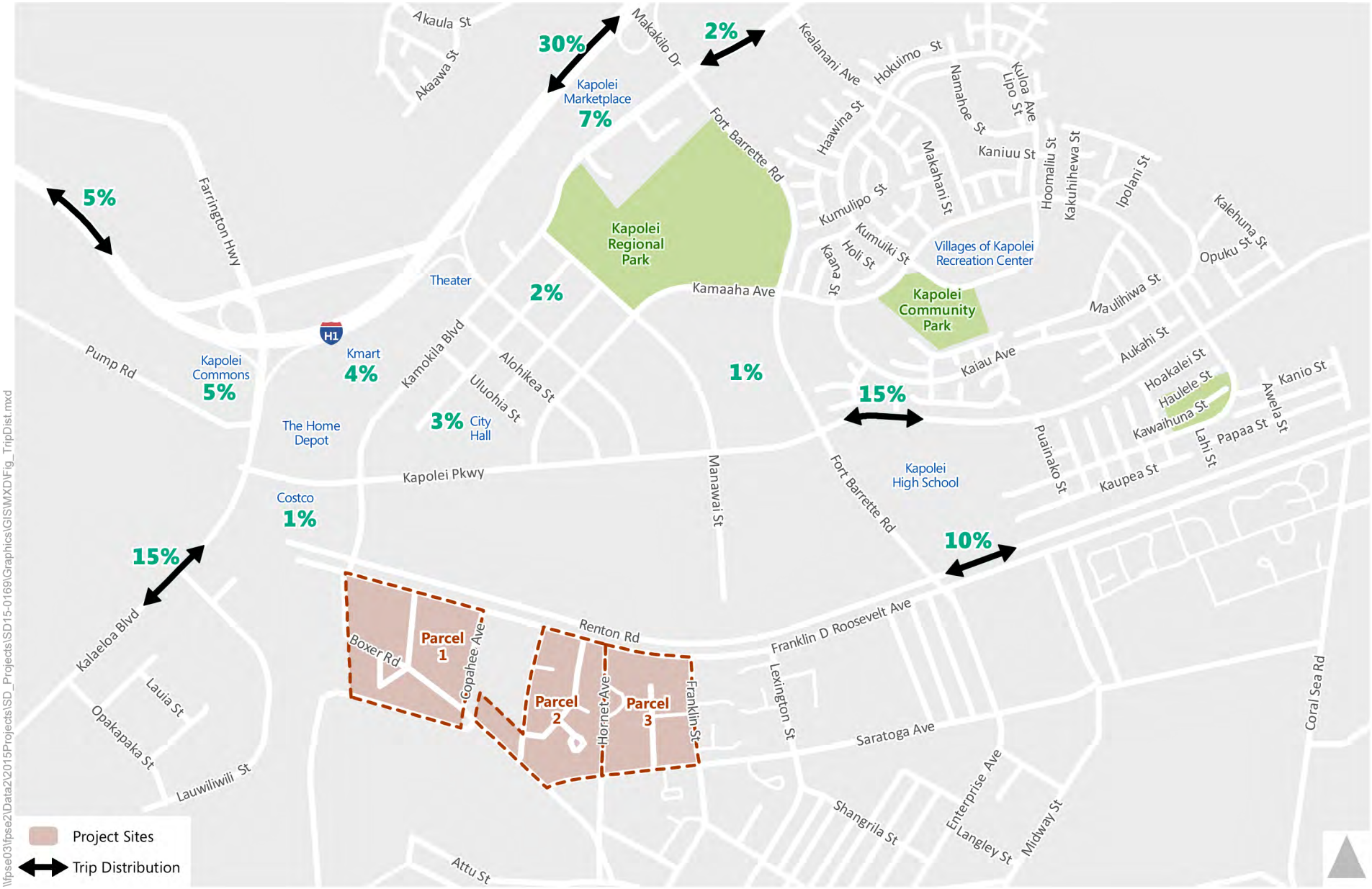


Figure 10

Residential Project Trip Distribution

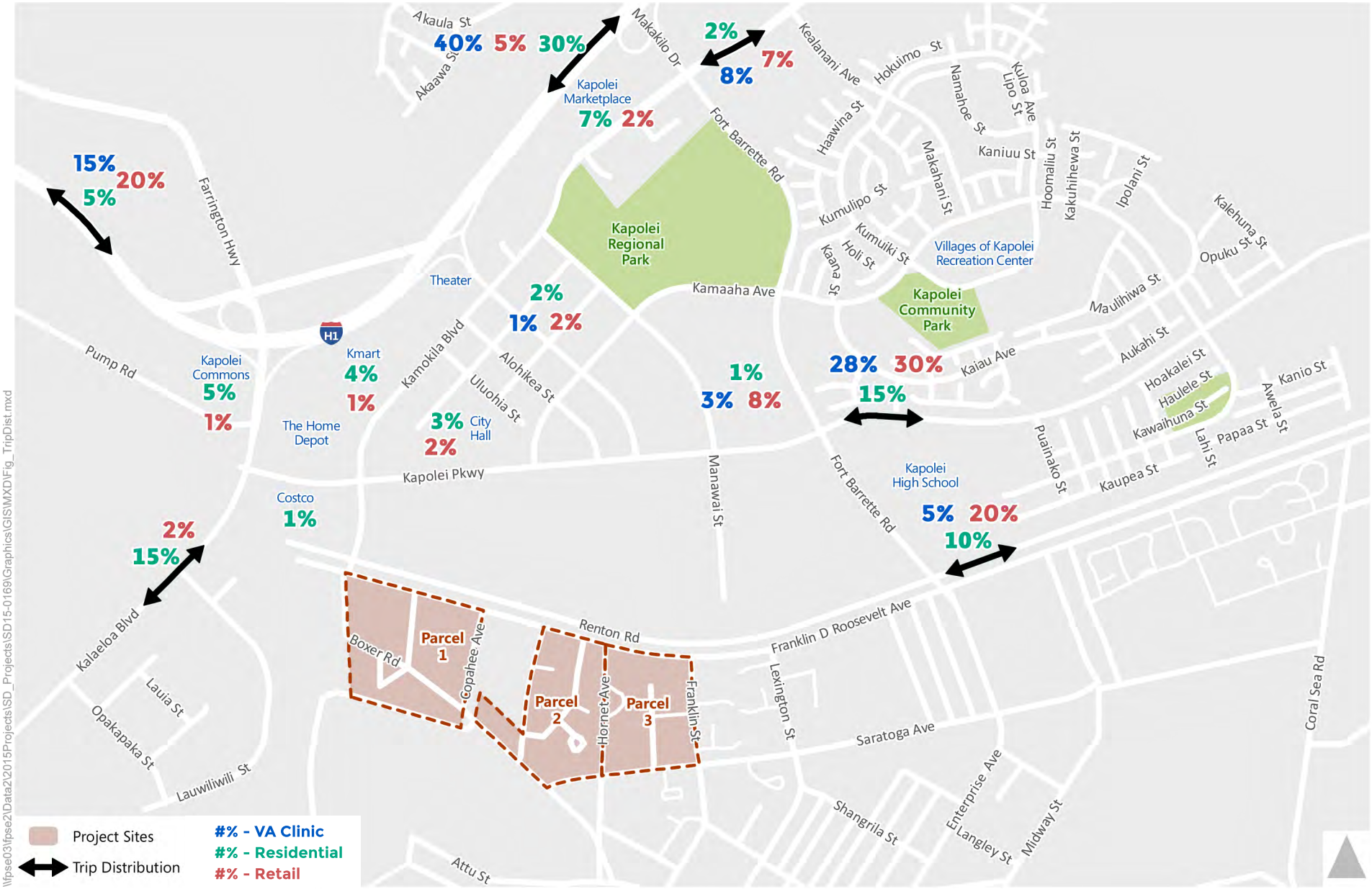


Figure 11

Mixed-Use Project Trip Distribution

5.3 PROJECT TRIP ASSIGNMENT

Using the estimated trip generation and the distribution patterns discussed, the traffic generated by the proposed project under Near Term (2020) Baseline Conditions was assigned to the study intersections based on the characteristics of the streets within the study area, anticipated congestion, and directness of route. **Figures 12, 13, and 14** shows the assignment of trips generated by the project for Parcel 1, Parcels 1 and 2, and Parcels 1, 2, and 3, respectively, for the 1,500 Residential Unit alternative. **Figures 15, 16, and 17** shows the assignment of trips generated by the project for Parcel 1, Parcels 1 and 2, and Parcels 1, 2, and 3, respectively, for the Mixed-Use Development alternative.

5.4 PROPOSED PROJECT ROADWAY MODIFICATIONS

The proposed project plans to construct the Kamokila Boulevard extension from Roosevelt Avenue to Saratoga Avenue and the Saratoga Avenue realignment/extension from Boxer Road to Kamokila Boulevard. Kamokila Boulevard will border the ewa-side of Parcel 1, and Saratoga Avenue will border the makai side of Parcels 1, 2, and 3. With these two new roadway extensions, the project also proposes to remove Boxer Road from Kamokila Boulevard to Tulagi Avenue; thus, Roosevelt Avenue's ewa terminus will be at Kamokila Boulevard in the future.

The new segment of Kamokila Boulevard will extend approximately 1,200 feet makai of Roosevelt Avenue to connect to Saratoga Avenue and will include two travel lanes. With the removal of Boxer Road, the Kamokila Boulevard/Roosevelt Avenue will be a T-intersection with no ewa intersection leg and is expected to initially remain as an unsignalized all-way stop controlled intersection. The new Kamokila Boulevard/Saratoga Avenue will be a two-legged intersection (mauka and Diamond Head intersection legs only) and will also be unsignalized with free turning-movements for both approaches. Access to Parcel 1 will be provided via an unsignalized intersection on Kamokila Boulevard, approximately 600 feet makai of Roosevelt Avenue.

Saratoga Avenue will extend from Tulagi Avenue in the Diamond Head side to the new Kamokila Boulevard extension. This segment will provide two-travel lanes and will intersect with Copahee Avenue, Tulagi Avenue, and Hornet Avenue. Access to Parcel 2 and 3 will be provided via the Saratoga Avenue/Tulagi Avenue intersection and the Saratoga Avenue/Wakea Street intersection, respectively.

Roosevelt Avenue will remain as a two-lane roadway with unsignalized intersections at Kamokila Boulevard, Copahee Avenue, and Tulagi Avenue. The project proposes to eliminate the Roosevelt Avenue/Hornet Avenue intersection, where Hornet Avenue will remain as roadway, but will be closed off at Roosevelt

Avenue. Hornet Avenue will still provide access to Parcel 3 via the two existing driveways, and will intersect with Saratoga Avenue in the makai side. The Wakea Street extension between Kapolei Parkway and Roosevelt Avenue is not part of the proposed project and thus, was not assumed in the analysis.

Figure 18 illustrates the overall development plan and new roadway alignments. Please note, that the figure shows the Wakea Street extension, but as stated above, this was not included as part of the proposed project.

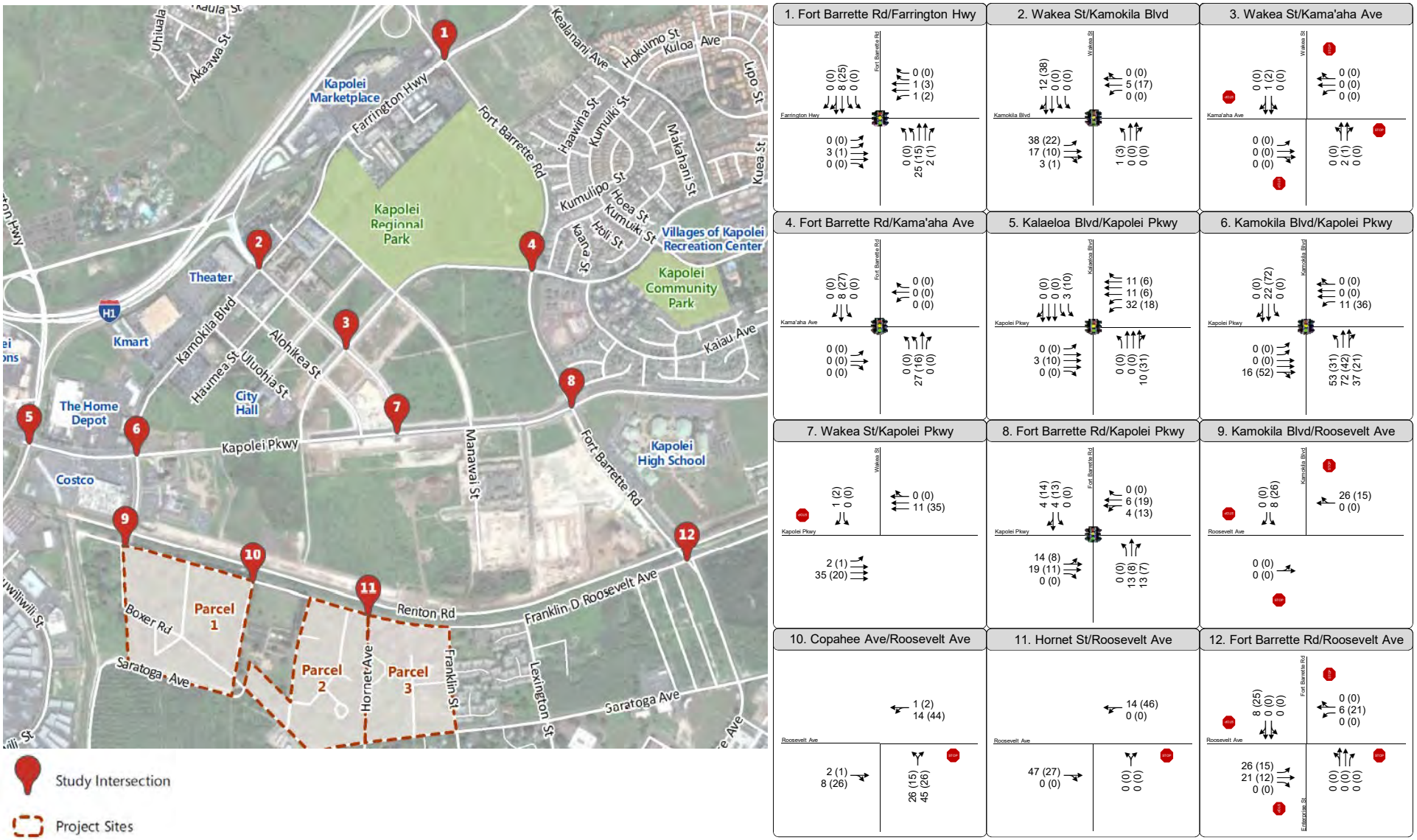


Figure 12
Peak Hour Traffic Volumes and Lane Configurations
1,500 Residential Unit - Parcel 1 Trip Assignment

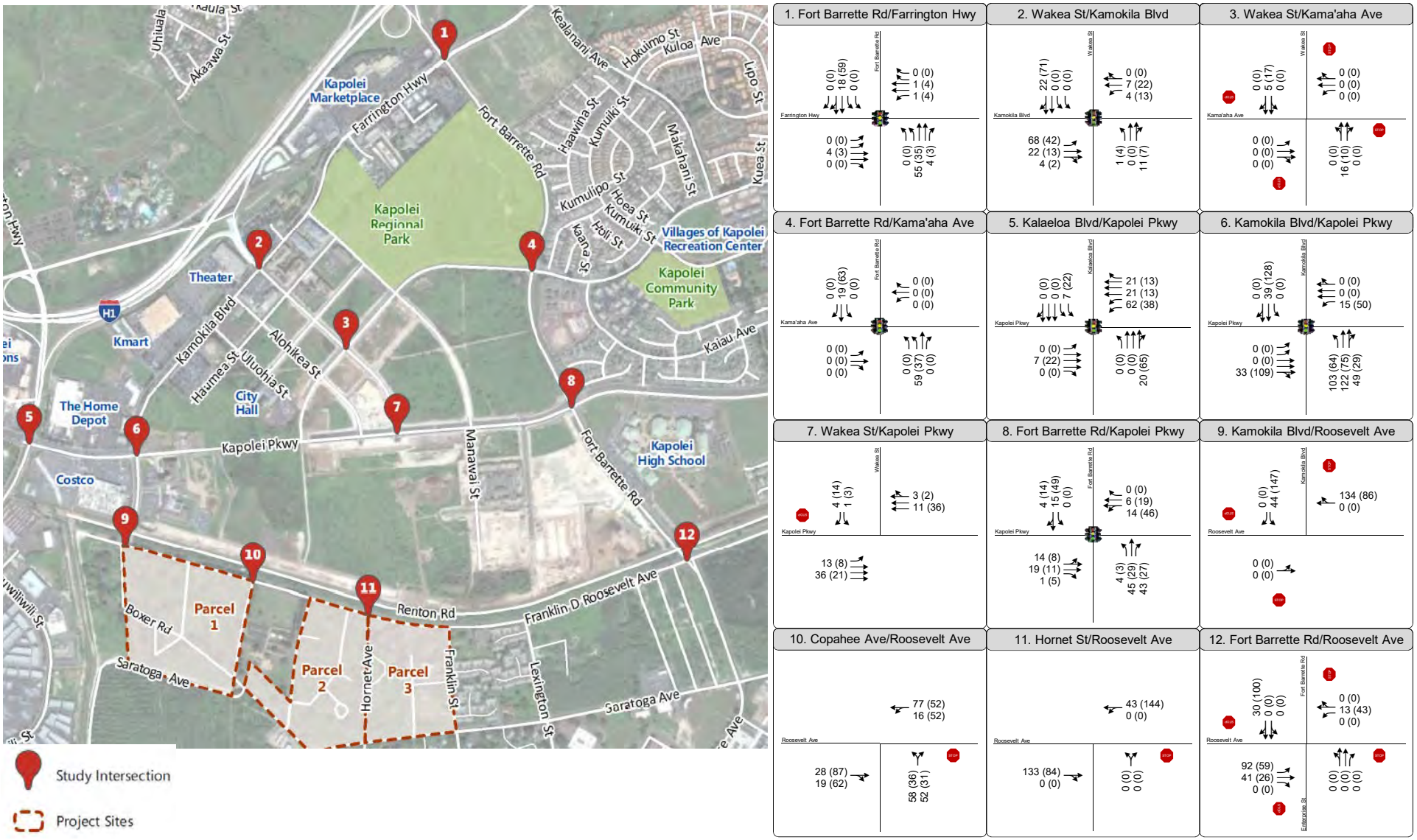


Figure 13
Peak Hour Traffic Volumes and Lane Configurations
1,500 Residential Unit - Parcels 1 & 2 Trip Assignment

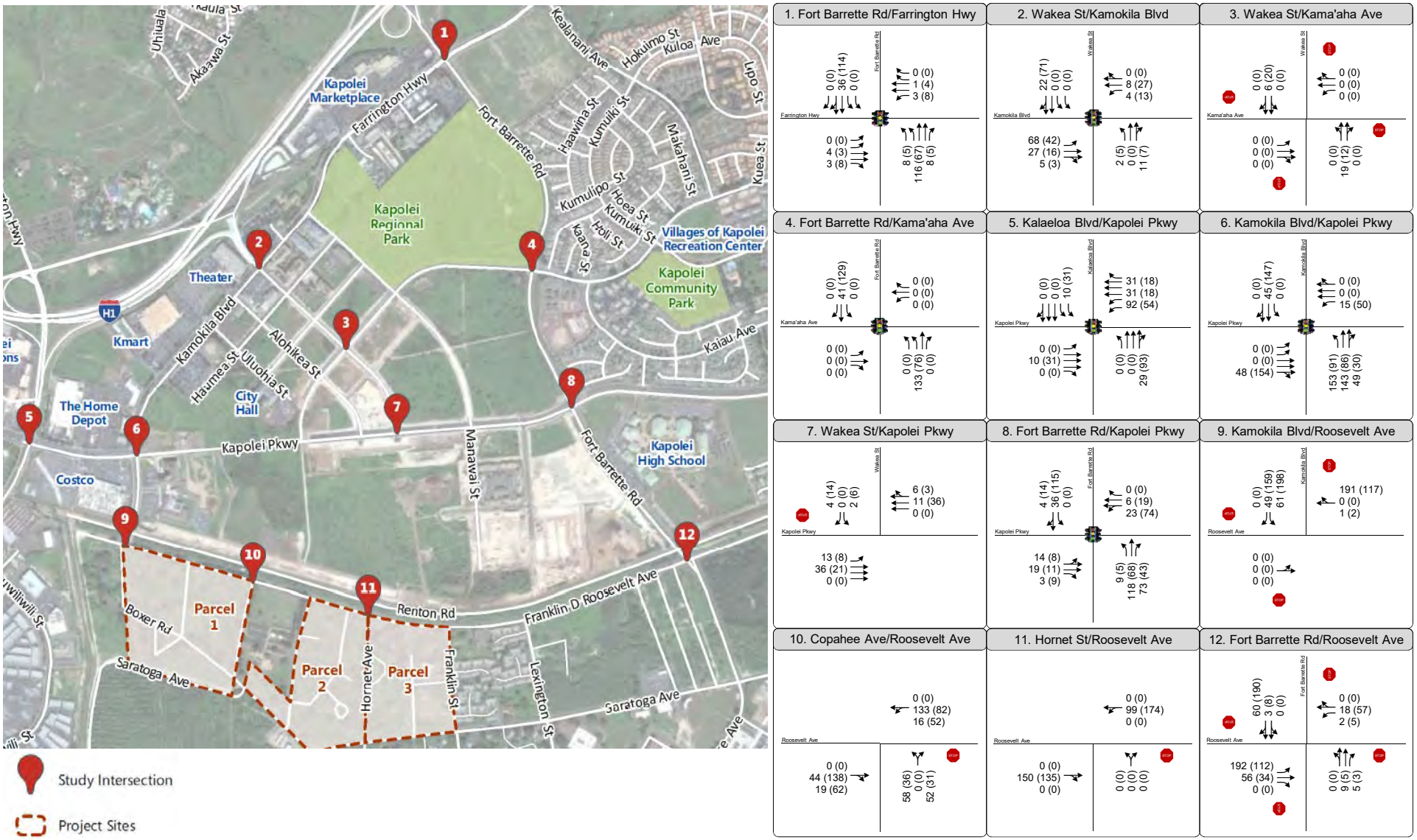


Figure 14
Peak Hour Traffic Volumes and Lane Configurations
1,500 Residential Unit - Parcels 1, 2, & 3 Trip Assignment

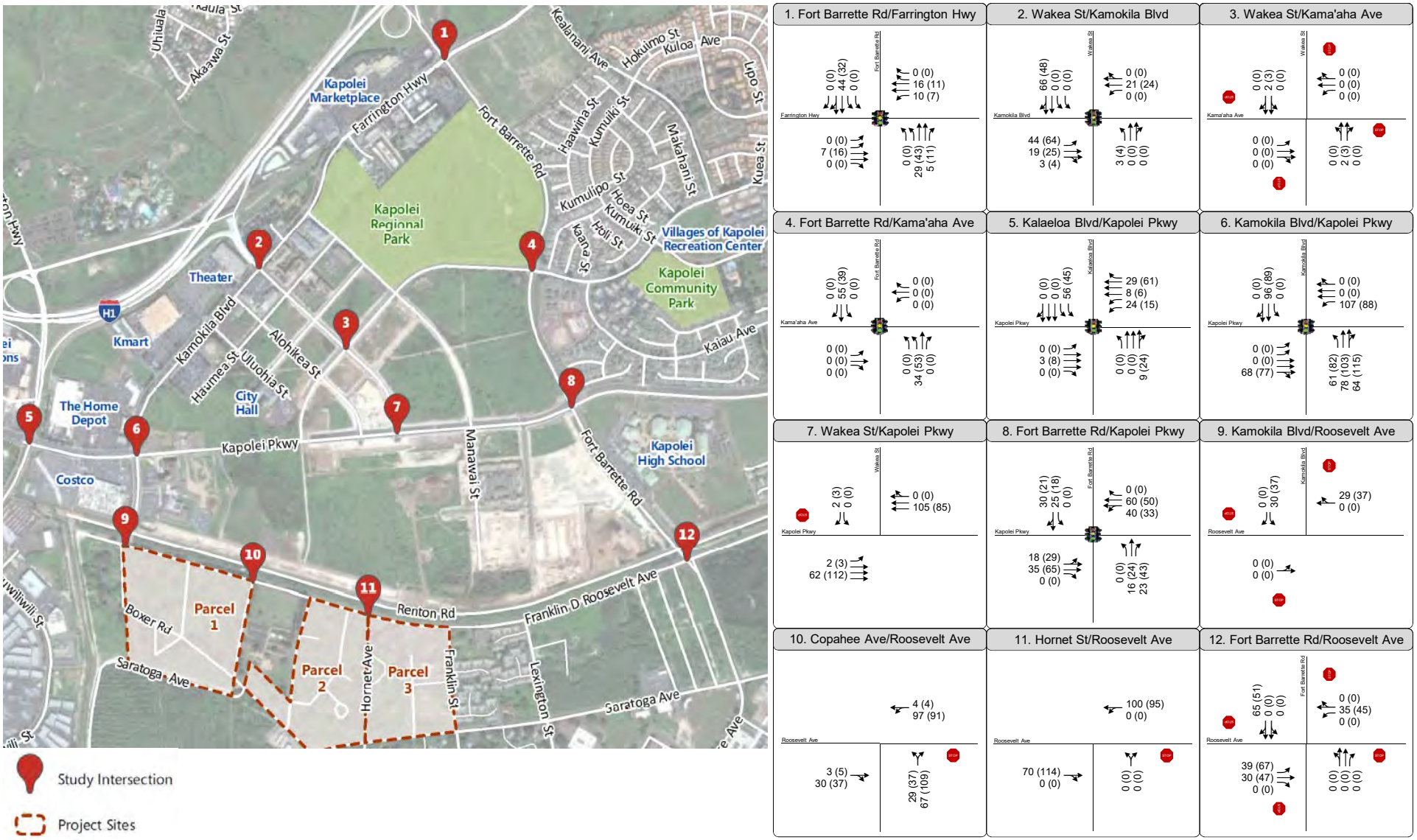


Figure 15
Peak Hour Traffic Volumes and Lane Configurations
Mixed-Use Development - Parcel 1 Trip Assignment

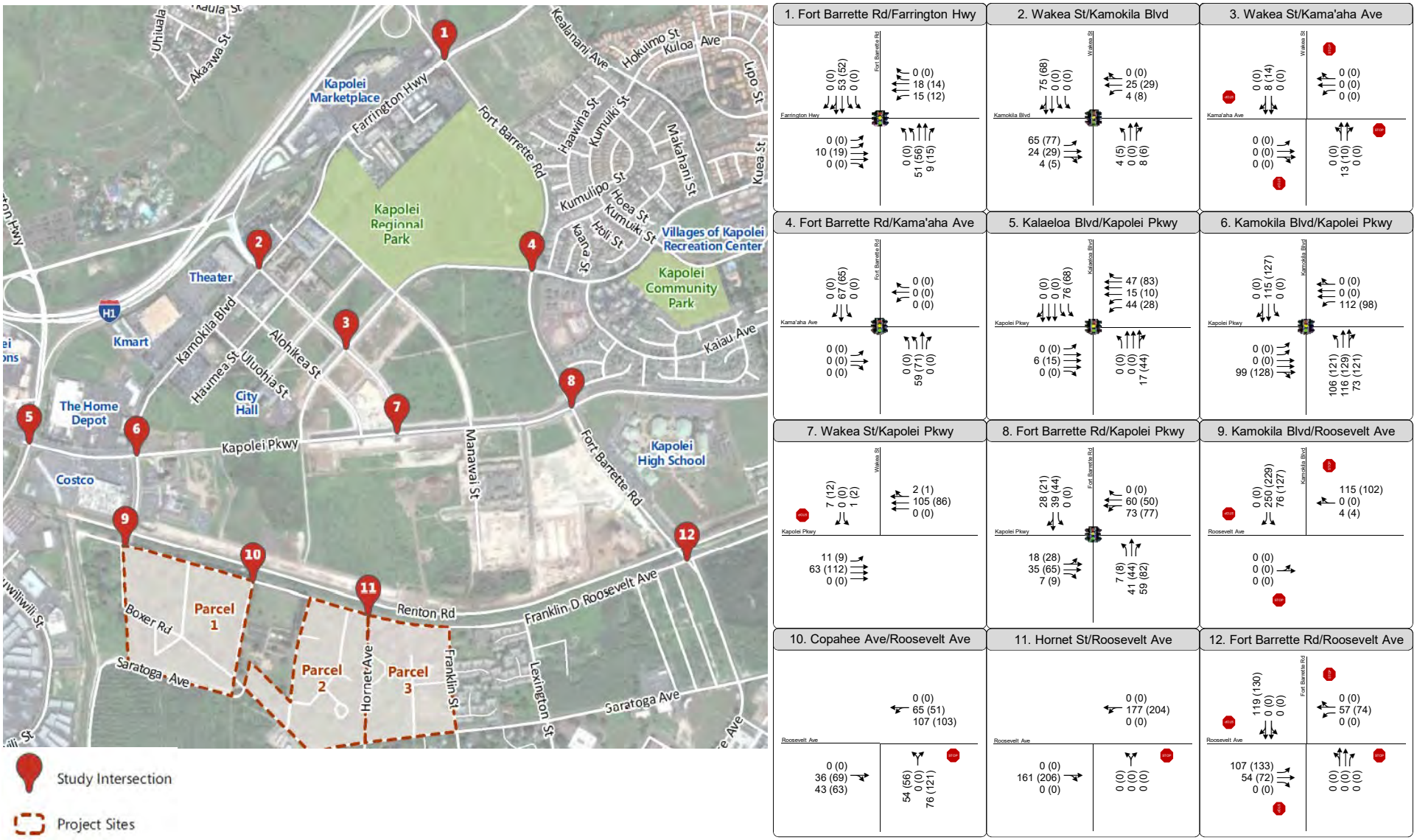


Figure 16
Peak Hour Traffic Volumes and Lane Configurations
Mixed-Use Development - Parcels 1 & 2 Trip Assignment

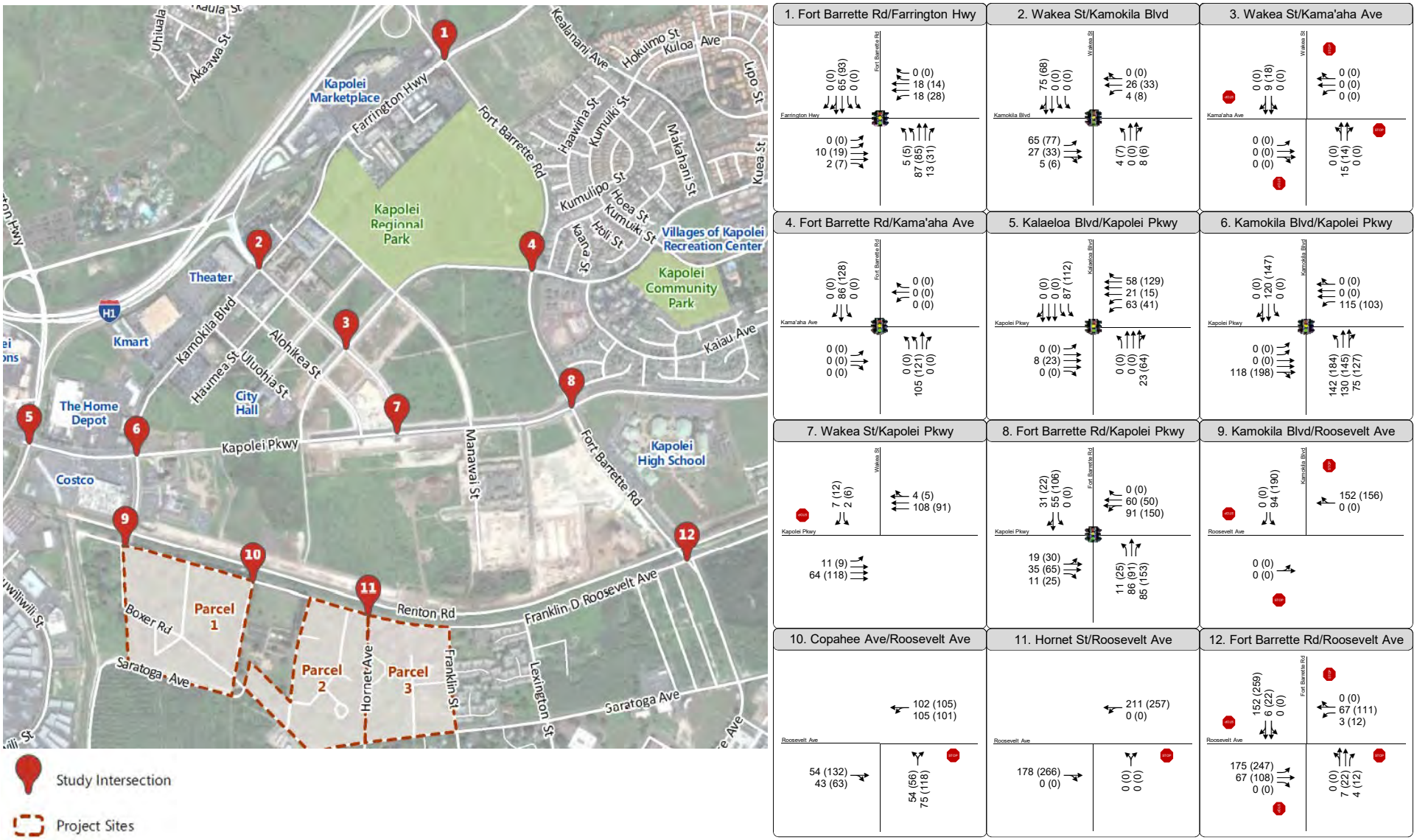


Figure 17
Peak Hour Traffic Volumes and Lane Configurations
Mixed-Use Development - Parcels 1, 2, & 3 Trip Assignment

Source: Belt Collins

Figure 18

Project Development Plan and New Roadway Alignments

6.0 NEAR TERM (2020) PLUS PROJECT CONDITIONS

This chapter summarizes and presents an analysis of the potential impacts on the roadway system due to projected increases in traffic, including traffic generated by the project in 2020. The Near Term (2020) Plus Project Conditions roadway network is the same network assumed under the baseline scenario, except for the addition of the site driveways that is discussed in Chapter 5. The analysis compares the projected levels of service at each study intersection under future baseline (or "No Project") conditions against the three "Plus Project" scenarios (i.e., Parcel 1, Parcels 1 and 2, and Parcels 1, 2, and 3) to determine potential Near Term impacts.

6.1 NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVEL OF SERVICE

This section presents an analysis of potential future traffic conditions projected for Near Term (2020) Plus Project Conditions. To forecast the peak hour operating conditions at each study intersection, the project trip assignment for Parcel 1, Parcels 1 and 2, and Parcels 1, 2, and 3 conditions were superimposed on Near Term (2020) Baseline traffic volumes to yield Near Term (2020) Plus Project for the two project alternatives. **Figures 19, 20, and 21** presents the anticipated lane configurations and projected Near Term (2020) Plus Project AM and PM peak hour volumes for each parcel scenario under the 1,500 Residential Units alternative. **Figures 22, 23, and 24** presents the anticipated lane configurations and projected Near Term (2020) Plus Project AM and PM peak hour volumes for each parcel scenario, under the Mixed-Use Development alternative. The results for each development alternative are presented below.

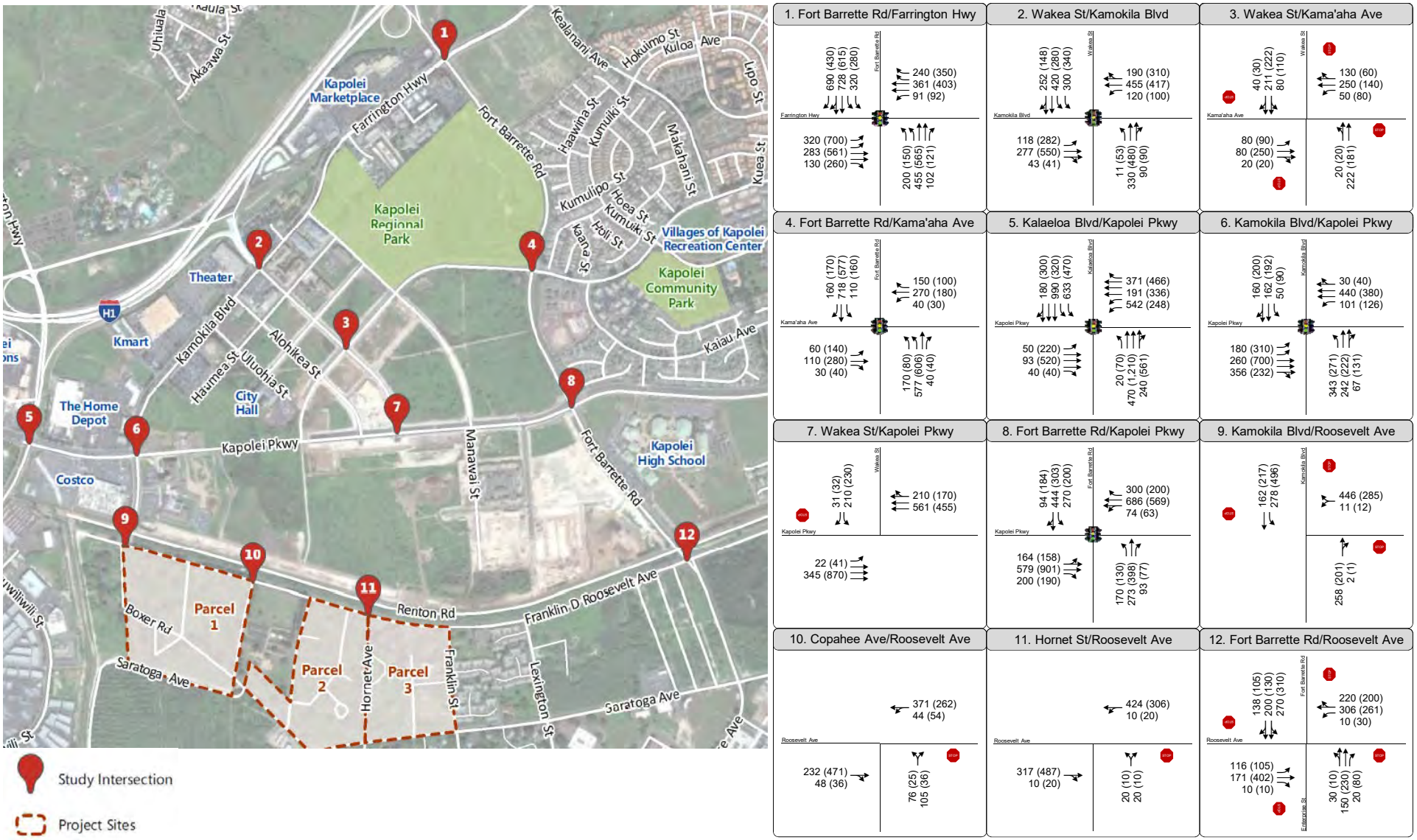


Figure 19
Peak Hour Traffic Volumes and Lane Configurations
1,500 Residential Unit - Near Term (2020) Plus Parcel 1 Conditions

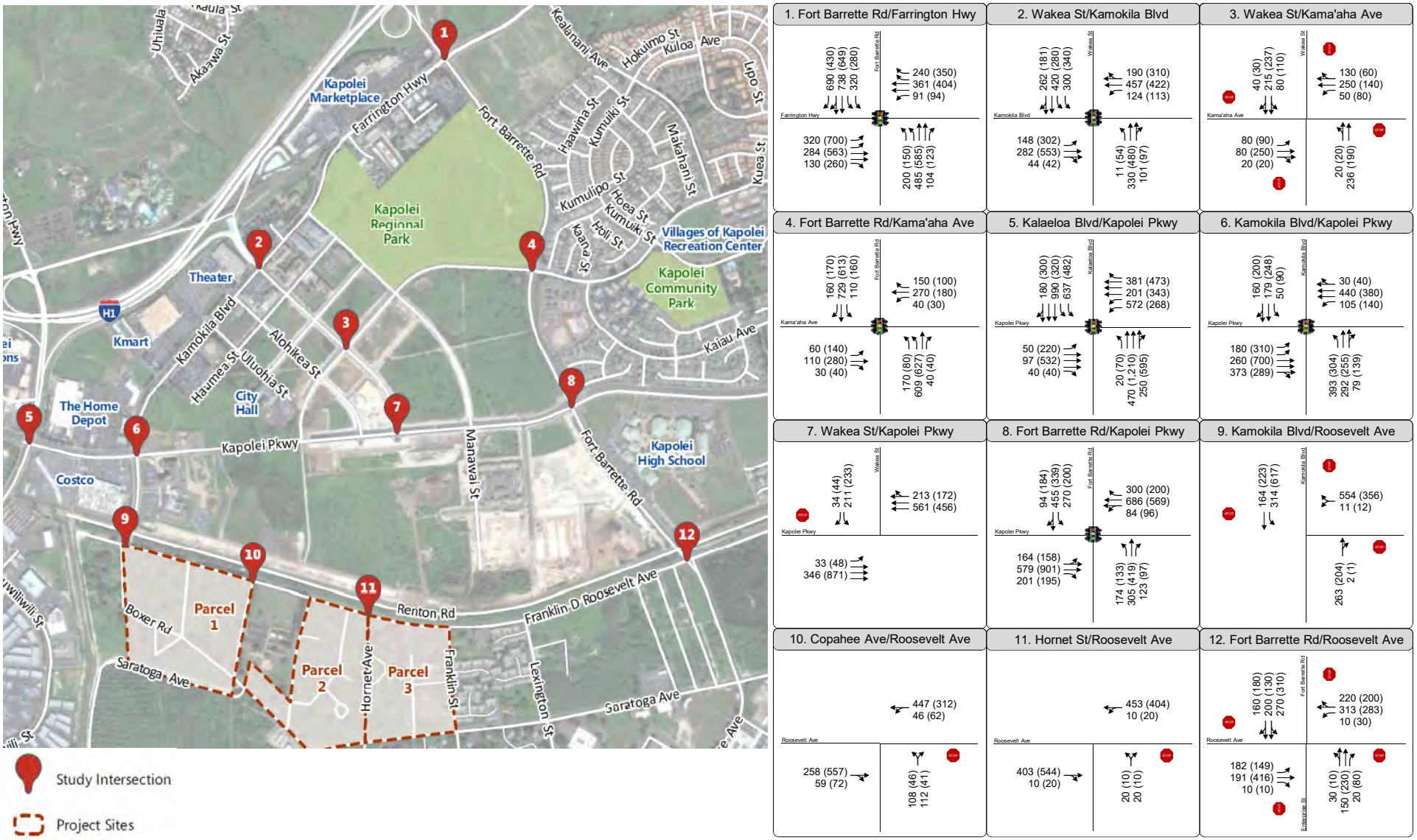


Figure 20

Peak Hour Traffic Volumes and Lane Configurations

1,500 Residential Unit - Near Term (2020) Plus Parcels 1 & 2 Conditions

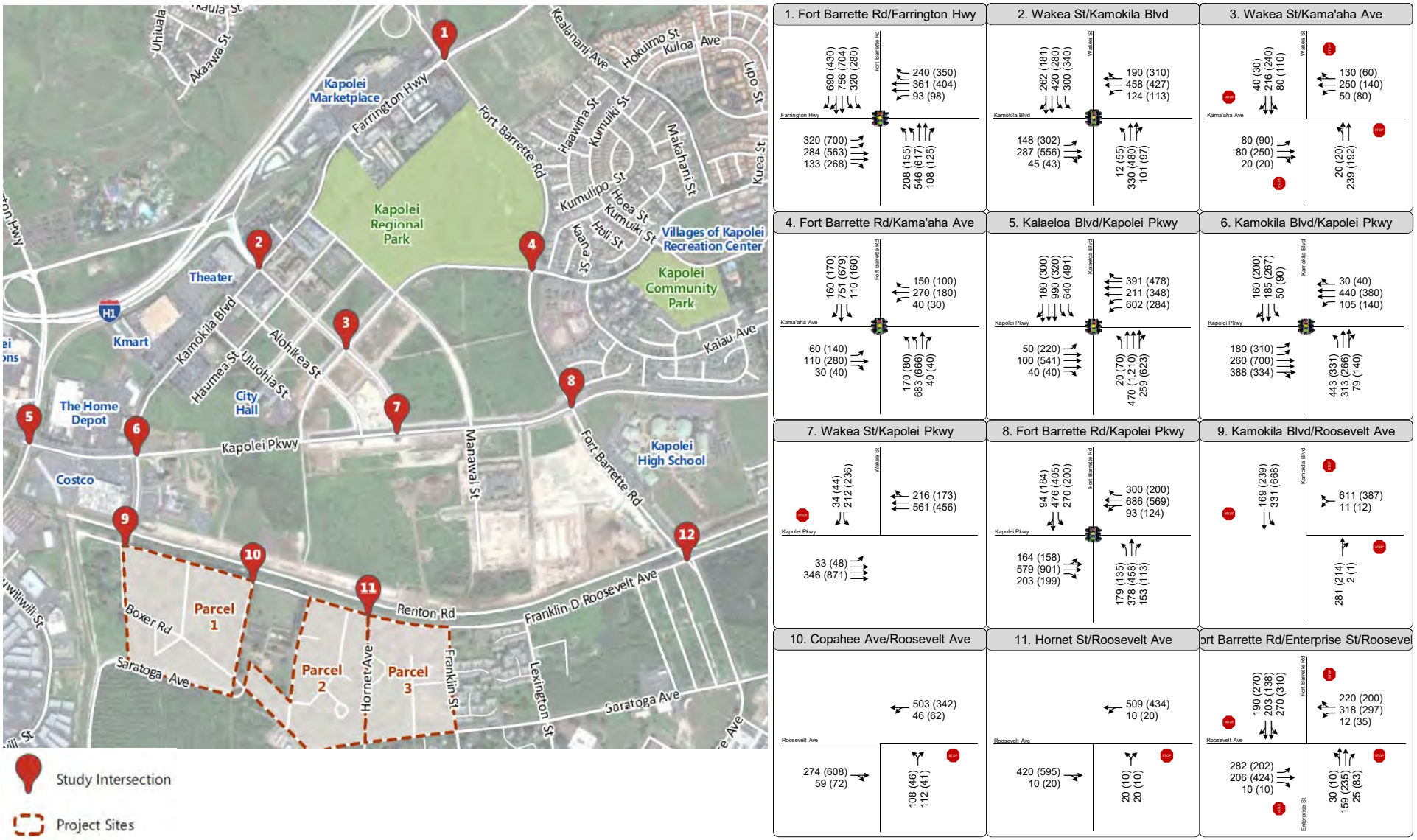


Figure 21

Peak Hour Traffic Volumes and Lane Configurations

1,500 Residential Unit - Near Term (2020) Plus Parcels 1, 2, & 3 Conditions

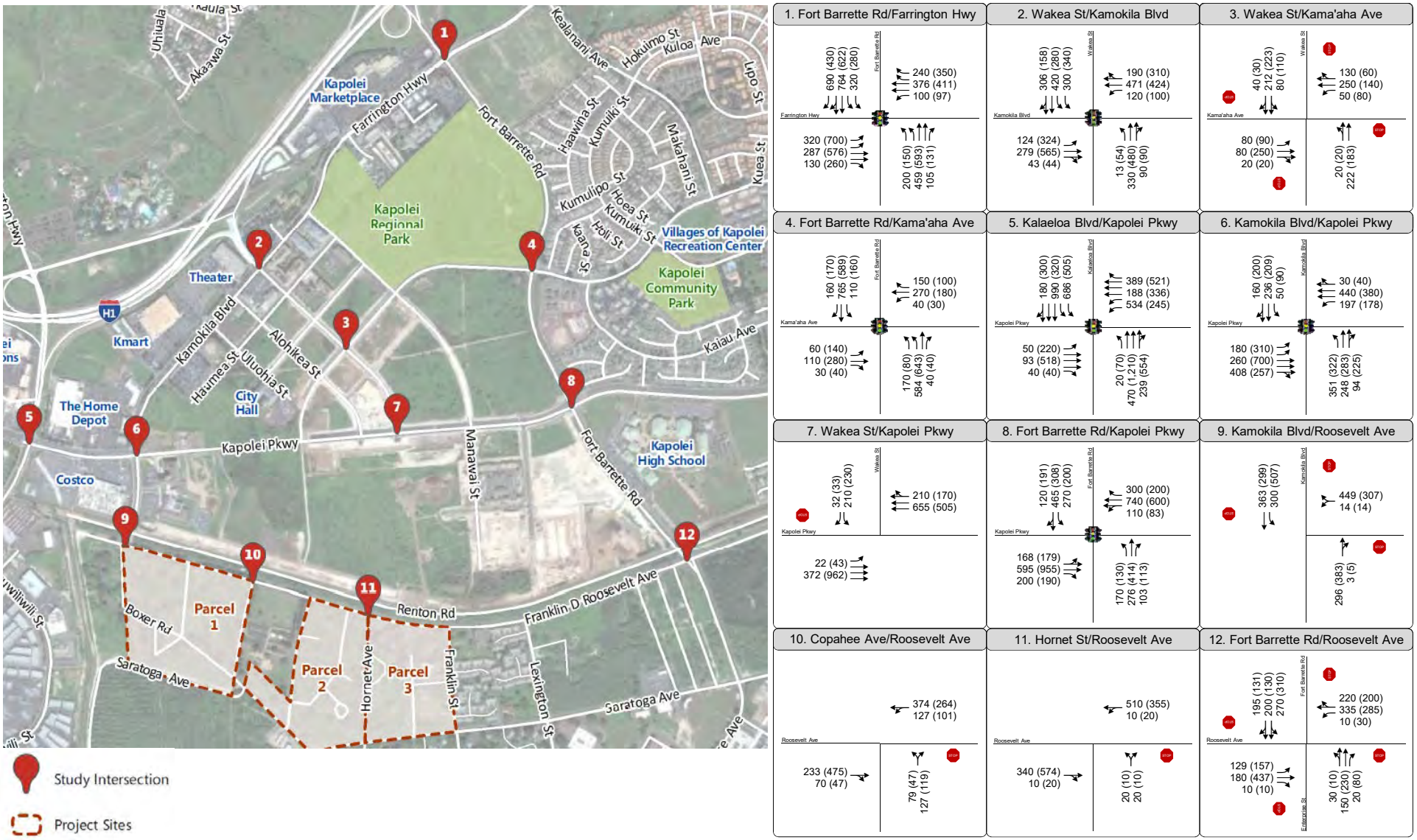


Figure 22

Peak Hour Traffic Volumes and Lane Configurations

Mixed-Use Development - Near Term (2020) Plus Parcel 1 Conditions

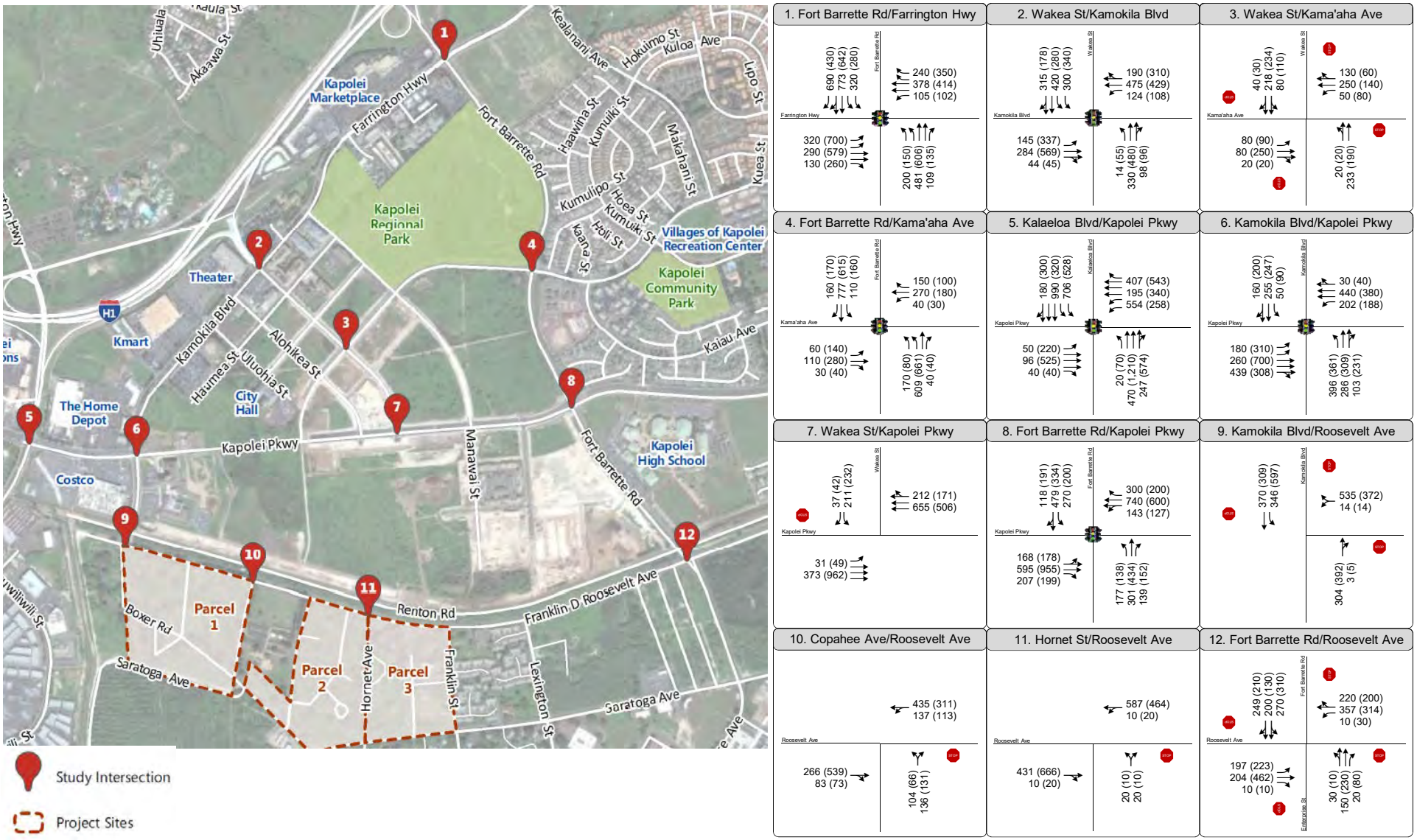


Figure 23

Peak Hour Traffic Volumes and Lane Configurations

Mixed-Use Development - Near Term (2020) Plus Parcels 1 & 2 Conditions

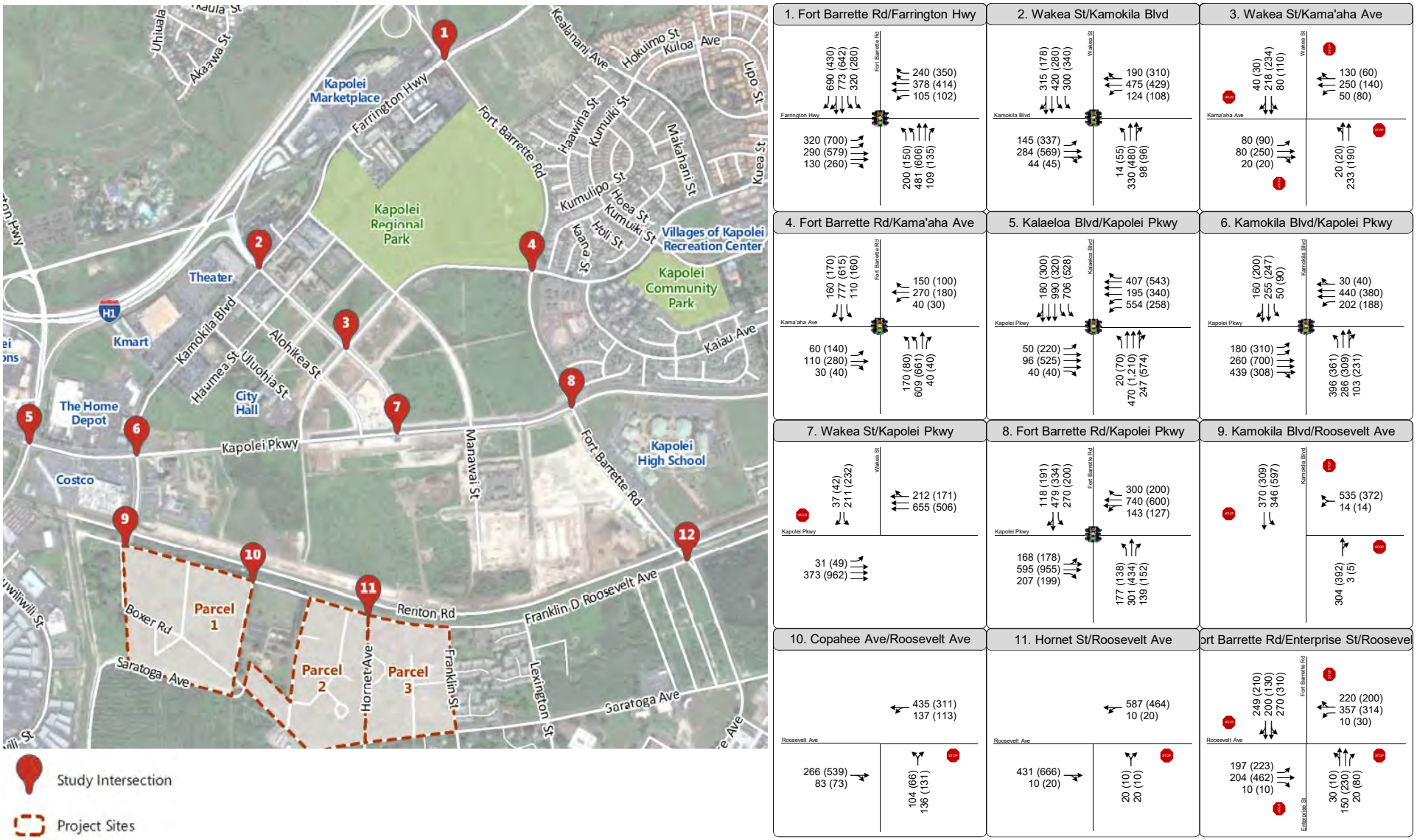


Figure 24

Peak Hour Traffic Volumes and Lane Configurations

Mixed-Use Development - Near Term (2020) Plus Parcels 1, 2, & 3 Conditions

6.1.1 1,500 RESIDENTIAL UNIT RESULTS

Table 8 presents the intersection operating conditions and traffic impacts under the three Near Term (2020) Plus Project Conditions scenarios for the 1,500-unit Residential Development and compares the projected levels of service at each study intersection under Near Term (2020) Baseline Conditions. The corresponding LOS Calculation sheets are included in **Appendix C.**

According to the results in **Table 8,** the three Plus Project scenarios would result in the following impacts:

Parcel 1 Conditions

The addition of Parcel 1 project trips would cause a total of four (4) significant impacts to study intersections. Under this scenario, the Parcel 1 project would contribute to cumulative impacts (exacerbating baseline LOS E or F operations) during one or both peak hours at the following four (4) study intersections:

5. Kapolei Parkway / Kalaeloa Boulevard (LOS F – PM peak hour)
7. Kapolei Parkway / Wakea Street (LOS E – AM peak hour, LOS F – PM peak hour)
8. Fort Barrette Road / Kapolei Parkway (LOS F – AM and PM peak hours)
12. Fort Barrette Road-Enterprise Street / Roosevelt Avenue (LOS F – AM and PM peak hours)

Parcels 1 and 2 Conditions

The addition of Parcels 1 and 2 project trips would cause a total of six (6) significant impacts to study intersections. Under this scenario, the Parcels 1 and 2 project would contribute to cumulative impacts (exacerbating baseline LOS E or F operations) during one of both peak hours at the following four (4) study intersections:

5. Kapolei Parkway / Kalaeloa Boulevard (LOS F – PM peak hour)
7. Kapolei Parkway / Wakea Street (LOS F – AM and PM peak hours)
8. Fort Barrette Road / Kapolei Parkway (LOS F – AM and PM peak hours)
12. Fort Barrette Road-Enterprise Street / Roosevelt Avenue (LOS F – AM and PM peak hours)

TABLE 8: NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVELS OF SERVICE – 1,500 RESIDENTIAL UNITS

Intersection	Traffic Control[1]	Peak Hour	Near Term Baseline		Near Term Plus Parcel 1			Near Term Plus Parcels 1 & 2			Near Term Plus Parcels 1, 2, & 3		
			Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line
1. Farrington Hwy / Fort Barrette Rd	Signal	AM	29.0	C	29.1	C	0.1	29.2	C	0.2	29.6	C	0.6
		PM	35.8	D	36.5	D	0.7	37.3	D	1.5	38.6	D	2.8
2. Kamokila Blvd / Wakea St	Signal	AM	26.2	C	28.5	C	2.3	30.5	C	4.3	30.6	C	4.4
		PM	36.7	D	38.7	D	2.0	40.7	D	4.0	40.9	D	4.2
3 Wakea St / Kama'aha Ave	AWSC	AM	19.1	C	19.2	C	0.1	19.8	C	0.7	19.9	C	0.8
		PM	16.6	C	16.7	C	0.1	17.2	C	0.6	17.3	C	0.7
4. Fort Barrette Rd / Kama'aha Ave	Signal	AM	37.0	D	38.4	D	1.4	40.6	D	3.6	47.3	D	10.3
		PM	37.2	D	38.7	D	1.5	40.8	D	3.6	45.0	D	7.8
5. Kapolei Pkwy / Kalaeloa Blvd	Signal	AM	26.3	C	27.1	C	0.8	28.0	C	1.7	28.8	C	2.5
		PM	**91.0**	**F**	***91.8***	***F***	0.8	***92.9***	***F***	1.9	***93.7***	***F***	2.7
6. Kapolei Pkwy / Kamokila Blvd	Signal	AM	27.6	C	40.3	D	12.7	***56.9***	***E***	29.3	***76.4***	***E***	48.8
		PM	26.1	C	32.9	C	6.8	39.7	D	13.6	43.2	D	17.1
7. Kapolei Pkwy / Wakea St	SSSC	AM	**41.5**	**E**	***46.8***	***E***	5.3	***55.7***	***F***	14.2	***56.3***	***F***	14.8
		PM	**44.1**	**E**	***52.0***	***F***	7.9	***58.9***	***F***	14.8	***60.7***	***F***	16.6
8. Fort Barrette Rd / Kapolei Pkwy	Signal	AM	**140.4**	**F**	***168.4***	***F***	28.0	***169.9***	***F***	29.5	***171.8***	***F***	31.4
		PM	**185.5**	**F**	***191.5***	***F***	6.0	***192.1***	***F***	6.6	***192.0***	***F***	6.5

TABLE 8: NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVELS OF SERVICE – 1,500 RESIDENTIAL UNITS

Intersection	Traffic Control[1]	Peak Hour	Near Term Baseline		Near Term Plus Parcel 1			Near Term Plus Parcels 1 & 2			Near Term Plus Parcels 1, 2, & 3		
			Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line
9. Roosevelt Ave / Kamokila Blvd	AWSC	AM	16.3	C	23.2	C	6.9	***47.9***	***E***	31.6	***72.9***	***F***	56.6
		PM	23.9	C	26.5	D	2.6	***66.3***	***F***	42.4	***90.6***	***F***	66.7
10. Roosevelt Ave / Copahee Ave	SSSC	AM	16.5	C	17.7	C	1.2	27.4	D	10.9	32.9	D	16.4
		PM	14.1	B	16.3	C	2.2	24.3	C	10.2	27.9	D	13.8
11. Roosevelt Ave / Hornet St	SSSC	AM	13.7	B	14.6	B	0.9	16.6	C	2.9	17.8	C	4.1
		PM	14.1	B	16.1	C	2.0	16.9	C	2.8	18.3	C	4.2
12. Fort Barrette Rd-Enterprise St / Roosevelt Ave	AWSC	AM	**95.2**	**F**	***100.0***	***F***	4.8	***112.5***	***F***	17.3	***135.3***	***F***	40.1
		PM	**91.4**	**F**	***102.5***	***F***	11.1	***117.5***	***F***	26.1	***136.3***	***F***	44.9

Source: Fehr & Peers, 2017

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. The vehicular delay for the worst movement is reported for side-street stop-controlled intersections.

[2] LOS calculations performed using the *Highway Capacity Manual (HCM) 2010* method. LOS for side street stop-controlled (SSSC) intersections is worst-case movement. Other uncontrolled movements generally operate well with limited delay.

[3&4] Undesired LOS and corresponding seconds of delay per vehicle are highlighted in **bold.** ***LOS*** represent project impact.

Additionally, project-specific impacts were identified at two (2) study intersections where the addition of Parcel 1 and 2-generated traffic would cause their overall intersection operations to degrade below LOS D in the peak hours for the 1,500-unit Residential Development. The project-specific impacts are:

6. Kapolei Parkway / Kamokila Boulevard (LOS E – AM peak hour)

- The high vehicular delay at this intersection is primarily attributed to the one mauka-bound left-turn lane, which increases considerably with the Parcels 1 and 2 project (i.e. 103 project trips in the AM peak hour). This signalized intersection serves a mauka-bound left-turn volume of 393 vehicles in the AM peak hour. The high vehicle delay is caused by a combination of the high turning volume in one travel lane and a short allocation of green-time in the signal timing for the mauka-bound left-turn movement.

9. Roosevelt Avenue / Kamokila Boulevard (LOS E – AM peak hour, LOS F - PM peak hour)

- This unsignalized all-way stop controlled intersection serves all project traffic traveling to and from the ewa-side of Kapolei. This intersection serves 554 ewa-bound right-turn vehicles in the AM peak hour and 617 makai-bound left-turn vehicles in the PM peak hour. The high turning volumes and intersection traffic control results in high vehicular delay from constant stop and go traffic at the intersection.

<u>Parcels 1, 2, and 3 Conditions</u>

The addition of Parcels 1, 2, and 3 project trips would cause a total of six (6) significant impacts to study intersections for the 1,500-unit Residential Development. Under this scenario, the Parcels 1, 2, and 3 project would contribute to cumulative impacts (exacerbating baseline LOS E or F operations) during one of both peak hours at four (4) study intersections:

5. Kapolei Parkway / Kalaeloa Boulevard (LOS F – PM peak hour)
7. Kapolei Parkway / Wakea Street (LOS F – AM and PM peak hours)
8. Fort Barrette Road / Kapolei Parkway (LOS F – AM and PM peak hours)
12. Fort Barrette Road-Enterprise Street / Roosevelt Avenue (LOS F – AM and PM peak hours)

Additionally, project-specific impacts were identified at two (2) study intersections where the addition of project-generated traffic would cause their overall intersection operations to degrade below LOS D in the peak hours for the 1,500-unit Residential Development. The project-specific impacts are:

6. Kapolei Parkway / Kamokila Boulevard (LOS E – AM PM peak hour)

- The high vehicular delay at this intersection is primarily attributed to the one mauka-bound left-turn lane, which increases considerably with the Parcels 1, 2, and 3 project (i.e. 153 project trips in the AM peak hour. This signalized intersection serves a mauka-bound left-turn volume of 443 vehicles in the AM peak hour. The high vehicle delay is caused by a combination of the high turning volume in one travel lane and a short allocation of green-time in the signal timing for the mauka-bound left-turn movement.

9. Roosevelt Avenue / Kamokila Boulevard (LOS F – AM and PM peak hours)

- This unsignalized all-way stop controlled intersection serves all project traffic traveling to and from the ewa-side of Kapolei. This intersection serves 611 ewa-bound right-turn vehicles in the AM peak hour and 668 makai-bound left-turn vehicles in the PM peak hour. The high turning volumes and intersection traffic control results in high vehicular delay from constant stop and go traffic at the intersection.

6.1.2 MIXED-USE RESULTS

Table 9 presents the intersection operating conditions and traffic impacts under the three Near Term (2020) Plus Project Conditions scenarios for the Mixed-Use Development and compares the projected levels of service at each study intersection under Near Term (2020) Baseline Conditions. The corresponding LOS Calculation sheets are included in **Appendix C.**

According to the results in **Table 9,** the three Plus Project scenarios would result in the following impacts:

<u>Parcel 1 Conditions</u>

The addition of Parcel 1 project trips would cause a total of five (5) significant impacts to study intersections. Under this scenario, the Parcel 1 project would contribute to cumulative impacts (exacerbating baseline LOS E or F operations) during one or both peak hours at the following five (5) study intersections:

5. Kapolei Parkway / Kalaeloa Boulevard (LOS F – PM peak hour)
7. Kapolei Parkway / Wakea Street (LOS F – AM and PM peak hours)
8. Fort Barrette Road / Kapolei Parkway (LOS F – AM and PM peak hours)
9. Roosevelt Avenue / Kamokila Boulevard (LOS E – AM and PM peak hours)
12. Fort Barrette Road-Enterprise Street / Roosevelt Avenue (LOS F – AM and PM peak hours)

TABLE 9: NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVELS OF SERVICE – MIXED-USE DEVELOPMENT

Intersection	Traffic Control[1]	Peak Hour	Near Term Baseline		Near Term Plus Parcel 1			Near Term Plus Parcels 1 & 2			Near Term Plus Parcels 1, 2, & 3		
			Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line
1. Farrington Hwy / Fort Barrette Rd	Signal	AM	29.0	C	29.8	C	0.8	30.0	C	1	30.3	C	1.3
		PM	35.8	D	37.5	D	1.7	38.1	D	2.3	39.4	D	3.6
2. Kamokila Blvd / Wakea St	Signal	AM	26.2	C	29.5	C	3.3	31.1	C	4.9	31.1	C	4.9
		PM	36.7	D	41.7	D	5.0	43.1	D	6.4	43.3	D	6.6
3 Wakea St / Kama'aha Ave	AWSC	AM	19.1	C	19.2	C	0.1	19.8	C	0.7	19.9	C	0.8
		PM	16.6	C	16.7	C	0.1	17.2	C	0.6	17.3	C	0.7
4. Fort Barrette Rd / Kama'aha Ave	Signal	AM	37.0	D	45.2	D	8.2	47.8	D	10.8	53.1	D	16.1
		PM	37.2	D	41.9	D	4.7	43.8	D	6.6	49.3	D	12.1
5. Kapolei Pkwy / Kalaeloa Blvd	Signal	AM	26.3	C	27.6	C	1.3	28.3	C	2.0	29.0	C	2.7
		PM	**91.0**	**F**	***93.8***	***F***	2.8	***95.8***	***F***	4.8	***100.2***	***F***	9.2
6. Kapolei Pkwy / Kamokila Blvd	Signal	AM	27.6	C	53.9	D	26.3	***73.3***	***E***	45.7	***90.9***	***F***	63.3
		PM	26.1	C	42.5	D	16.4	49.8	D	23.7	***58.7***	***E***	32.6
7. Kapolei Pkwy / Wakea St	SSSC	AM	**41.5**	**E**	***73.3***	***F***	31.8	***87.6***	***F***	46.1	***89.8***	***F***	48.3
		PM	**44.1**	**E**	***74.2***	***F***	30.1	***83.4***	***F***	39.3	***90.5***	***F***	46.4
8. Fort Barrette Rd / Kapolei Pkwy	Signal	AM	**140.4**	**F**	***186.5***	***F***	46.1	***189.7***	***F***	49.3	***192.9***	***F***	52.5
		PM	**185.5**	**F**	***214.5***	***F***	29.0	***218.9***	***F***	33.4	***230.4***	***F***	44.9

TABLE 9: NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVELS OF SERVICE – MIXED-USE DEVELOPMENT

Intersection	Traffic Control[1]	Peak Hour	Near Term Baseline		Near Term Plus Parcel 1			Near Term Plus Parcels 1 & 2			Near Term Plus Parcels 1, 2, & 3		
			Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line	Delay (sec/ veh)[2]	LOS[3,4]	Δ from Base-line
9. Roosevelt Ave / Kamokila Blvd	AWSC	AM	16.3	C	***35.8***	***E***	19.5	***58.2***	***F***	41.9	***73.9***	***F***	57.6
		PM	23.9	C	***36.7***	***E***	12.8	***70.5***	***F***	46.6	***106.3***	***F***	82.4
10. Roosevelt Ave / Copahee Ave	SSSC	AM	16.5	C	33.2	D	16.7	***61.0***	***F***	44.5	***76.7***	***F***	60.2
		PM	14.1	B	22.8	C	8.7	***57.8***	***F***	43.7	***61.8***	***F***	47.7
11. Roosevelt Ave / Hornet St	SSSC	AM	13.7	B	16.1	C	2.4	19.5	C	5.8	20.7	C	7.0
		PM	14.1	B	16.8	C	2.7	20.5	C	6.4	23.0	C	8.9
12. Fort Barrette Rd-Enterprise St / Roosevelt Ave	AWSC	AM	**95.2**	**F**	***119.9***	***F***	24.7	***144.0***	***F***	48.8	***171.4***	***F***	76.2
		PM	**91.4**	**F**	***122.2***	***F***	30.8	***146.3***	***F***	54.9	***207.5***	***F***	116.1

Source: Fehr & Peers, 2017

Notes:

[1] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. The vehicular delay for the worst movement is reported for side-street stop-controlled intersections.

[2] LOS calculations performed using the *Highway Capacity Manual (HCM) 2010* method. LOS for side street stop-controlled (SSSC) intersections is worst-case movement. Other uncontrolled movements generally operate well with limited delay.

[3&4] Undesired LOS and corresponding seconds of delay per vehicle are highlighted in **bold.** ***LOS*** represent project impact.

Parcels 1 and 2 Conditions

The addition of Parcels 1 and 2 project trips would cause a total of seven (7) significant impacts to study intersections. Under this scenario, the Parcels 1 and 2 project would contribute to cumulative impacts (exacerbating baseline LOS E or F operations) during one of both peak hours at the following four (4) study intersections:

5. Kapolei Parkway / Kalaeloa Boulevard (LOS F – PM peak hour)
7. Kapolei Parkway / Wakea Street (LOS F – AM and PM peak hours)
8. Fort Barrette Road / Kapolei Parkway (LOS F – AM and PM peak hours)
12. Fort Barrette Road-Enterprise Street / Roosevelt Avenue (LOS F – AM and PM peak hours)
12. Fort Barrette Road-Enterprise Street / Roosevelt Avenue (LOS F – AM and PM peak hours)

Additionally, project-specific impacts were identified at three (3) study intersections where the addition of Parcel 1 and 2-generated traffic would cause their overall intersection operations to degrade below LOS D in the peak hours for the Mixed-Use Development. The project-specific impacts are:

6. Kapolei Parkway / Kamokila Boulevard (LOS E – AM peak hour)

- The high vehicular delay at this intersection is primarily attributed to the one mauka-bound left-turn lane, which increases considerably with the Parcels 1 and 2 project (i.e. 106 project trips in the AM peak hour). This signalized intersection serves a mauka-bound left-turn volume of 396 vehicles in the AM peak hour. The high vehicle delay is caused by a combination of the high turning volume in one travel lane and a short allocation of green-time in the signal timing for the mauka-bound left-turn movement.

9. Roosevelt Avenue / Kamokila Boulevard (LOS F – AM and PM peak hours)

- This unsignalized all-way stop controlled intersection serves all project traffic traveling to and from the ewa-side of Kapolei. This intersection serves 535 ewa-bound right-turn vehicles in the AM peak hour and 597 makai-bound left-turn vehicles in the PM peak hour. The high turning volumes and intersection traffic control results in high vehicular delay from constant stop and go traffic at the intersection.

10. Roosevelt Avenue / Copahee Avenue (LOS F – AM and PM peak hours)

- This unsignalized two-way stop controlled intersection is one of the project driveway that serves Parcels 1 and 2 project trips. The increased traffic on Copahee Avenue and

Roosevelt Avenue results in higher delay on the side-street (Copahee Avenue) caused by limited gaps in through traffic on Roosevelt Avenue.

Parcels 1, 2, and 3 Conditions

The addition of Parcels 1, 2, and 3 project trips would cause a total of seven (7) significant impacts to study intersections for the Mixed-Use Development. Under this scenario, the Parcels 1, 2, and 3 project would contribute to cumulative impacts (exacerbating baseline LOS E or F operations) during one of both peak hours at four (4) study intersections:

5. Kapolei Parkway / Kalaeloa Boulevard (LOS F – PM peak hour)
7. Kapolei Parkway / Wakea Street (LOS F – AM and PM peak hours)
8. Fort Barrette Road / Kapolei Parkway (LOS F – AM and PM peak hours)
12. Fort Barrette Road-Enterprise Street / Roosevelt Avenue (LOS F – AM and PM peak hours)

Additionally, project-specific impacts were identified at three (3) study intersections where the addition of Parcels 1, 2, and 3-generated traffic would cause their overall intersection operations to degrade below LOS D in the peak hours for the Mixed-Use Development. The project-specific impacts are:

6. Kapolei Parkway / Kamokila Boulevard (LOS F – AM peak hour, LOS E – PM peak hour)

- The high vehicular delay at this intersection is primarily attributed to the one mauka-bound left-turn lane, which increases considerably with the Parcels 1, 2, and 3 project (i.e. 142 project trips in the AM peak hour and 184 project trips in the PM peak hour). This signalized intersection serves a mauka-bound left-turn volume of 396 vehicles in the AM peak hour and 361 vehicles in the PM peak hour. The high vehicle delay is caused by a combination of the high turning volume in one travel lane and a short allocation of green-time in the signal timing for the mauka-bound left-turn movement.

9. Roosevelt Avenue / Kamokila Boulevard (LOS F – AM and PM peak hours)

- This unsignalized all-way stop controlled intersection serves all project traffic traveling to and from the ewa-side of Kapolei. This intersection serves 535 ewa-bound right-turn vehicles in the AM peak hour and 597 makai-bound left-turn vehicles in the PM peak hour. The high turning volumes and intersection traffic control results in high vehicular delay from constant stop and go traffic at the intersection.

10. Roosevelt Avenue / Copahee Avenue (LOS F – AM and PM peak hours)

- This unsignalized two-way stop controlled intersection is one of the project driveway that serves Parcels 1, 2, and 3 project trips. The increased traffic on Copahee Avenue and Roosevelt Avenue results in higher delay on the side-street (Copahee Avenue) caused by limited gaps in through traffic on Roosevelt Avenue.

In addition to evaluating overall intersection operations, DPP and HDOT typically requires that a review be conducted of the individual turning movements at each intersection to determine whether any movements are operating below LOS D. The majority of the poorly operating movements are left-turns. This is attributed to the signal timing allocating more green time to the through movements, which in most cases has caused the left-turn movements to operate at LOS E or F in at least one of the peak hours. For left-turns operating poorly at unsignalized intersections, this is primarily due to the high traffic volume on the major streets (e.g. Kapolei Parkway) and limited number of gaps for vehicles at the stop-controlled movement to make left-turns.

6.2 POTENTIAL TRAFFIC IMPROVEMENTS

Potential traffic improvements were developed to increase the capacity and/or efficiency of the roadway system at the locations where the addition of project-related traffic would cause or contribute to poor operating conditions. The emphasis was to identify physical and/or operational improvements that could be implemented within the existing or planned roadway rights-of-way.

The potential measures to address the identified traffic impacts are described in this chapter. Each of the initially identified impacts would be reduced such that future operations would be at the minimum desired LOS (LOS D) for the overall intersection with the project in place, or better than the Near Term (2020) Baseline Conditions if LOS D cannot be obtained with significant Right-of-Way (ROW) impacts to the roadway. Although TRB and HDOT strive to maintain LOS D or better conditions at the movement level, measures to improve turning movement operations are only proposed where feasible and appropriate from a traffic engineering perspective since adding lanes or signal control just to achieve the desired LOS for a particular movement also has secondary negative impacts to the environment and to active transportation modes.

The full range of improvements that address both project-related and/or cumulative traffic impacts are discussed in detail below.

INTERSECTION 5: KAPOLEI PARKWAY / KALAELOA BOULEVARD (CUMULATIVE IMPACT)

Significantly impacted with any development on Parcels 1, 2, or 3

This intersection operates at LOS F in the PM peak hour under Existing and Near Term (2020) Baseline Conditions. The addition of project trips (Parcel 1, Parcels 1 and 2, and Parcels 1, 2, and 3) would exacerbate LOS F operations under all six project scenarios (i.e. Residential Parcel 1, Residential Parcels 1 and 2,Residential Parcels 1, 2, and 3, Mixed-Use Parcel 1, Mixed-Use Parcels 1 and 2, and Mixed-Use Parcels 1, 2, and 3).

<u>Recommended Improvement:</u> Construct a second Diamond Head bound left-turn lane on Kapolei Parkway and optimize signal cycle length and splits.

The existing roadway width on Kapolei Parkway is sufficient to add a second Diamond Head bound left-turn lane. This would be achieved by removing the existing landscaped median on the ewa and repaving a new left turn lane. The additional capacity for the Diamond Head approach would improve operations to

LOS E in the PM peak hour under all six project scenarios, which does not meet the LOS D requirement, but is an improvement from Existing and Near Term (2020) Baseline Conditions.

Figure 25 shows a schematic of the proposed mitigations at this intersection.

INTERSECTION 6: KAPOLEI PARKWAY / KAMOKILA BOULEVARD (PROJECT-SPECIFIC IMPACT)

Significantly impacted under Parcel 1 and 2 conditions and Parcel 1, 2, and 3 conditions.

This intersection operates at LOS C in both AM and PM peak hours, under Near Term (2020) Baseline Conditions. The addition of Parcels 1 and 2project trips would degrade operations to undesirable LOS E during the AM peak hours.

Recommended improvement: Optimize signal cycle length and splits to accommodate for new demand volumes at the intersection.

Parcels 1 and 2add 274vehicle trips in the AM peak hour to the mauka-bound approach at the Kapolei Parkway/Kamokila Boulevard intersection with the 1,500-unit Residential Development and 295 vehicle trips with the Mixed-Use Development. The addition of project traffic exacerbates the poor mauka-bound left movement, and degrades the overall intersection operations to undesirable LOS E for both the Residential and Mixed-Use developments. Re-optimizing the signal is recommended to increase the cycle length and re-distribute splits to accommodate the additional vehicle demand and ameliorate vehicle delay at this intersection to LOS C in the AM PM peak hour for the Residential Development and LOS D for both AM and PM peak hours for the Mixed-Use Development.

Figure 26 shows a schematic of the proposed mitigations at this intersection.

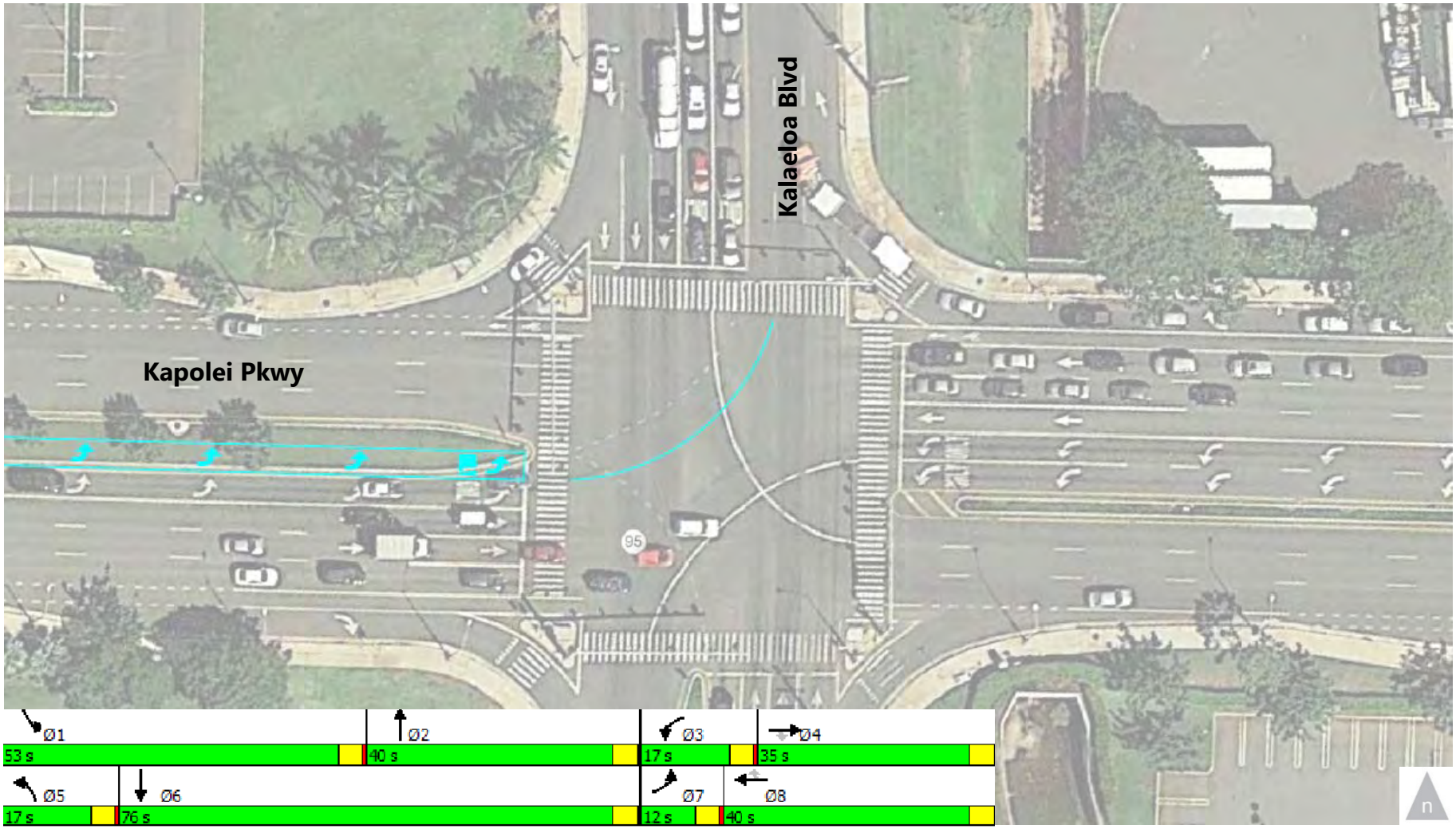
INTERSECTION 7: KAPOLEI PARKWAY / WAKEA STREET (CUMULATIVE IMPACT)

Significantly impacted with any development on Parcels 1, 2, or 3.

This intersection operates at LOS E in both AM and PM peak hours, under Near Term (2020) Baseline Conditions. The addition of Residential project trips in Parcel 1 would exacerbate LOS E and F operations in the AM and PM peak hours, respectively. The addition of Parcels 1 and 2, Parcels 1, 2, and 3 for the Residential Development would exacerbate LOS F operations for both AM and PM peak hours. For the Mixed-Use Development, the addition of project trips (Parcel 1, Parcels 1 and 2, Parcels 1, 2, and 3) would exacerbate LOS F operations in both AM and PM peak hours.

CONSTRUCT A SECOND DIAMOND HEAD-BOUND LEFT TURN LANE ON KAPOLEI PKWY AND OPTIMIZE SIGNAL TIMING AND CYCLE LENGTH

Impacted w/ any development of Parcels 1, 2, or 3 under both the Residential and Mixed-Use project alternatives



Conceptual plan only – not for construction

Figure 25

CONSTRUCT A SECOND MAUKA-BOUND LEFT TURN LANE ON KAMOKILA BLVD AND OPTIMIZE SIGNAL TIMING AND CYCLE LENGTH

Impacted w/ development of Parcels 2 or 3 under both the Residential and Mixed-Use project alternatives

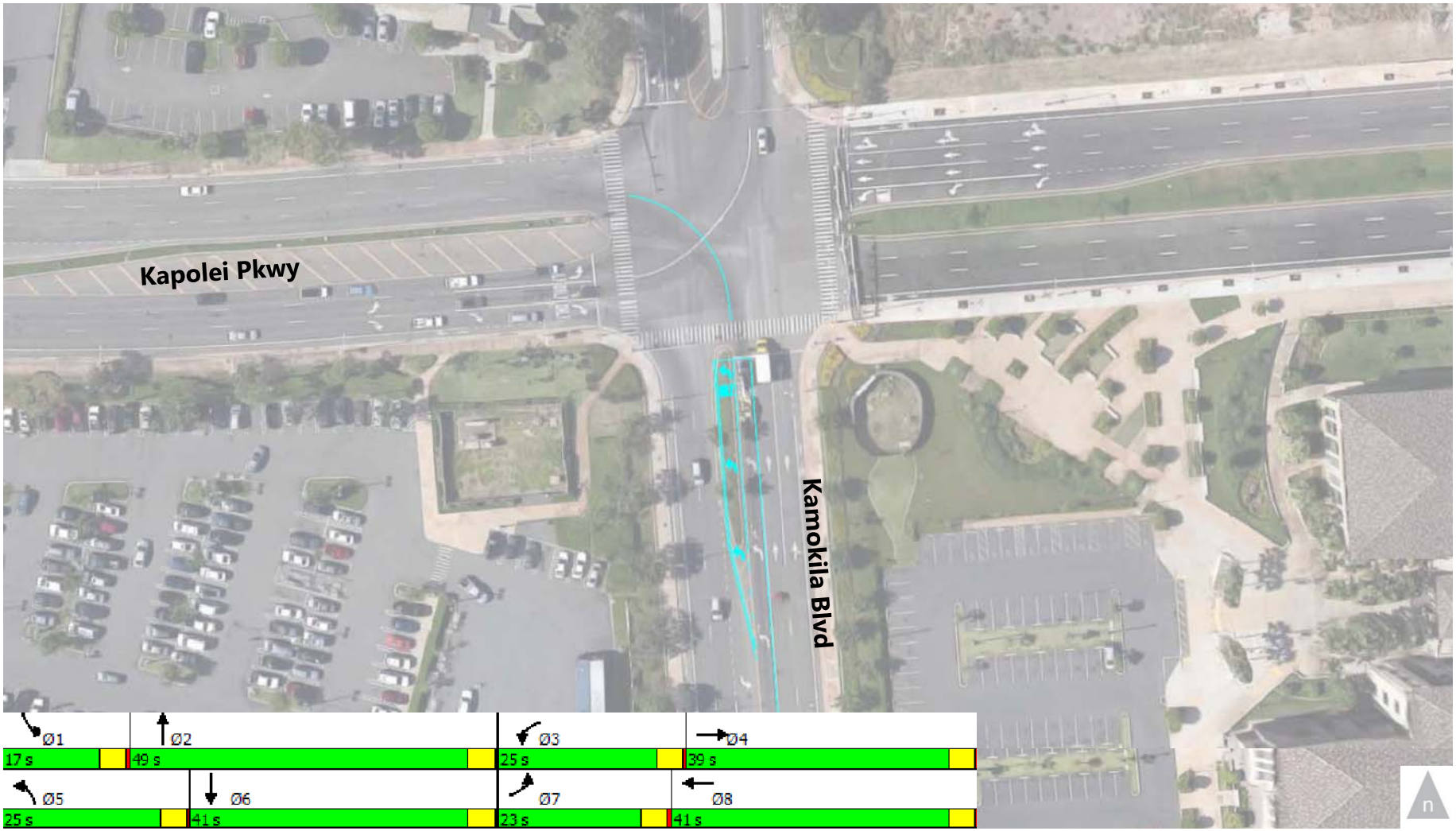


Figure 26

6. Kapolei Parkway/Kamokila Boulevard Mitigation

Recommended improvement: Install a traffic signal.

A preliminary traffic signal warrant analysis was evaluated at this intersection. The 2009 edition of the *Manual of Uniform Traffic Control Devices* (MUTCD, Federal Highway Association) identifies several warrants by which the need for a traffic signal can be evaluated. The MUTCD signal warrant 3 (Peak hour) is satisfied for the Kapolei Parkway/Wakea Street intersection in the PM peak hour under all six project scenarios. However, even when a peak-hour signal warrant is satisfied, the decision to install a signal should not be based solely upon this factor. The City & County of Honolulu Department of Transportation Services (DTS) should regularly monitor traffic conditions and accident data, and evaluate the full set of warrants to prioritize and program this intersection for signalization. Installing a traffic signal at this intersection would improve operations to LOS A in the AM and PM peak hours under all six project scenarios.

Figure 27 shows a schematic of the proposed mitigations at this intersection.

INTERSECTION 8: KAPOLEI PARKWAY / FORT BARRETTE ROAD (CUMULATIVE IMPACT)

Significantly impacted with any development on Parcels 1, 2, or 3.

This intersection operates at LOS F in both AM and PM peak hours, under Existing and Near Term (2020) Baseline Conditions. The addition of project trips (Parcel 1, Parcels 1 and 2, Parcels 1, 2, and 3) would exacerbate operations to LOS F during both the AM and PM peak hours for both the 1,500-unit Residential Development and the Mixed-Use Development.

Recommended improvement: Restripe Kapolei Parkway to provide a separate left-turn lane and second through lane on both the ewa-bound and Diamond Head-bound approaches, and modify the signal (including optimization) to provide protected left-turn phasing on Kapolei Parkway.

The existing roadway width is sufficient to add a second through lane for the ewa-bound and Diamond Head-bound approaches on Kapolei Parkway, which would increase vehicle throughput this facility and improve intersection operations. Additionally, in lieu of the existing split phasing on Kapolei Parkway, protected left-turn phasing would improve signal operations by more efficiently distributing green time amongst all approaches. This modification would improve operations to LOS E in the AM and PM peak hours under all six project scenarios, which does not meet the LOS D requirement, but is an improvement from Existing and Near Term (2020) Baseline Conditions.

Figure 28 shows a schematic of the proposed mitigations at this intersection.

INSTALL A TRAFFIC SIGNAL

Impacted w/ any development of Parcels 1, 2, or 3 under both the Residential and Mixed-Use project alternatives

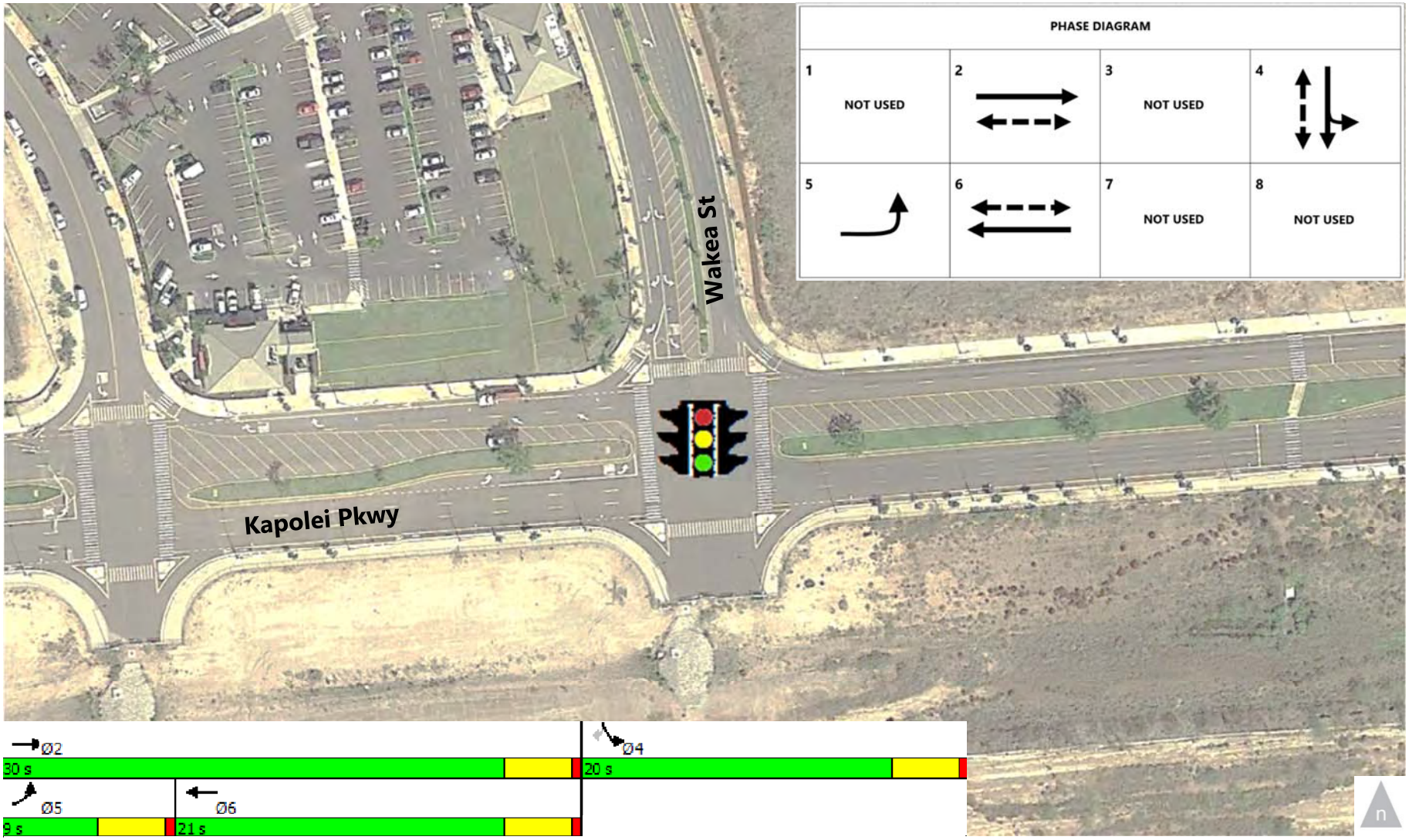
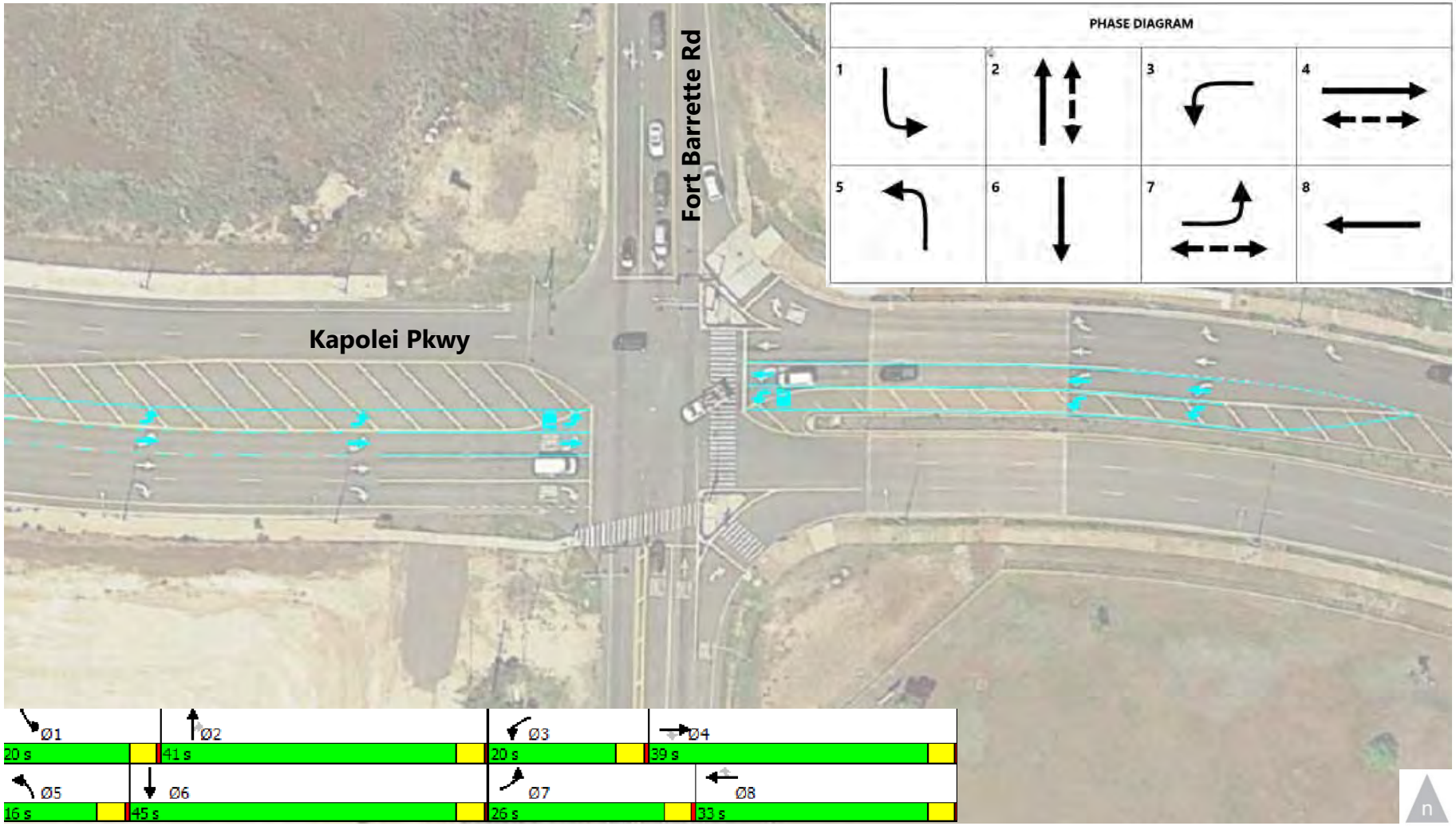


Figure 27

7. Kapolei Parkway/Wakea Street Mitigation

RESTRIPE EWA-BOUND AND DH-BOUND ON KAPOLEI PKWY. PROVIDE LEFT-TURN PROTECTED SIGNAL PHASING ON KAPOLEI PKWY AND OPTIMIZE SIGNAL TIMING.

Impacted w/ any development of Parcels 1, 2, or 3 under both the Residential and Mixed-Use project alternatives



Conceptual plan only – not for construction

Figure 28

8. Kapolei Parkway/Fort Barrette Road Mitigation

INTERSECTION 9: ROOSEVELT AVENUE / KAMOKILA BOULEVARD (PROJECT-SPECIFIC IMPACT)

Significantly impacted under Parcel 1 and 2 and Parcel 1, 2, and 3 conditions for the 1,500-unit Residential Development, and with any development on Parcels 1, 2, and 3 for the Mixed-Use Development.

This intersection operates at LOS C in the AM and PM peak hours under Near Term (2020) Baseline Conditions. The addition of the Residential Development Parcels 1 and 2 would degrade operations to LOS E and LOS F in the AM peak hour and PM peak hour, respectively, and the addition of the Residential Development Parcels 1, 2, and 3 project trips would degrade operations to LOS F in the AM and PM peak hours. The addition of the Mixed-Use Development Parcel 1 would degrade operations to LOS E in the AM and PM peak hours, and the addition of the Mixed-Use Development Parcels 1 and 2, and Parcels 1, 2, and 3 project trips would degrade operations to LOS F in the AM and PM peak hours.

<u>Recommended Improvement:</u> Install a traffic signal.

A preliminary traffic signal warrant analysis was evaluated at this intersection. The 2009 edition of the *Manual of Uniform Traffic Control Devices* (MUTCD, Federal Highway Association) identifies several warrants by which the need for a traffic signal can be evaluated. The MUTCD signal warrant 3 (Peak hour) is satisfied for the Roosevelt Avenue/Kamokila Boulevard intersection in the AM peak hour under all six project scenarios and in the PM peak hour under five project scenarios (all except for Residential Parcel 1). However, even when a peak-hour signal warrant is satisfied, the decision to install a signal should not be based solely upon this factor. The City & County of Honolulu Department of Transportation Services (DTS) should regularly monitor traffic conditions and accident data, and evaluate the full set of warrants to prioritize and program this intersection for signalization.

Installing a traffic signal at this intersection would improve operations to LOS C or better in the AM and PM peak hours under Parcels 1, 2, and 3 conditions

Figure 29 shows a schematic of the proposed mitigations at this intersection.

INSTALL A TRAFFIC SIGNAL

Impacted w/ any development of Parcels 1, 2, or 3 under both Mixed-Use and Residential project alternatives

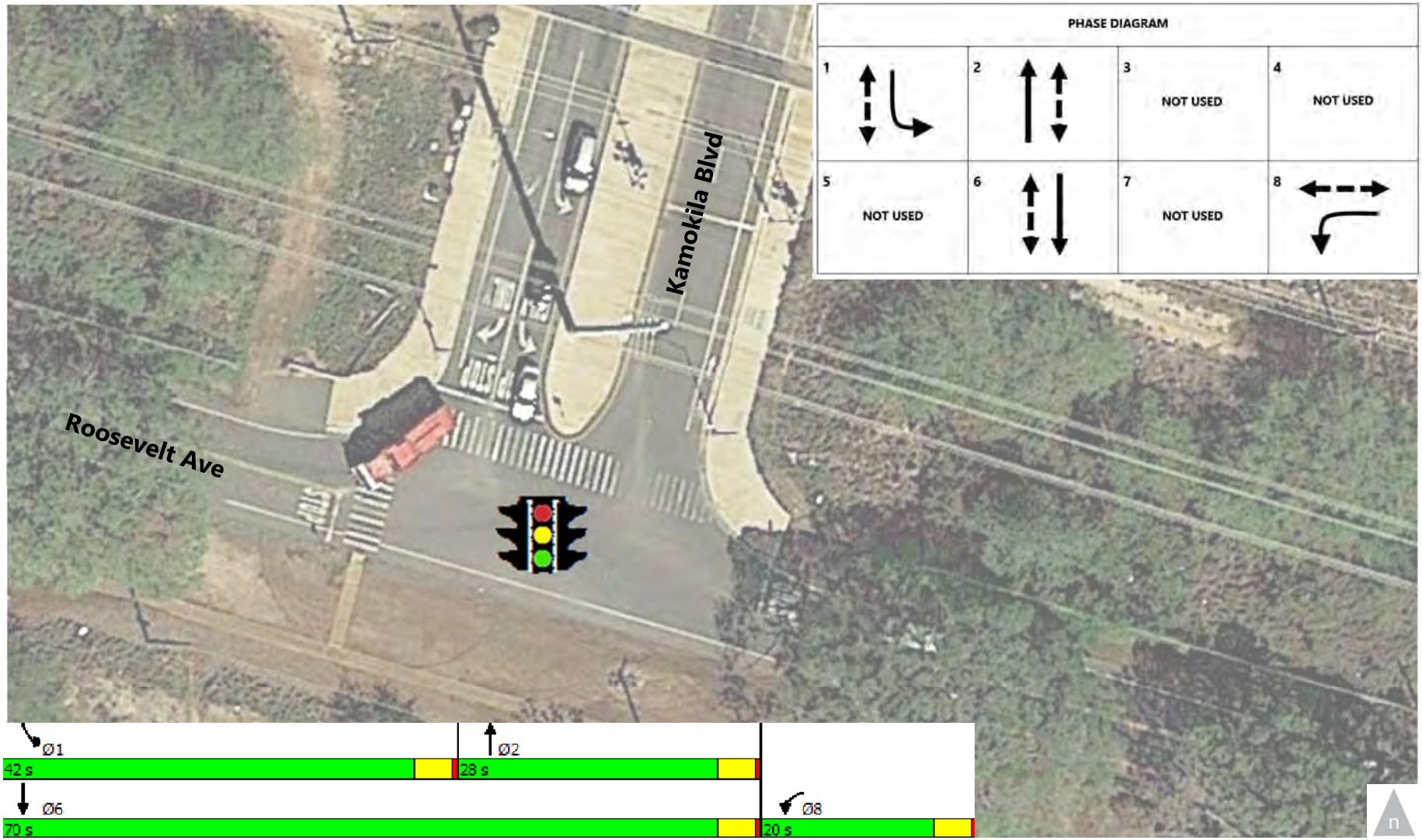


Figure 29

9. Roosevelt Avenue/Kamokila Boulevard Mitigation

INTERSECTION 10: ROOSEVELT AVENUE / COPAHEE AVENUE (PROJECT-SPECIFIC IMPACT)

Significantly impacted under Parcels 1 and 2, and Parcels 1, 2, and 3 conditions for only the Mixed-Use Development.

This mauka-bound left-turn movement at this unsignalized intersection operates at LOS C and B in the AM and PM peak hour, respectively, under Near Term (2020) Baseline Conditions. The addition of Parcels 1 and 2 and Parcels 1, 2, and 3 project trips would degrade operations to LOS F in the AM and PM peak hours for the Mixed-Use Development.

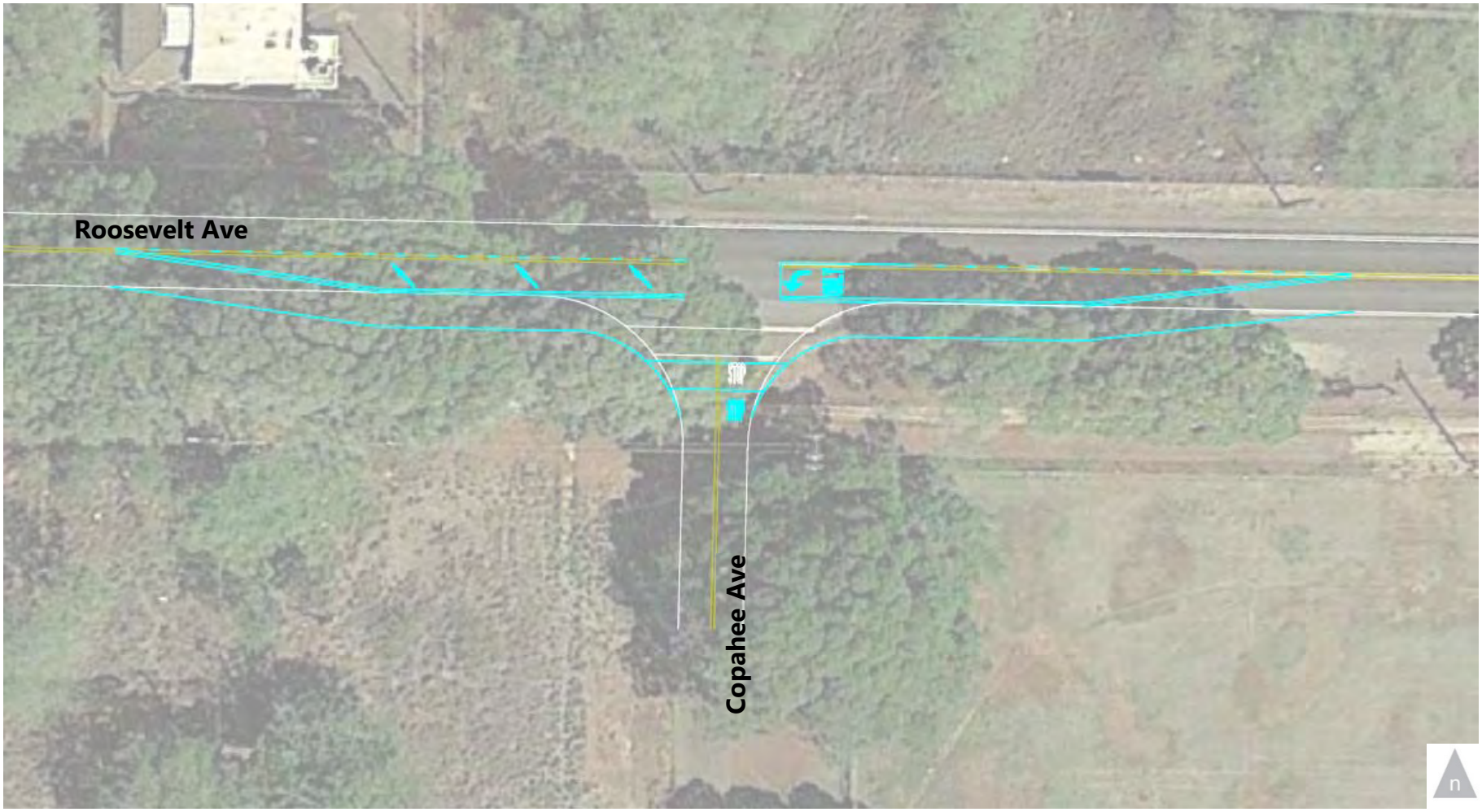
Recommended Improvement: Widen Roosevelt Avenue to provide a refuge island median for the mauka-bound left-turn storage and an ewa-bound merge lane.

A preliminary traffic signal warrant analysis was evaluated at this intersection. The MUTCD signal warrant 3 (peak hour) is satisfied for the Roosevelt Avenue / Copahee Avenue intersection in the AM and PM peak hours under the Mixed-Use Development Parcels 1 and 2 scenario and the Mixed-Use Development Parcels 1, 2, and 3 scenario. However, analysis implies that without installing a signal at this intersection, a refuge area will allow vehicles on the minor street yielding movement (i.e. Copahee Avenue mauka-bound left-turn) to only have to wait for gaps in one direction of traffic at a time, thus reducing overall delay for that approach. Therefore, adding a refuge island median on Roosevelt Avenue would improve the side-street operations to LOS D in the AM and PM peak hours for the Mixed-Use Parcels 1, 2, and 3 conditions. This improvement would be similar to the configuration at the Roosevelt Avenue/Coral Sea Road intersection.

Figure 30 shows a schematic of the proposed mitigations at this intersection.

WIDEN ROOSEVELT AVENUE EWA OF COPAHEE AVE TO PROVIDE A REFUGE ISLAND MEDIAN FOR THE MAUKA-BOUND LEFT-TURN MOVEMENT

Impacted w/ development of Parcels 2 or 3 under the Mixed-Use project alternatives



Conceptual plan only – not for construction

Figure 30

10. Roosevelt Avenue/Copahee Avenue Mitigation

INTERSECTION 12: FORT BARRETTE ROAD-ENTERPRISE STREET / ROOSEVELT AVENUE (CUMULATIVE IMPACT)

Significantly impacted with any development on Parcels 1, 2, or 3.

This intersection operates at LOS F in the AM and PM peak hours, under Near Term (2020) Baseline Conditions. The addition of project trips (Parcel 1, Parcels 1 and 2, Parcels 1, 2, and 3) would degrade operations to LOS F in the AM and PM peak hours under all six project scenarios.

Recommended Improvements: Install a signal.

A preliminary traffic signal warrant analysis was evaluated at this intersection. The 2009 edition of the *Manual of Uniform Traffic Control Devices* (MUTCD, Federal Highway Association) identifies several warrants by which the need for a traffic signal can be evaluated. The MUTCD signal warrant 3 (Peak hour) is satisfied for the Fort Barrette Road-Enterprise Street/Roosevelt Avenue intersection in the AM and PM peak hours under all six project scenarios. However, even when a peak-hour signal warrant is satisfied, the decision to install a signal should not be based solely upon this factor. The City & County of Honolulu Department of Transportation Services (DTS) should regularly monitor traffic conditions and accident data, and evaluate the full set of warrants to prioritize and program this intersection for signalization.

Installing a traffic signal at this intersection would improve operations to LOS D or better in the AM and PM peak hours under Parcels 1, 2, and 3 conditions for both the 1,500-unit Residential Development and the Mixed-Use Development.

Figure 31 shows a schematic of the proposed mitigations at this intersection.

Table 10 summarizes the impacted intersection LOS and the LOS with proposed recommendations.

As noted in Chapter 5.4, the Kamokila Boulevard extension, makai of Roosevelt Avenue, and Roosevelt Avenue Diamond Head of Kamokila Boulevard was assumed to be two-lane roadways with the proposed projects. Project traffic is expected to be accommodated on these two-lane roadways, but are constrained at the adjacent intersections (i.e., Roosevelt Avenue/Kamokila Boulevard and Fort Barrette Road-Enterprise Street/Roosevelt Avenue). However, the project mitigations identified above (installing traffic signals) would improve operations on Kamokila Boulevard, Roosevelt Avenue, and Fort Barrette Road and enhance vehicular flow around the project site.

INSTALL A TRAFFIC SIGNAL

Impacted w/ any development of Parcels 1, 2, or 3 under both Mixed-Use and Residential project alternatives

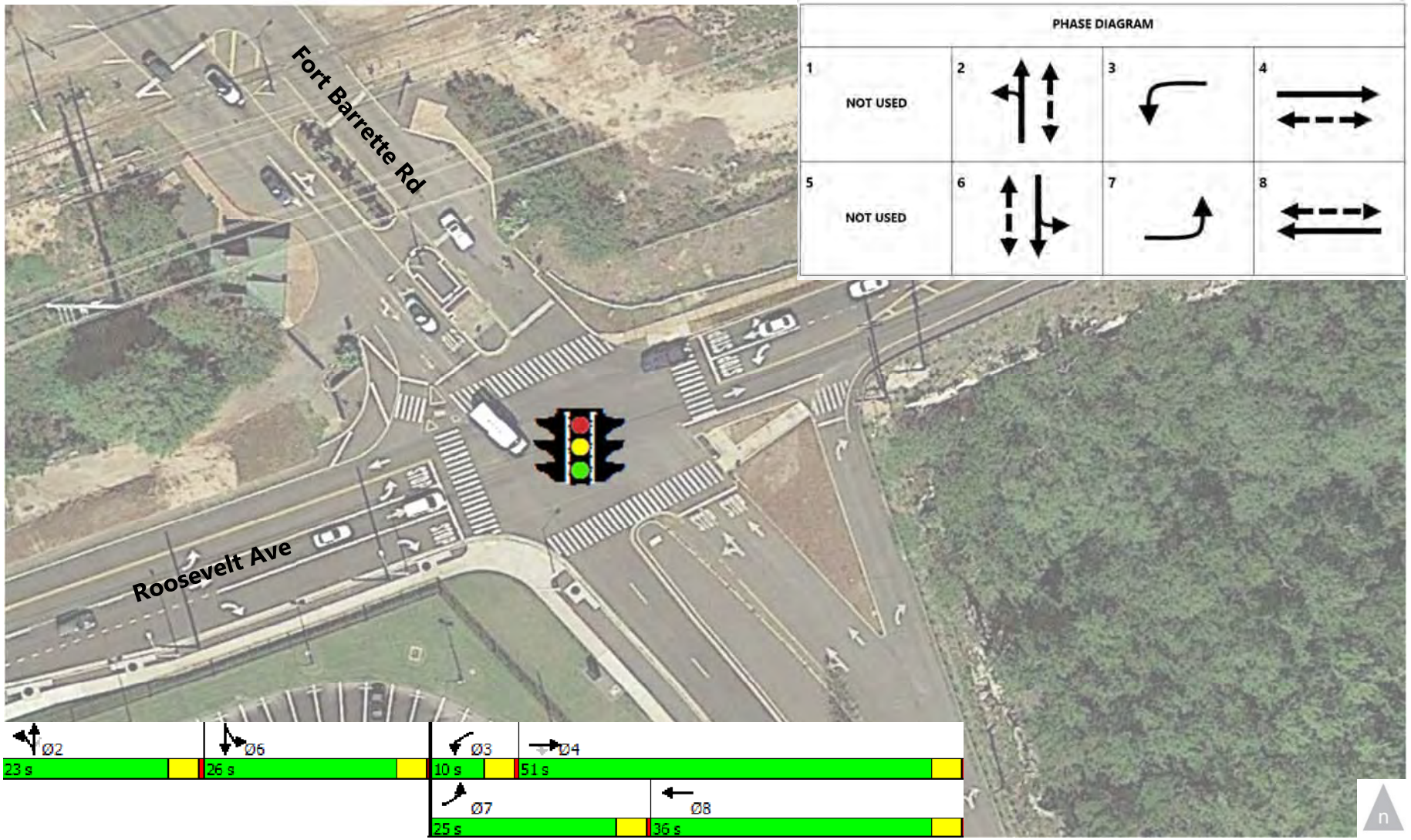


Figure 31

12. Fort Barrette Road/Roosevelt Avenue Mitigation

TABLE 10: NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Near Term Baseline		Near Term Plus Parcel 1[1]		Near Term Plus Parcel 1 w/ Mitigations[1]		Near Term Plus Parcels 1 & 2[1]		Near Term Plus Parcels 1 & 2 w/ Mitigations[1]		Near Term Plus Parcels 1, 2, & 3[1]		Near Term Plus Parcels 1, 2, and 3 w/ Mitigations[1]	
		Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]
5. Kapolei Pkwy / Kalaeloa Blvd	AM	26.3	C	27.6	C	27.3	C	28.3	C	28.1	C	29.0	C	28.7	C
	PM	**91.0**	**F**	***93.8***	***F***	65.6	**E**	***95.8***	***F***	67.9	**E**	***100.2***	***F***	72.8	**E**
6. Kapolei Pkwy / Kamokila Blvd	AM	27.6	C	53.9	D	N/A		***73.3***	***E***	26.9	C	***90.9***	***F***	28.6	C
	PM	26.1	C	42.5	D			49.8	D	32.2	C	***58.7***	***E***	35.5	D
7. Kapolei Pkwy / Wakea St	AM	**41.5**	**E**	***73.3***	***F***	7.5	A	***87.6***	***F***	7.7	A	***89.8***	***F***	7.7	A
	PM	**44.1**	**E**	***74.2***	***F***	6.7	A	***83.4***	***F***	6.8	A	***90.5***	***F***	6.9	A
8. Fort Barrette Rd / Kapolei Pkwy	AM	**140.4**	**F**	***186.5***	***F***	74.0	**E**	***189.7***	***F***	77.0	**E**	***192.9***	***F***	79.4	**E**
	PM	**185.5**	**F**	***214.5***	***F***	51.5	D	***218.9***	***F***	59.0	**E**	***230.4***	***F***	75.6	**E**
9. Roosevelt Ave / Kamokila Blvd	AM	16.3	C	***35.8***	***E***	14.7	B	***58.2***	***F***	16.6	B	***73.9***	***F***	18.9	B
	PM	23.9	C	***36.7***	***E***	20.6	C	***70.5***	***F***	24.3	C	***106.3***	***F***	28.3	C
10. Roosevelt Ave / Copahee Ave	AM	16.5	C	33.2	D	N/A		***61.0***	***F***	24.9	C	***76.7***	***F***	26.7	D
	PM	14.1	B	22.8	C			***57.8***	***F***	23.4	C	***61.8***	***F***	26.8	D
12. Fort Barrette Rd-Enterprise St / Roosevelt Ave	AM	**95.2**	**F**	***119.9***	***F***	31.3	C	***144.0***	***F***	38.9	D	***171.4***	***F***	49.2	D
	PM	**91.4**	**F**	***122.2***	***F***	27.7	C	***146.3***	***F***	32.6	C	***207.5***	***F***	47.1	D

Source: Fehr & Peers, 2017

TABLE 10: NEAR TERM (2020) PLUS PROJECT INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Near Term Baseline		Near Term Plus Parcel 1[1]		Near Term Plus Parcel 1 w/ Mitigations[1]		Near Term Plus Parcels 1 & 2[1]		Near Term Plus Parcels 1 & 2 w/ Mitigations[1]		Near Term Plus Parcels 1, 2, & 3[1]		Near Term Plus Parcels 1, 2, and 3 w/ Mitigations[1]	
		Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]	Delay (sec/ veh)[2]	LOS[3,4]

Notes:

[1] Mixed-Use Development conditions were applied as these are the more conservative results.

[2] Whole intersection weighted average stopped delay expressed in seconds per vehicle for signalized and all-way stop-controlled intersections. The vehicular delay for the worst movement is reported for side-street stop-controlled intersections.

[3] LOS calculations performed using the *Highway Capacity Manual (HCM) 2010* method. LOS for side street stop-controlled (SSSC) intersections is worst-case movement. Other uncontrolled movements generally operate well with limited delay.

[4] Undesired LOS and corresponding seconds of delay per vehicle are highlighted in **bold.** ***LOS*** represent project impact.
N/A = Not Applicable. No mitigation necessary.

6.3 WAKEA STREET EXTENSION

The Wakea Street extension is a planned roadway improvement that will extend Wakea Street from its existing terminus at Kapolei Parkway in the makai direction to connect to Roosevelt Avenue. This improvement would provide a direct connection for residents in Kalaeloa to the H-1 freeway. The Wakea Street extension will provide a parallel makai-mauka roadway to Kamokila Boulevard and Fort Barrette Road and better distribute traffic through the Kapolei and Kalaeloa communities. An existing discontinuous segment of the extension currently exists between Kapolei Parkway and the ORL right-of-way.

DPP requested that this study analyze if the Wakea Street extension would be needed to accommodate project-generated traffic. The metric for this evaluation is when traffic operations at the Fort Barrette Road-Enterprise Street/Roosevelt Avenue and Roosevelt Avenue/Kamokila Boulevard intersections would degrade below desirable levels (LOS D or better). This analysis revealed that under Near Term (2020) Baseline Conditions, the Fort Barrette Road-Enterprise Street/Roosevelt Avenue would operate at an undesirable level (i.e. LOS F) without and with the project. In addition, operations at the Kamokila Boulevard/Roosevelt Avenue would degrade from LOS D or better to LOS E or F with either development alternative (except for Parcel 1 only under the 1,500 Residential Unit alternative). However, the project would be able to mitigate its impacts at both of these locations by contributing to the installation of traffic signals at each intersection. Accordingly, implementation of this proposed project mitigation would maintain peak hour traffic operations at LOS D or better through project buildout, and the need for the Wakea Street extension would not be warranted with the Parcel 1, 2 and 3 development.

It should be noted that under Near Term (2020) Plus Parcels 1, 2, and 3, the project's proposed mitigation would improve operations at the Fort Barrette Road-Enterprise Street/Roosevelt Avenue intersection to LOS D in the AM peak hour. In the future, as traffic continues to grow in the study area due to upcoming developments, operations of the proposed traffic signal at this location will degrade below LOS D and additional capacity serving the Kalaeloa area will be required. Additional improvements at the Fort Barrette Road-Enterprise Street/Roosevelt Avenue and Roosevelt Avenue/Kamokila Boulevard intersections are not expected to be feasible due to right-of-way constraints. Therefore, as development increases in the Kalaeloa area beyond development of Parcels 1, 2 and 3 (regardless of the project alternative), the Wakea Street extension would need to be implemented to provide an additional route to motorists in Kalaeloa and balance vehicle demand on the surrounding roadway network

7.0 ASSESSMENT OF SITE ACCESS AND CIRCULATION

The following chapter provides a summary of the site access, circulation, and parking with the proposed project. Vehicle access to Parcels 1, 2, and 3 are described below and illustrated on **Figure 18**.

Parcel 1:

- Full access driveway on Kamokila Boulevard (all-way stop controlled)
- Full access driveway on Copahee Avenue (side-street stop controlled)

Parcel 2:

- Partial access (right-turn outbound and left-turn and right-turn inbound) driveway on Saratoga Avenue (side-street stop controlled)
- Full access driveway on Tulagi Avenue (side-street stop controlled)

Parcel 3:

- Full access driveway on Hornet Avenue (side-street stop controlled)
- Full access driveway on Saratoga Avenue (all-way stop controlled)
- Full access driveway on Franklin Street (side-street stop controlled)
- Full access driveway on Roosevelt Avenue (side-street stop controlled)

The project driveways identified above are anticipated to serve primarily project trips given that Kamokila Boulevard and Saratoga Avenue are not expected to be major arterials. Therefore, based on the moderately low traffic volumes at these intersections and the sufficient spacing in between intersections, no traffic operations issues (e.g. queue spillbacks, sight distance issues, etc.) are anticipated to occur at any of the project driveways.

8.0 MULTI-MODAL ASSESSMENT

Consistent with State of Hawaii and City & County of Honolulu policies on Complete Streets, this chapter addresses any potential project impacts on all non-automobile modes of transportation, including existing and planned pedestrian, bicycle, and transit facilities. Based on the review of the site plan illustrated on **Figure 2 and 3** and the project description, the project would not cause any significant impact to the overall existing and planned external multi-modal transportation system of the Kalaeloa area. The project design will adhere to the policies and principles outlined in the City & County of Honolulu's Ordinance relating to Complete Streets (2012) as it maintains to provide safe mobility and access for all its residents and other users using all modes of transportation. It is further recommended that as the site plan is further refined, the Developer should consult with the State and City & County of Honolulu to design the internal roadway networks, cross sections, and access driveways in a manner that embraces the principles of Complete Streets.

8.1.1 PEDESTRIAN NETWORK

The proposed project follows new urbanist design principles that include an emphasis on walkability and connectivity through the pedestrian networks of the project site and of the Kapolei and Kalaeloa communities. Although the proposed project site plan does not illustrate the network of sidewalks within the individual parcels, the site plan does include sidewalks along Kamokila Boulevard, Saratoga Avenue, and Copahee Avenue, as well as an eight (8) foot multi-use path on the makai side of Roosevelt Avenue from Kamokila Boulevard to Franklin Street. These proposed pedestrian facilities would provide convenient and accessible linkages to schools and retail centers adjacent to the project site, which maximizes the relationship of the project to the rest of the Kapolei and Kalaeloa communities, and by nature reduce vehicle trip making and promote the use of non-motorized modes.

It is recommended that appropriate crossing treatments and traffic calming measures be provided where pedestrians will cross Kamokila Boulevard, Roosevelt Avenue, or Saratoga Avenue. Additionally, it is recommended that high-visibility crossing treatments be implemented at designated crossings from the project sites to the Barbers Point Elementary School.

8.1.2 BICYCLE NETWORK

The *Oahu Bike Plan* (August 2012) does plan for enhanced bicycle facilities to be implemented within the study area. The following are planned bicycle projects relevant to the project site and that would serve the study area:

- Bicycle lane on Saratoga Avenue from Kamokila Boulevard to Nassau Street
- Bicycle lane on Fort Barrette Road from Farrington Road to Roosevelt Avenue
- Bicycle Route on Enterprise Street from Roosevelt Avenue to Midway Street
- Bicycle lane on Roosevelt Avenue from Kamokila Boulevard to Geiger Road
- Bicycle path on Kapolei Parkway Diamond Head-bound between Kalaeloa Boulevard to Fort Barrette Road

No additional designated bicycle paths or lanes are necessary as part of project implementation. However, bicycle racks or secure storage should be provided within or near each set of major dwelling unit clusters on the site to encourage cycling by both residents and visitors and to provide a dedicated location for bike parking and secure storage.

8.1.3 TRANSIT NETWORK

While "The Bus" has no immediate plans to expand service in this area, as the Kalaeloa area develops, it will allow for the introduction of bus services along Kapolei Parkway and Roosevelt Avenue and this should be considered as the Honolulu Public Transit Authority plans for the future expansion of The Bus in the Kapolei region. Additionally, enhancements and amenities (i.e., benches or covered shelter) could be installed at any new bus stops to support future transit riders in the study area.

It is anticipated that by 2020, the Honolulu Rail Transit system will start operating the initial section from Kapolei to Aloha Stadium. The East Kapolei Station will be located at Kualaka`i Parkway and Keahumoa Parkway and will serve the Kapolei, Makakilo, Ewa Beach, and other outlying residential areas. The station will be located approximately one mile from the project site and will feature ADA pedestrian access, bicycle parking, a Kiss-and-Ride, and a Park & Ride with 900 spaces. Current plans are for trains to operate between 4:00 AM and midnight daily, with five-minute headways during peak travel times and 10 minute headways during off-peak hours. By the time the rail system is fully open in 2025, it will allow Kapolei residents to travel Diamond Head as far as Ala Moana Center in roughly 42 minutes.

Generally, the proposed project is not expected to substantially increase the walking, biking, or transit demand to a level where it could not be accommodated by existing or planned facilities. In addition, the

project is expected to enhance multi-modal facilities and services, especially with the promotion of the use of passive and active spaces and non-motorized modes. The project is also expected to not conflict with any existing facilities and planned improvements. Thus, the project's impacts to pedestrian, bicycle, and transit facilities and services are therefore considered *less-than-significant*.

APPENDIX A: TRAFFIC COUNT DATA

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

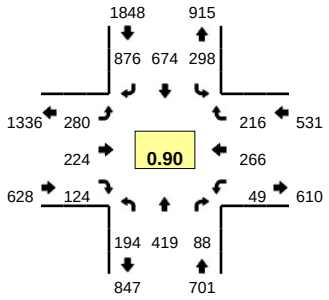
LOCATION: Makakilo Dr/Fort Barrette Rd -- Farrington Hwy

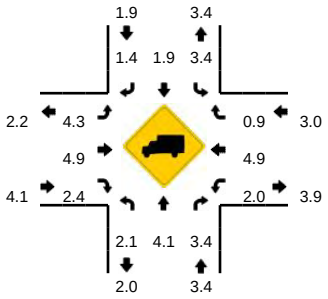
QC JOB #: 14567201

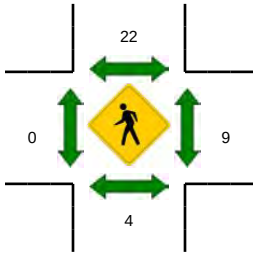
CITY/STATE: Kapolei, HI

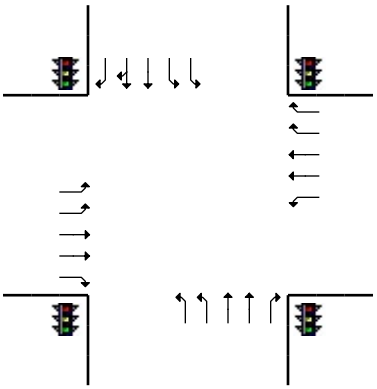
DATE: Wed, Nov 29 2017

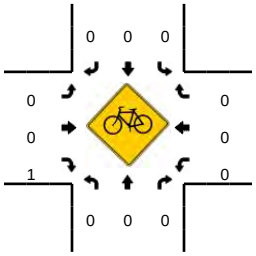
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

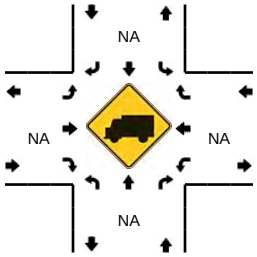


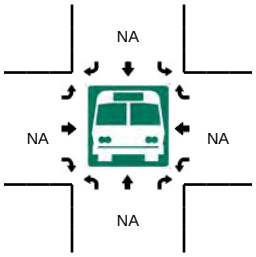












5-Min Count Period Beginning At	Makakilo Dr/Fort Barrette Rd (Northbound)				Makakilo Dr/Fort Barrette Rd (Southbound)				Farrington Hwy (Eastbound)				Farrington Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	5	20	4	0	22	38	43	0	12	12	7	0	1	14	19	0	197	
6:35 AM	16	16	8	0	14	35	47	0	7	12	8	0	2	11	13	0	189	
6:40 AM	8	15	6	0	19	40	34	0	17	20	11	0	1	18	14	0	203	
6:45 AM	8	24	4	0	16	51	43	0	13	9	12	0	0	18	12	0	210	
6:50 AM	12	18	5	0	14	41	66	0	17	19	9	0	4	12	10	0	227	
6:55 AM	12	16	3	0	26	34	47	0	13	9	7	0	1	23	20	0	211	
7:00 AM	12	29	7	0	10	51	50	0	18	17	11	0	1	19	22	0	247	
7:05 AM	4	36	6	0	12	53	51	0	24	9	9	0	2	22	26	0	254	
7:10 AM	9	27	1	0	17	58	72	0	17	16	15	0	3	10	24	0	269	
7:15 AM	11	36	7	0	30	75	71	0	10	10	7	0	0	19	32	0	308	
7:20 AM	19	10	7	0	29	42	62	0	25	22	14	0	9	24	22	0	285	
7:25 AM	12	29	5	0	26	70	78	0	20	15	8	0	10	23	16	0	312	2912
7:30 AM	10	38	4	0	10	70	74	0	22	14	16	0	5	18	17	0	298	3013
7:35 AM	17	41	12	0	42	76	92	0	21	21	13	0	5	13	19	0	372	3196
7:40 AM	19	34	6	0	39	41	64	0	18	15	8	0	3	33	16	0	296	3289
7:45 AM	11	47	13	0	25	74	94	0	28	22	12	0	5	15	16	0	362	3441
7:50 AM	27	27	5	0	41	47	78	0	19	17	7	0	0	24	13	0	305	3519
7:55 AM	13	49	8	0	7	70	87	0	35	24	11	0	3	22	15	0	344	3652
8:00 AM	27	43	8	0	24	42	75	0	18	19	8	0	3	19	16	0	302	3707
8:05 AM	19	18	6	0	19	22	34	0	29	22	8	0	0	34	16	0	227	3680
8:10 AM	9	47	7	0	6	45	67	0	35	23	12	0	6	22	18	0	297	3708
8:15 AM	25	42	8	0	13	44	51	0	24	19	13	0	1	15	21	0	276	3676
8:20 AM	15	18	3	0	8	23	51	0	39	27	10	0	2	21	14	0	231	3622
8:25 AM	17	39	6	0	16	51	52	0	34	15	13	0	6	9	18	0	276	3586

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	188	488	124	0	424	764	1000	0	268	232	132	0	52	244	204	0	4120
Heavy Trucks	4	24	4		28	20	8		12	20	4		4	12	4		144
Pedestrians		0				36				0				16			52
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

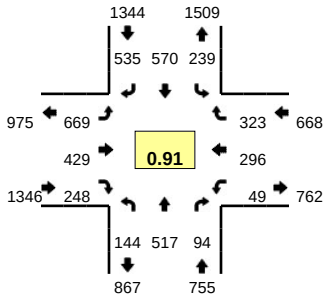
LOCATION: Makakilo Dr/Fort Barrette Rd -- Farrington Hwy

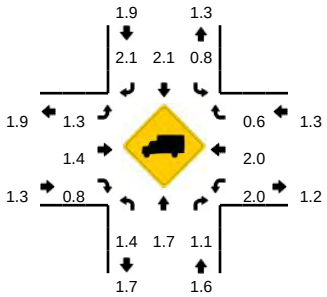
QC JOB #: 14567202

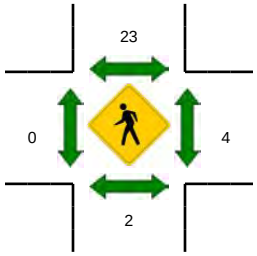
CITY/STATE: Kapolei, HI

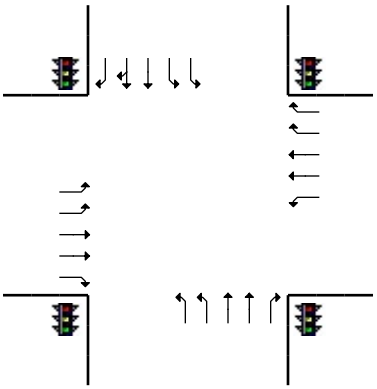
DATE: Wed, Nov 29 2017

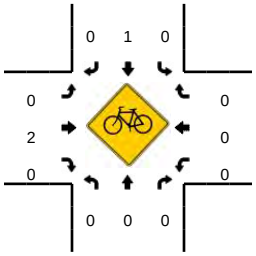
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:50 PM -- 5:05 PM

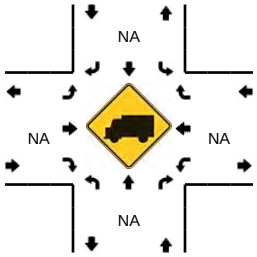


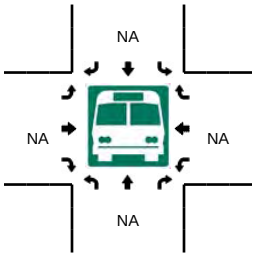












5-Min Count Period Beginning At	Makakilo Dr/Fort Barrette Rd (Northbound)				Makakilo Dr/Fort Barrette Rd (Southbound)				Farrington Hwy (Eastbound)				Farrington Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	6	33	6	0	10	23	52	0	49	32	18	0	7	29	28	0	293	
3:35 PM	22	28	5	0	23	37	47	0	45	26	15	0	6	52	32	0	338	
3:40 PM	14	73	6	0	18	67	60	0	42	26	15	0	4	21	34	0	380	
3:45 PM	14	30	6	0	14	47	45	0	78	39	27	0	6	22	19	0	347	
3:50 PM	11	45	13	0	7	34	40	0	74	22	26	0	4	18	33	0	327	
3:55 PM	25	42	2	0	27	28	53	0	40	23	24	0	6	44	24	0	338	
4:00 PM	13	74	10	0	25	69	62	0	42	27	24	0	4	17	15	0	382	
4:05 PM	12	35	5	0	8	44	50	0	66	47	22	0	12	28	34	0	363	
4:10 PM	9	33	6	0	15	40	37	0	68	43	16	0	1	18	19	0	305	
4:15 PM	12	40	7	0	27	46	42	0	46	28	11	0	5	28	27	0	319	
4:20 PM	18	74	4	0	14	59	57	0	36	22	18	0	5	21	22	0	350	
4:25 PM	11	32	8	0	12	39	54	0	62	32	18	0	11	17	23	0	319	4061
4:30 PM	10	27	2	0	12	42	44	0	45	39	13	0	1	16	19	0	270	4038
4:35 PM	17	17	6	0	30	40	45	0	32	40	22	0	3	37	30	0	319	4019
4:40 PM	5	36	12	0	15	71	62	0	46	26	20	0	1	18	22	0	334	3973
4:45 PM	9	47	18	0	20	38	45	0	52	47	23	0	9	22	31	0	361	3987
4:50 PM	6	46	6	0	16	45	42	0	93	42	23	0	1	18	23	0	361	4021
4:55 PM	26	41	7	0	33	36	34	0	50	39	15	0	3	46	29	0	359	4042
5:00 PM	16	87	11	0	14	77	55	0	51	26	23	0	5	14	28	0	407	4067
5:05 PM	11	28	7	0	18	38	26	0	90	45	21	0	4	22	22	0	332	4036
5:10 PM	4	41	5	0	16	39	39	0	63	32	22	0	8	23	40	0	332	4063
5:15 PM	18	34	8	0	23	35	35	0	32	24	18	0	6	42	34	0	309	4053
5:20 PM	8	67	2	0	27	71	62	0	41	31	29	0	6	24	31	0	399	4102
5:25 PM	14	46	10	0	15	38	46	0	74	38	19	0	2	14	14	0	330	4113

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	192	696	96	0	252	632	524	0	776	428	244	0	36	312	320	0	4508
Heavy Trucks	0	16	0		4	12	8		8	8	4		0	4	0		64
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

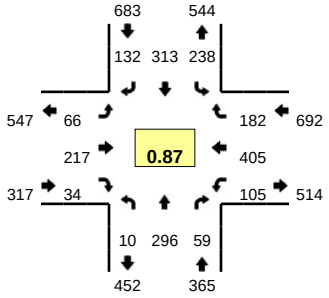
Type of peak hour being reported: Intersection Peak

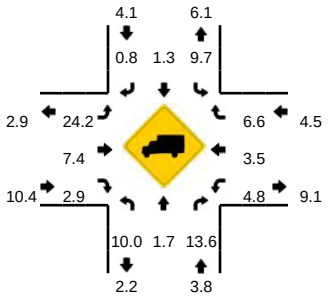
Method for determining peak hour: Total Entering Volume

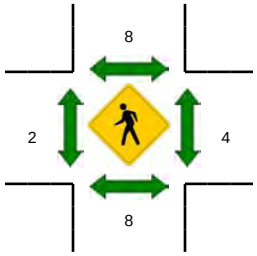
LOCATION: Wakea St -- Kamokila Dr
CITY/STATE: Kapolei, HI

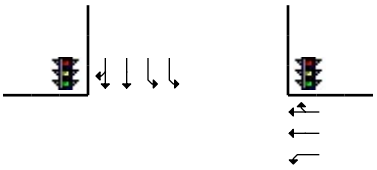
QC JOB #: 14567203
DATE: Wed, Nov 29 2017

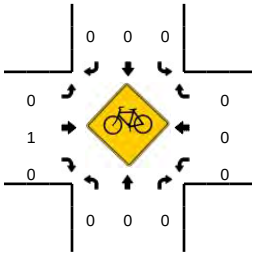
Peak-Hour: 7:25 AM -- 8:25 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

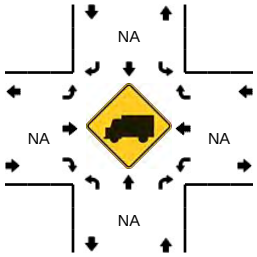


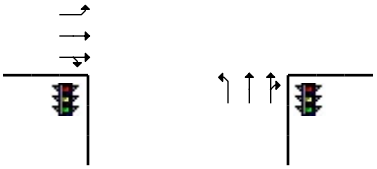


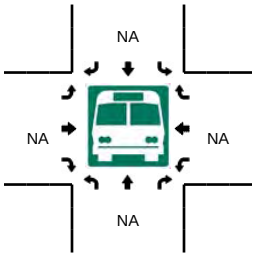












5-Min Count Period Beginning At	Wakea St (Northbound)				Wakea St (Southbound)				Kamokila Dr (Eastbound)				Kamokila Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	1	21	5	0	7	22	6	0	0	4	3	0	1	18	7	0	95	
6:35 AM	0	19	2	0	26	14	6	0	1	5	1	0	5	29	5	0	113	
6:40 AM	2	13	1	0	15	13	4	0	1	6	0	0	5	33	20	0	113	
6:45 AM	1	17	2	0	19	8	2	0	3	7	1	0	3	28	8	0	99	
6:50 AM	2	22	1	0	22	25	7	0	2	8	0	0	10	30	9	0	138	
6:55 AM	3	19	3	0	11	29	8	0	1	10	3	0	3	19	16	0	125	
7:00 AM	1	14	3	0	18	19	7	0	4	6	1	0	12	27	11	0	123	
7:05 AM	2	30	3	0	26	24	3	0	5	6	0	0	4	23	11	0	137	
7:10 AM	1	20	1	0	11	19	9	0	4	19	7	0	12	33	13	0	149	
7:15 AM	2	23	3	0	24	17	11	0	4	18	2	0	5	28	13	0	150	
7:20 AM	2	13	3	0	23	34	9	0	0	10	4	0	11	29	5	0	143	
7:25 AM	2	28	4	0	11	24	6	0	6	11	2	0	15	32	15	0	156	1541
7:30 AM	0	25	8	0	15	39	18	0	2	12	2	0	9	33	15	0	178	1624
7:35 AM	1	24	5	0	17	40	10	0	6	13	2	0	13	40	16	0	187	1698
7:40 AM	1	23	7	0	20	36	18	0	1	21	3	0	6	39	18	0	193	1778
7:45 AM	0	30	3	0	13	37	15	0	6	11	1	0	14	30	13	0	173	1852
7:50 AM	0	34	5	0	22	31	8	0	14	21	1	0	9	42	20	0	207	1921
7:55 AM	3	34	9	0	22	32	11	0	1	18	3	0	14	52	14	0	213	2009
8:00 AM	0	28	6	0	27	13	16	0	3	17	3	0	4	27	23	0	167	2053
8:05 AM	1	27	2	0	11	13	7	0	1	20	5	0	4	27	12	0	130	2046
8:10 AM	0	14	3	0	19	5	2	0	7	21	6	0	5	26	11	0	119	2016
8:15 AM	1	17	5	0	39	32	16	0	8	28	2	0	5	27	10	0	190	2056
8:20 AM	1	12	2	0	22	11	5	0	11	24	4	0	7	30	15	0	144	2057
8:25 AM	0	28	3	0	18	12	8	0	11	17	5	0	6	21	14	0	143	2044

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	392	68	0	228	400	136	0	84	200	20	0	148	496	188	0	2372
Heavy Trucks	4	4	4		36	12	0		40	16	0		4	24	0		144
Pedestrians		4				12				4				4			24
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

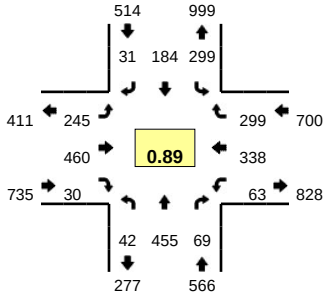
Type of peak hour being reported: Intersection Peak

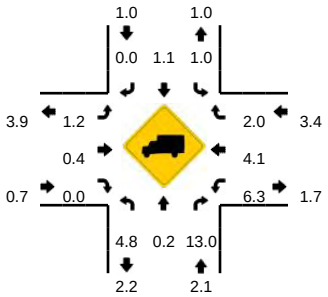
Method for determining peak hour: Total Entering Volume

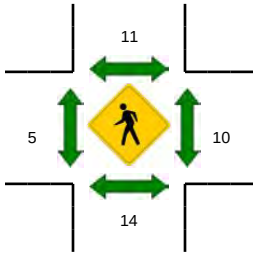
LOCATION: Wakea St -- Kamokila Dr
CITY/STATE: Kapolei, HI

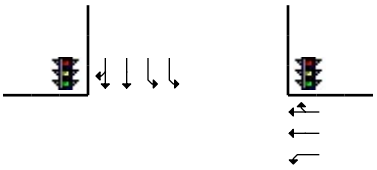
QC JOB #: 14567204
DATE: Wed, Nov 29 2017

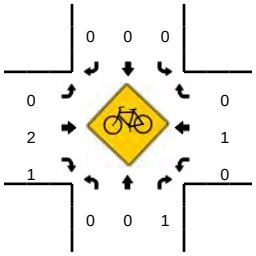
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

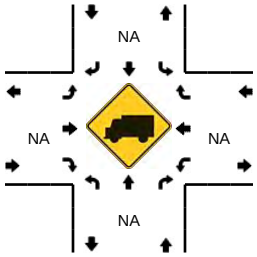


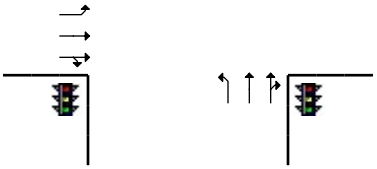


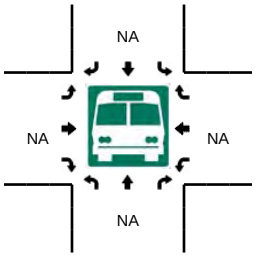












5-Min Count Period Beginning At	Wakea St (Northbound)				Wakea St (Southbound)				Kamokila Dr (Eastbound)				Kamokila Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	5	23	8	0	19	20	10	0	10	41	8	0	3	38	25	0	210	
3:35 PM	2	42	11	0	21	11	2	0	10	25	2	0	11	25	20	0	182	
3:40 PM	1	29	6	0	15	13	7	0	18	55	3	0	5	35	24	0	211	
3:45 PM	2	40	5	0	26	19	7	0	20	33	3	0	3	34	19	0	211	
3:50 PM	5	38	9	0	17	14	5	0	19	37	5	0	7	26	17	0	199	
3:55 PM	5	23	8	0	18	15	6	0	23	32	2	0	5	24	26	0	187	
4:00 PM	3	23	11	0	12	20	5	0	15	39	0	0	4	29	21	0	182	
4:05 PM	8	33	5	0	29	15	4	0	26	44	5	0	5	25	21	0	220	
4:10 PM	2	36	4	0	30	17	1	0	11	28	5	0	9	32	19	0	194	
4:15 PM	2	27	5	0	20	8	6	0	12	40	2	0	4	29	24	0	179	
4:20 PM	3	32	4	0	25	10	7	0	18	24	4	0	13	30	26	0	196	
4:25 PM	3	38	4	0	46	20	0	0	19	21	4	0	5	28	21	0	209	2380
4:30 PM	2	41	12	0	11	12	1	0	32	42	1	0	3	30	16	0	203	2373
4:35 PM	8	57	3	0	23	17	2	0	23	37	3	0	3	31	35	0	242	2433
4:40 PM	3	57	3	0	23	18	3	0	23	39	1	0	3	24	34	0	231	2453
4:45 PM	2	29	2	0	27	13	0	0	26	65	3	0	4	31	28	0	230	2472
4:50 PM	3	38	8	0	29	18	1	0	26	50	1	0	8	25	28	0	235	2508
4:55 PM	3	44	8	0	24	16	1	0	14	31	1	0	2	24	26	0	194	2515
5:00 PM	1	48	13	0	15	14	1	0	13	24	3	0	6	23	11	0	172	2505
5:05 PM	6	37	3	0	14	12	3	0	17	35	4	0	1	27	36	0	195	2480
5:10 PM	3	40	4	0	30	14	2	0	18	21	1	0	9	27	22	0	191	2477
5:15 PM	1	51	8	0	14	17	4	0	13	30	3	0	3	19	23	0	186	2484
5:20 PM	2	29	5	0	15	12	0	0	7	39	7	0	5	19	26	0	166	2454
5:25 PM	1	36	7	0	35	12	2	0	10	35	3	0	11	29	23	0	204	2449

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	572	32	0	292	192	20	0	288	564	28	0	40	344	388	0	2812
Heavy Trucks	0	0	4		0	0	0		8	4	0		0	16	8		40
Pedestrians		12				32				16				8			68
Bicycles	0	0	0		0	0	0		0	1	1		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

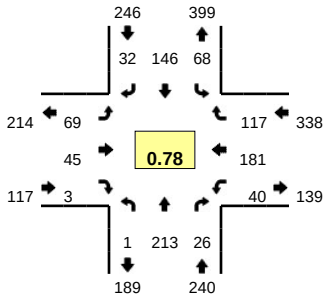
Type of peak hour being reported: Intersection Peak

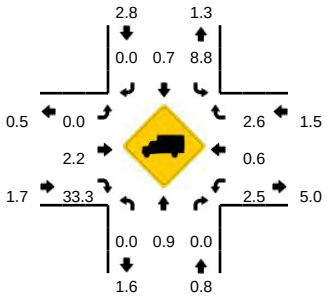
Method for determining peak hour: Total Entering Volume

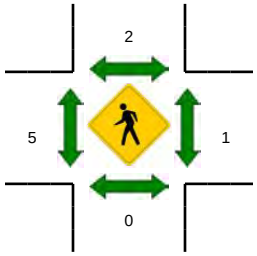
LOCATION: Wakea St -- Kama`aha Ave
CITY/STATE: Kapolei, HI

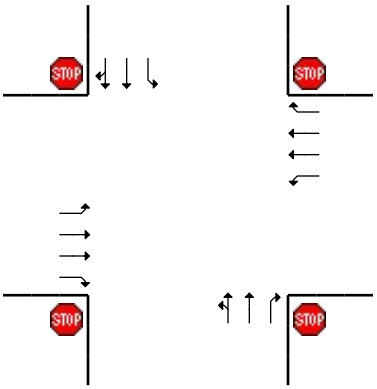
QC JOB #: 14567205
DATE: Wed, Nov 29 2017

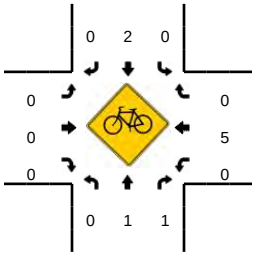
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

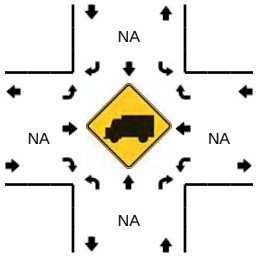


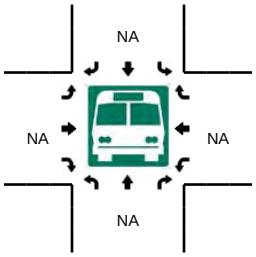












5-Min Count Period Beginning At	Wakea St (Northbound)				Wakea St (Southbound)				Kama`aha Ave (Eastbound)				Kama`aha Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	15	0	0	2	8	1	0	6	1	0	0	3	8	5	0	49	
6:35 AM	0	5	1	0	5	17	1	0	12	3	0	0	3	6	6	0	59	
6:40 AM	0	17	1	0	1	9	2	0	3	1	1	0	0	10	5	0	50	
6:45 AM	0	11	0	0	2	8	0	0	3	1	0	0	0	11	6	0	42	
6:50 AM	0	10	0	0	4	12	0	0	5	4	0	0	1	7	7	0	50	
6:55 AM	1	16	0	0	2	22	0	0	3	2	0	0	0	5	7	0	58	
7:00 AM	0	12	3	0	7	16	3	0	2	2	1	0	2	6	6	0	60	
7:05 AM	0	17	0	0	1	8	0	0	9	3	0	0	1	10	4	0	53	
7:10 AM	0	15	1	0	1	13	4	0	4	4	0	0	0	10	4	0	56	
7:15 AM	0	10	4	0	4	7	1	0	4	3	0	0	2	7	4	0	46	
7:20 AM	0	14	2	0	4	12	3	0	2	6	0	0	2	8	16	0	69	
7:25 AM	0	15	0	0	6	12	3	0	5	3	0	0	3	17	9	0	73	665
7:30 AM	0	20	2	0	9	19	2	0	3	2	0	0	1	11	10	0	79	695
7:35 AM	0	20	2	0	8	16	2	0	8	1	1	0	1	20	14	0	93	729
7:40 AM	0	25	1	0	8	11	3	0	6	4	0	0	5	21	16	0	100	779
7:45 AM	1	32	4	0	7	13	6	0	10	4	0	0	5	17	9	0	108	845
7:50 AM	0	17	5	0	7	13	2	0	9	1	0	0	5	21	14	0	94	889
7:55 AM	0	22	1	0	5	14	2	0	8	3	0	0	7	23	9	0	94	925
8:00 AM	0	10	3	0	4	6	2	0	4	6	0	0	4	17	8	0	64	929
8:05 AM	0	13	1	0	5	10	2	0	6	8	2	0	5	9	4	0	65	941
8:10 AM	0	12	3	0	5	5	1	0	3	5	1	0	3	4	6	0	48	933
8:15 AM	1	12	2	0	1	14	3	0	2	2	1	0	2	7	1	0	48	935
8:20 AM	0	9	5	0	2	4	1	0	6	7	0	0	4	9	2	0	49	915
8:25 AM	0	23	2	0	5	12	0	0	2	5	0	0	4	12	3	0	68	910

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	296	40	0	88	148	44	0	100	36	0	0	60	236	156	0	1208
Heavy Trucks	0	0	0		4	0	0		0	0	0		0	0	8		12
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	1	0		0	0	0		0	1	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

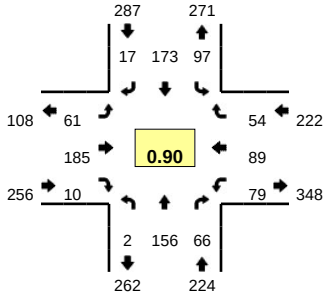
Type of peak hour being reported: Intersection Peak

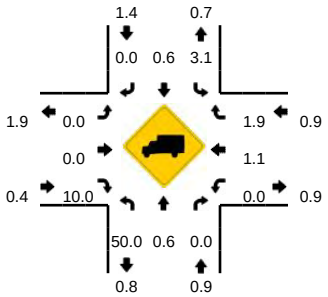
Method for determining peak hour: Total Entering Volume

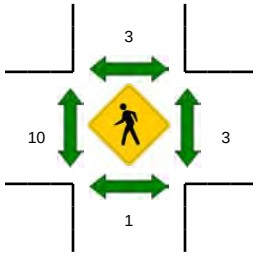
LOCATION: Wakea St -- Kama`aha Ave
CITY/STATE: Kapolei, HI

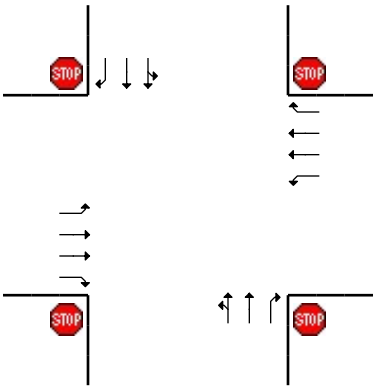
QC JOB #: 14567206
DATE: Wed, Nov 29 2017

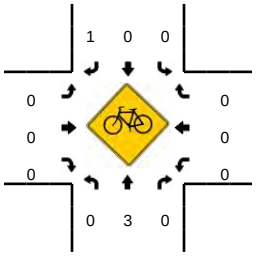
Peak-Hour: 3:45 PM -- 4:45 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

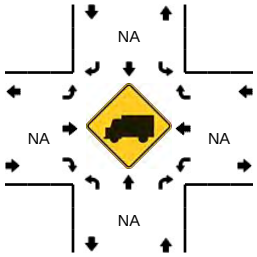


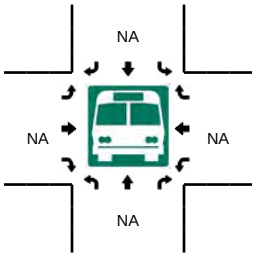












5-Min Count Period Beginning At	Wakea St (Northbound)				Wakea St (Southbound)				Kama`aha Ave (Eastbound)				Kama`aha Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	0	9	5	0	6	15	4	0	5	11	1	0	9	7	5	0	77	
3:35 PM	1	19	4	0	12	13	1	0	6	7	0	0	6	9	3	0	81	
3:40 PM	2	16	8	0	9	12	0	0	8	9	1	0	8	5	3	0	81	
3:45 PM	0	13	4	0	10	14	1	0	7	18	2	0	15	7	2	0	93	
3:50 PM	0	12	6	0	8	14	0	0	6	10	3	0	7	10	3	0	79	
3:55 PM	1	10	6	0	9	19	2	0	7	17	0	0	5	13	5	0	94	
4:00 PM	0	14	5	0	7	14	1	0	3	20	1	0	5	5	5	0	80	
4:05 PM	0	7	6	0	7	13	3	0	5	13	0	0	3	6	5	0	68	
4:10 PM	0	14	5	0	10	10	2	0	2	10	1	0	6	8	3	0	71	
4:15 PM	0	9	7	0	8	15	0	0	5	9	1	0	5	7	3	0	69	
4:20 PM	0	15	7	0	5	10	2	0	2	20	0	0	4	7	2	0	74	
4:25 PM	0	18	6	0	11	14	2	0	4	9	0	0	7	6	8	0	85	952
4:30 PM	0	17	7	0	7	18	1	0	5	20	0	0	6	10	1	0	92	967
4:35 PM	0	13	3	0	6	17	1	0	8	19	2	0	4	5	6	0	84	970
4:40 PM	1	14	4	0	9	15	2	0	7	20	0	0	12	5	11	0	100	989
4:45 PM	0	13	5	0	6	12	2	0	6	16	0	0	7	7	6	0	80	976
4:50 PM	0	14	6	0	11	11	3	0	4	14	0	0	12	5	2	0	82	979
4:55 PM	0	11	5	0	4	19	1	0	6	16	0	0	7	9	3	0	81	966
5:00 PM	0	8	8	0	3	14	1	0	4	6	0	0	4	13	4	0	65	951
5:05 PM	2	19	7	0	7	15	1	0	4	9	0	0	2	11	5	0	82	965
5:10 PM	0	10	5	0	4	13	2	0	4	18	1	0	3	6	7	0	73	967
5:15 PM	0	10	5	0	5	12	1	0	7	10	2	0	3	8	3	0	66	964
5:20 PM	1	15	2	0	8	12	3	0	5	18	0	0	8	10	7	0	89	979
5:25 PM	0	16	7	0	4	19	0	0	6	15	2	0	3	5	1	0	78	972

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	176	56	0	88	200	16	0	80	236	8	0	88	80	72	0	1104
Heavy Trucks	0	0	0		8	4	0		0	0	0		0	0	0		12
Pedestrians		4				0				8				4			16
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

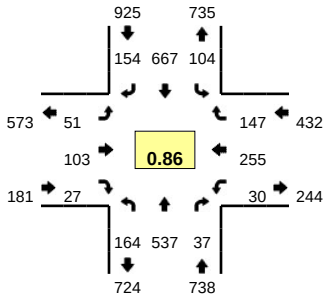
Type of peak hour being reported: Intersection Peak

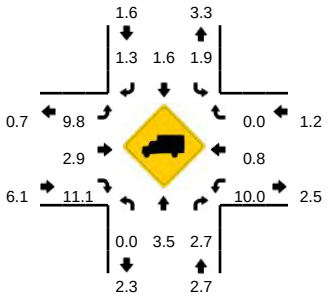
Method for determining peak hour: Total Entering Volume

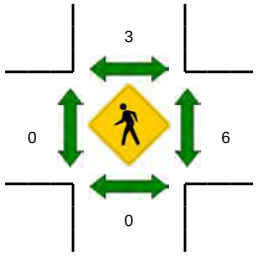
LOCATION: Fort Barrette Rd -- Kama`aha Ave
CITY/STATE: Kapolei, HI

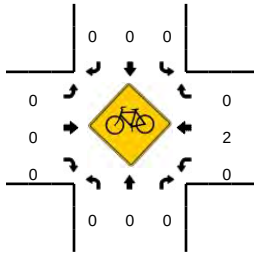
QC JOB #: 14567207
DATE: Wed, Nov 29 2017

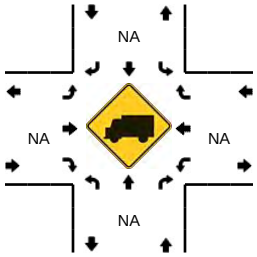
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

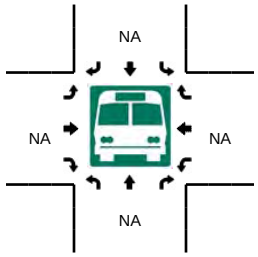












5-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Kama`aha Ave (Eastbound)				Kama`aha Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	3	18	1	0	4	40	5	0	1	3	1	0	0	10	11	0	97	
6:35 AM	2	25	0	0	8	23	6	0	4	4	0	0	0	14	14	0	100	
6:40 AM	2	17	0	0	8	50	8	0	3	3	2	0	2	15	7	0	117	
6:45 AM	4	27	0	0	6	30	5	0	3	2	1	0	2	12	9	0	101	
6:50 AM	2	21	0	0	6	43	9	0	0	4	1	0	2	7	12	0	107	
6:55 AM	3	18	1	0	9	35	7	0	4	4	0	0	2	15	14	0	112	
7:00 AM	2	36	4	0	8	59	5	0	1	7	0	0	1	11	16	0	150	
7:05 AM	3	28	3	0	5	57	6	0	2	4	0	0	0	12	19	0	139	
7:10 AM	5	25	2	0	8	59	5	0	1	3	0	0	3	15	20	0	146	
7:15 AM	9	42	2	0	6	48	8	0	4	6	1	0	7	15	7	0	155	
7:20 AM	12	27	0	0	13	61	15	0	1	9	1	0	4	30	9	0	182	
7:25 AM	4	43	0	0	7	67	22	0	2	9	4	0	3	21	3	0	185	1591
7:30 AM	8	46	4	0	11	66	11	0	2	14	0	0	0	30	11	0	203	1697
7:35 AM	21	34	7	0	13	55	14	0	4	7	1	0	6	27	21	0	210	1807
7:40 AM	23	57	6	0	7	69	15	0	6	5	0	0	1	15	15	0	219	1909
7:45 AM	25	42	4	0	13	47	16	0	8	11	2	0	4	32	20	0	224	2032
7:50 AM	23	50	7	0	3	72	13	0	5	5	4	0	2	16	15	0	215	2140
7:55 AM	22	49	4	0	14	51	11	0	4	12	2	0	2	35	12	0	218	2246
8:00 AM	6	51	0	0	10	54	16	0	5	7	6	0	0	14	9	0	178	2274
8:05 AM	4	39	1	0	3	32	5	0	8	11	6	0	1	12	9	0	131	2266
8:10 AM	7	57	2	0	4	45	8	0	2	7	0	0	0	8	16	0	156	2276
8:15 AM	11	37	0	0	10	19	4	0	4	5	0	0	1	9	15	0	115	2236
8:20 AM	4	28	2	0	6	51	10	0	9	7	1	0	2	10	10	0	140	2194
8:25 AM	4	46	0	0	4	49	15	0	4	6	3	0	2	9	12	0	154	2163

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	284	596	68	0	92	752	176	0	76	84	24	0	28	252	200	0	2632
Heavy Trucks	0	32	4		0	16	4		0	4	0		0	4	0		64
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

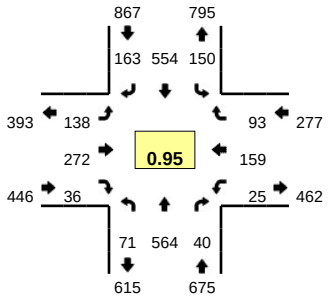
Type of peak hour being reported: Intersection Peak

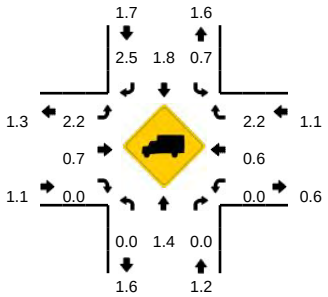
Method for determining peak hour: Total Entering Volume

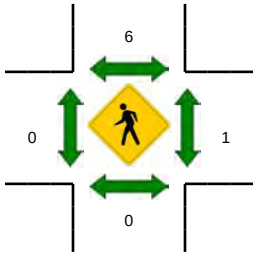
LOCATION: Fort Barrette Rd -- Kama`aha Ave
CITY/STATE: Kapolei, HI

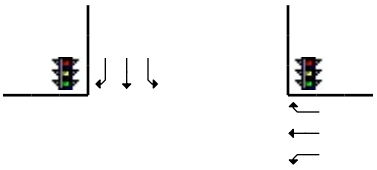
QC JOB #: 14567208
DATE: Wed, Nov 29 2017

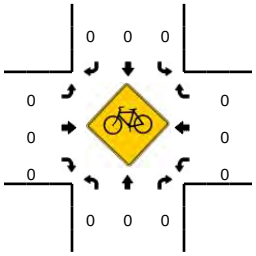
Peak-Hour: 4:10 PM -- 5:10 PM
Peak 15-Min: 4:55 PM -- 5:10 PM

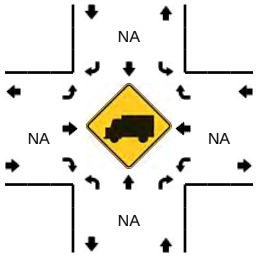


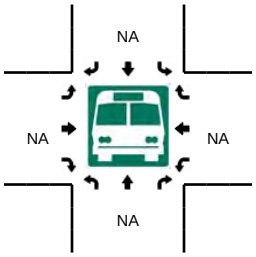












5-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Kama`aha Ave (Eastbound)				Kama`aha Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	7	36	2	0	10	47	7	0	12	12	2	0	2	14	13	0	164	
3:35 PM	11	44	2	0	7	33	13	0	10	23	3	0	1	12	6	0	165	
3:40 PM	6	51	4	0	15	33	11	0	7	11	3	0	1	22	12	0	176	
3:45 PM	5	53	7	0	11	41	21	0	13	24	4	0	2	16	3	0	200	
3:50 PM	2	72	3	0	13	62	9	0	7	10	0	0	4	8	10	0	200	
3:55 PM	5	44	4	0	27	38	8	0	11	21	9	0	2	14	4	0	187	
4:00 PM	3	32	3	0	15	40	14	0	15	27	6	0	1	11	15	0	182	
4:05 PM	6	54	3	0	16	50	13	0	5	14	4	0	1	6	6	0	178	
4:10 PM	4	40	5	0	17	53	17	0	17	25	2	0	1	12	8	0	201	
4:15 PM	4	57	4	0	7	42	13	0	8	27	5	0	3	11	5	0	186	
4:20 PM	4	58	6	0	9	31	12	0	12	24	4	0	0	11	15	0	186	
4:25 PM	2	45	4	0	10	50	17	0	7	27	4	0	0	15	9	0	190	2215
4:30 PM	5	16	1	0	15	42	15	0	11	29	7	0	1	9	11	0	162	2213
4:35 PM	4	47	2	0	13	43	12	0	10	20	2	0	0	16	9	0	178	2226
4:40 PM	9	44	5	0	4	41	11	0	19	23	5	0	2	14	6	0	183	2233
4:45 PM	8	38	5	0	18	56	15	0	10	13	3	0	7	13	10	0	196	2229
4:50 PM	3	55	5	0	11	54	17	0	7	19	4	0	3	6	6	0	190	2219
4:55 PM	15	34	0	0	20	34	10	0	16	33	0	0	4	22	6	0	194	2226
5:00 PM	3	71	1	0	10	53	12	0	12	7	0	0	4	9	4	0	186	2230
5:05 PM	10	59	2	0	16	55	12	0	9	25	0	0	0	21	4	0	213	2265
5:10 PM	8	35	4	0	21	36	13	0	14	17	1	0	2	19	7	0	177	2241
5:15 PM	3	51	2	0	14	51	16	0	7	19	0	0	3	13	4	0	183	2238
5:20 PM	2	43	6	0	12	44	10	0	11	20	5	0	0	13	5	0	171	2223
5:25 PM	6	48	5	0	15	45	15	0	3	22	8	0	4	13	4	0	188	2221

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	112	656	12	0	184	568	136	0	148	260	0	0	32	208	56	0	2372
Heavy Trucks	0	16	0		0	12	4		4	0	0		0	0	0		36
Pedestrians		0				12				0				0			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

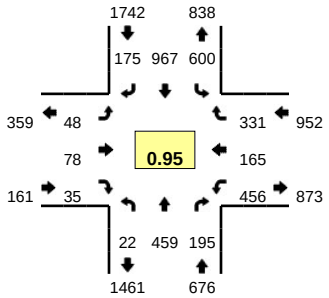
Type of peak hour being reported: Intersection Peak

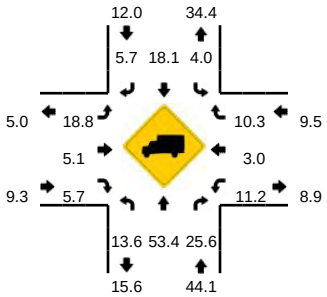
Method for determining peak hour: Total Entering Volume

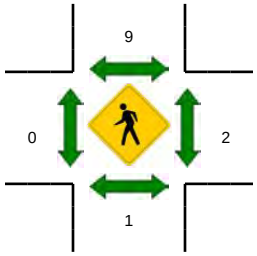
LOCATION: Kalaeloa Boulevard -- Kapolei Pkwy
CITY/STATE: Kapolei, HI

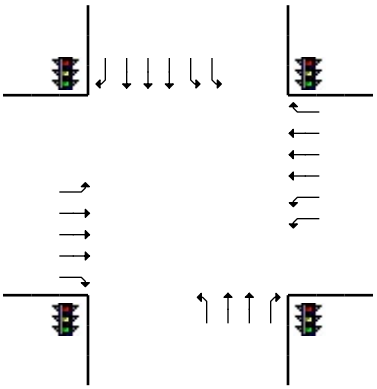
QC JOB #: 14567209
DATE: Wed, Nov 29 2017

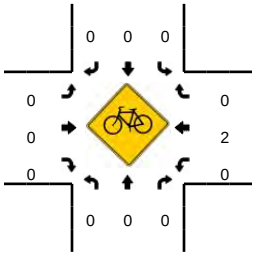
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:55 AM -- 8:10 AM

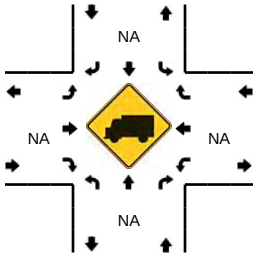


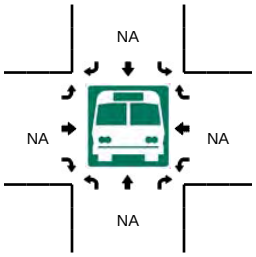












5-Min Count Period Beginning At	Kalaeloa Boulevard (Northbound)				Kalaeloa Boulevard (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	1	19	7	0	38	108	10	0	0	4	4	0	43	12	17	0	263	
6:35 AM	2	21	7	0	47	104	6	0	3	2	2	0	67	8	19	0	288	
6:40 AM	3	28	8	1	23	89	8	0	4	3	5	0	70	5	19	0	266	
6:45 AM	1	25	6	0	22	107	10	0	3	1	3	0	68	13	21	0	280	
6:50 AM	4	33	14	0	46	128	7	0	3	7	6	0	37	3	13	0	301	
6:55 AM	1	23	13	0	41	111	13	0	2	5	3	0	56	9	19	0	296	
7:00 AM	3	23	21	0	32	87	10	0	8	7	3	0	48	7	22	0	271	
7:05 AM	0	29	12	0	52	77	12	0	5	7	6	0	39	8	15	0	262	
7:10 AM	3	39	11	0	48	86	12	0	2	13	1	0	22	3	24	0	264	
7:15 AM	0	41	14	1	26	82	13	0	5	6	3	0	56	8	40	0	295	
7:20 AM	3	37	11	0	74	104	4	0	1	8	4	0	32	7	11	0	296	
7:25 AM	0	42	17	0	34	76	15	0	5	5	2	0	53	12	22	0	283	3365
7:30 AM	1	36	10	0	67	105	9	0	2	6	2	0	25	5	24	0	292	3394
7:35 AM	2	22	23	0	65	67	6	0	7	12	5	0	46	7	27	0	289	3395
7:40 AM	0	37	20	0	40	86	22	0	3	1	1	0	42	8	29	0	289	3418
7:45 AM	0	38	9	0	69	80	18	0	0	5	1	0	32	14	28	0	294	3432
7:50 AM	3	38	20	0	34	65	13	0	4	3	4	0	46	21	25	0	276	3407
7:55 AM	4	39	15	1	73	93	24	0	4	10	1	0	27	18	35	0	344	3455
8:00 AM	4	29	20	0	38	71	18	0	3	8	6	0	36	26	28	0	287	3471
8:05 AM	1	34	18	0	39	72	18	0	6	10	2	0	38	26	33	0	297	3506
8:10 AM	1	66	18	1	41	66	15	0	8	4	4	0	23	13	29	0	289	3531
8:15 AM	2	42	9	0	37	65	20	0	6	11	5	0	45	25	26	0	293	3529
8:20 AM	2	60	19	0	50	51	19	0	7	8	4	0	22	7	16	0	265	3498
8:25 AM	5	54	19	0	28	46	22	0	15	7	1	0	24	21	33	0	275	3490

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	408	212	4	600	944	240	0	52	112	36	0	404	280	384	0	3712
Heavy Trucks	8	220	52		32	228	20		8	4	4		52	12	52		692
Pedestrians		0				8				0				4			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

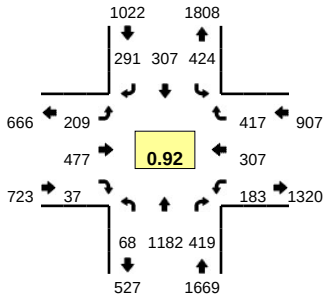
Type of peak hour being reported: Intersection Peak

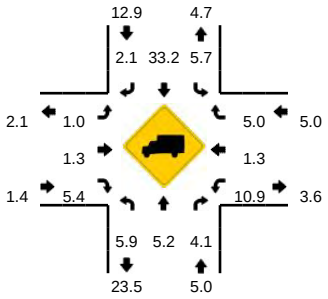
Method for determining peak hour: Total Entering Volume

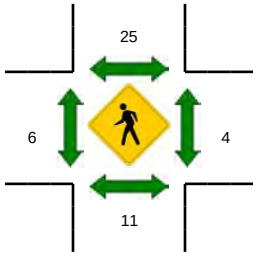
LOCATION: Kalaeloa Boulevard -- Kapolei Pkwy
CITY/STATE: Kapolei, HI

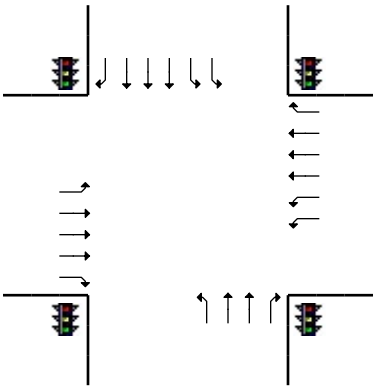
QC JOB #: 14567210
DATE: Wed, Nov 29 2017

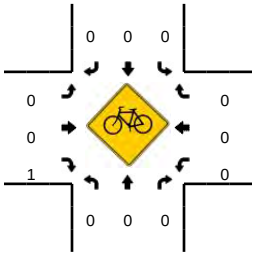
Peak-Hour: 3:30 PM -- 4:30 PM
Peak 15-Min: 3:35 PM -- 3:50 PM

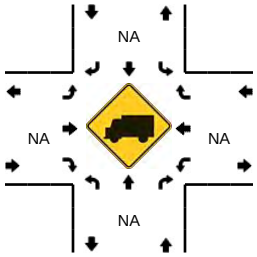


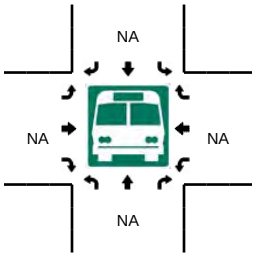












5-Min Count Period Beginning At	Kalaeloa Boulevard (Northbound)				Kalaeloa Boulevard (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	3	115	41	0	33	36	26	0	17	36	3	0	21	13	33	0	377	
3:35 PM	5	107	41	0	36	24	26	0	27	35	3	0	32	32	34	0	402	
3:40 PM	6	111	39	0	30	28	21	0	14	54	2	0	7	41	33	0	386	
3:45 PM	7	108	42	0	55	35	31	0	16	33	1	0	13	19	31	0	391	
3:50 PM	4	101	21	0	42	28	34	0	15	31	1	0	15	24	34	0	350	
3:55 PM	8	90	42	0	29	17	27	0	13	31	3	0	15	17	27	0	319	
4:00 PM	8	60	20	0	43	25	27	0	26	56	4	0	6	31	42	0	348	
4:05 PM	11	108	36	0	35	31	13	0	16	39	3	0	0	17	35	0	344	
4:10 PM	4	117	44	0	26	19	23	0	13	40	2	0	9	13	35	0	345	
4:15 PM	3	119	32	0	27	23	15	0	14	24	3	0	9	34	31	0	334	
4:20 PM	3	72	34	0	34	18	25	0	25	50	4	0	35	37	49	0	386	
4:25 PM	6	74	27	0	34	23	23	0	13	48	8	0	21	29	33	0	339	4321
4:30 PM	2	89	31	0	50	38	18	0	14	24	3	0	11	18	25	0	323	4267
4:35 PM	8	36	29	0	53	32	24	0	31	37	2	0	16	28	52	0	348	4213
4:40 PM	9	105	54	0	24	33	17	0	15	32	3	0	28	26	48	0	394	4221
4:45 PM	2	116	51	0	37	16	14	0	14	41	2	0	9	16	38	0	356	4186
4:50 PM	1	83	44	0	22	24	18	0	28	30	1	0	35	19	30	0	335	4171
4:55 PM	11	41	26	0	64	22	23	0	11	33	2	0	9	55	40	0	337	4189
5:00 PM	5	103	25	0	31	25	18	0	15	28	1	0	17	15	29	0	312	4153
5:05 PM	0	87	31	0	36	17	25	0	13	39	4	0	15	22	30	0	319	4128
5:10 PM	5	63	32	0	28	21	21	0	29	35	3	0	41	20	34	0	332	4115
5:15 PM	12	65	32	0	46	26	24	0	14	50	2	0	7	24	25	0	327	4108
5:20 PM	7	53	14	1	40	13	16	0	26	30	3	0	22	33	32	0	290	4012
5:25 PM	1	82	42	0	22	22	19	0	26	24	2	0	19	21	25	0	305	3978

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	72	1304	488	0	484	348	312	0	228	488	24	0	208	368	392	0	4716
Heavy Trucks	0	52	20		48	136	20		4	12	0		40	4	32		368
Pedestrians		16				8				4				0			28
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

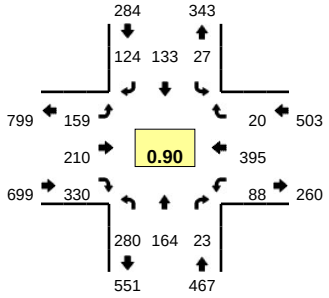
Type of peak hour being reported: Intersection Peak

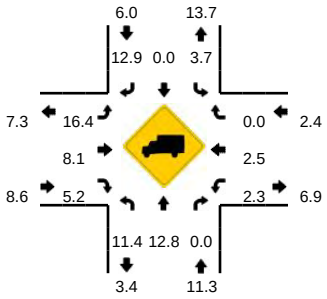
Method for determining peak hour: Total Entering Volume

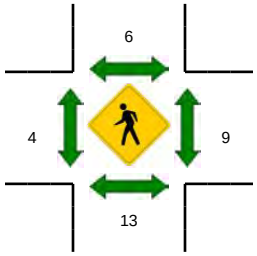
LOCATION: Kamokila Blvd -- Kapolei Pkwy
CITY/STATE: Kapolei, HI

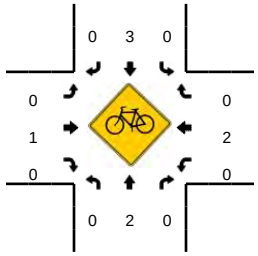
QC JOB #: 14567211
DATE: Wed, Nov 29 2017

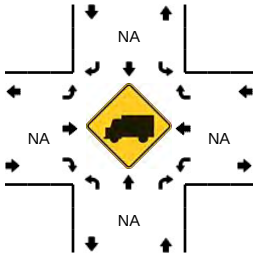
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

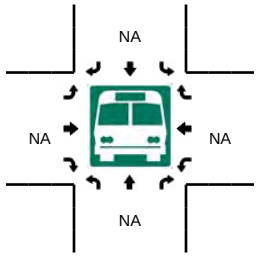












5-Min Count Period Beginning At	Kamokila Blvd (Northbound)				Kamokila Blvd (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	15	1	0	0	1	8	16	0	11	9	19	0	2	27	0	0	109	
6:35 AM	36	7	0	0	2	9	12	0	7	5	14	0	2	30	1	0	125	
6:40 AM	33	4	0	0	1	3	19	0	4	9	11	0	4	25	3	0	116	
6:45 AM	25	6	0	0	0	6	9	0	5	11	4	0	1	36	0	0	103	
6:50 AM	14	5	0	0	4	12	8	0	5	21	12	0	1	30	1	0	113	
6:55 AM	32	8	1	0	1	11	11	0	11	7	14	0	6	17	4	0	123	
7:00 AM	32	12	2	0	1	8	6	0	8	16	19	0	1	20	4	0	129	
7:05 AM	18	0	2	0	1	7	18	0	9	15	22	0	3	18	2	0	115	
7:10 AM	22	12	1	0	4	6	4	0	21	12	26	0	3	34	1	0	146	
7:15 AM	27	11	0	0	2	8	9	0	10	7	17	0	2	27	3	0	123	
7:20 AM	23	8	3	0	2	3	11	0	13	18	28	0	4	39	0	0	152	
7:25 AM	13	8	1	0	0	17	10	0	18	14	22	0	9	22	3	0	137	1491
7:30 AM	32	14	2	0	3	15	7	0	11	16	30	0	6	13	0	0	149	1531
7:35 AM	26	9	3	0	1	17	6	0	9	17	34	0	5	31	1	0	159	1565
7:40 AM	16	18	3	0	2	9	8	0	18	20	42	0	9	41	2	0	188	1637
7:45 AM	25	27	2	0	3	17	8	0	14	12	14	0	14	28	3	0	167	1701
7:50 AM	30	29	2	0	5	9	10	0	9	12	29	0	4	45	0	0	184	1772
7:55 AM	21	12	2	0	3	8	9	0	14	23	25	0	10	35	4	0	166	1815
8:00 AM	14	7	0	0	3	5	24	0	21	25	33	0	8	49	2	0	191	1877
8:05 AM	26	11	4	0	2	11	6	0	14	19	22	0	9	34	0	0	158	1920
8:10 AM	27	10	1	0	1	14	16	0	8	27	34	0	8	31	2	0	179	1953
8:15 AM	24	5	1	0	4	7	13	0	9	12	19	0	7	16	1	0	118	1948
8:20 AM	22	10	1	0	6	7	11	0	23	12	28	0	5	22	4	0	151	1947
8:25 AM	24	4	1	0	0	14	14	0	12	11	17	0	4	19	0	0	120	1930

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	260	192	16	0	44	88	172	0	176	240	348	0	88	516	24	0	2164
Heavy Trucks	16	28	0		0	0	24		28	8	20		0	16	0		140
Pedestrians		16				8				0				8			32
Bicycles	0	1	0		0	1	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

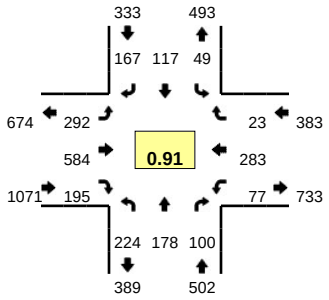
Type of peak hour being reported: Intersection Peak

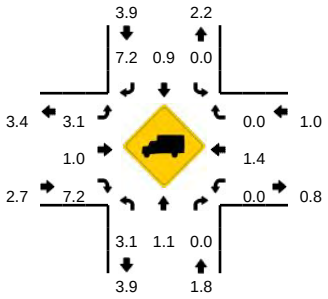
Method for determining peak hour: Total Entering Volume

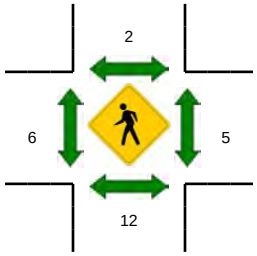
LOCATION: Kamokila Blvd -- Kapolei Pkwy
CITY/STATE: Kapolei, HI

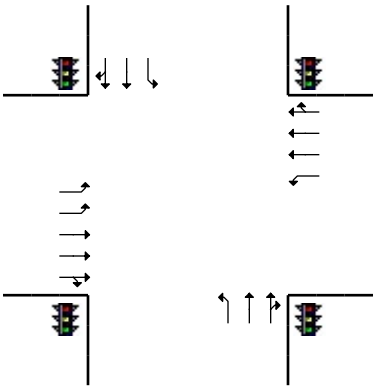
QC JOB #: 14567212
DATE: Wed, Nov 29 2017

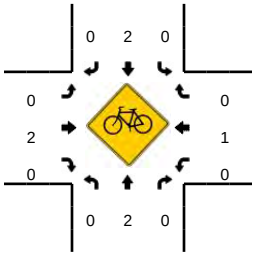
Peak-Hour: 3:50 PM -- 4:50 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

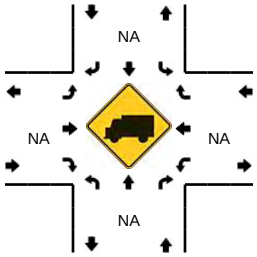


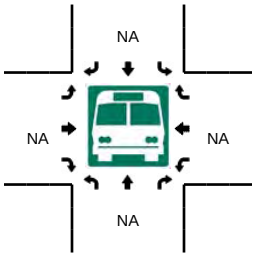












5-Min Count Period Beginning At	Kamokila Blvd (Northbound)				Kamokila Blvd (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	13	13	6	0	5	5	29	0	33	42	14	0	5	25	1	0	191	
3:35 PM	23	17	4	0	5	18	8	0	19	45	16	0	2	29	2	0	188	
3:40 PM	14	15	8	0	3	7	12	0	25	48	22	0	10	19	3	0	186	
3:45 PM	29	16	5	0	6	16	10	0	16	39	17	0	7	22	1	0	184	
3:50 PM	19	11	7	0	8	6	6	0	33	57	22	0	6	27	4	0	206	
3:55 PM	11	13	3	0	3	14	16	0	19	53	19	0	8	19	2	0	180	
4:00 PM	13	10	8	0	4	11	18	0	20	40	5	0	8	25	2	0	164	
4:05 PM	17	27	8	0	3	10	12	0	34	38	18	0	3	11	0	0	181	
4:10 PM	7	6	4	0	5	11	11	0	37	53	22	0	8	30	2	0	196	
4:15 PM	31	20	10	0	6	7	17	0	21	33	14	0	4	19	0	0	182	
4:20 PM	19	9	8	0	4	11	9	0	12	52	10	0	5	34	1	0	174	
4:25 PM	16	11	10	0	3	15	16	0	24	41	11	0	9	27	1	0	184	2216
4:30 PM	26	16	10	0	3	11	11	0	17	54	21	0	5	16	1	0	191	2216
4:35 PM	14	16	12	0	0	7	27	0	32	46	21	0	6	13	4	0	198	2226
4:40 PM	30	23	14	0	4	2	11	0	21	31	16	0	7	40	5	0	204	2244
4:45 PM	21	16	6	0	6	12	13	0	22	86	16	0	8	22	1	0	229	2289
4:50 PM	21	12	7	0	1	10	16	0	31	47	7	0	9	37	1	0	199	2282
4:55 PM	18	6	4	0	3	2	12	0	17	49	8	0	10	26	2	0	157	2259
5:00 PM	18	14	12	0	6	14	20	0	19	41	13	0	2	20	0	0	179	2274
5:05 PM	20	13	5	0	4	2	5	0	23	42	15	0	11	30	3	0	173	2266
5:10 PM	10	6	4	0	6	10	8	0	18	58	20	0	4	28	5	0	177	2247
5:15 PM	25	13	6	0	2	14	7	0	24	43	11	0	4	25	2	0	176	2241
5:20 PM	15	8	7	0	7	9	18	0	29	39	10	0	7	31	3	0	183	2250
5:25 PM	22	11	8	0	8	6	9	0	20	48	10	0	3	22	4	0	171	2237

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	260	220	128	0	40	84	204	0	300	652	212	0	84	300	40	0	2524
Heavy Trucks	0	4	0		0	0	24		16	4	8		0	4	0		60
Pedestrians		20				4				8				0			32
Bicycles	0	1	0		0	0	0		0	1	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

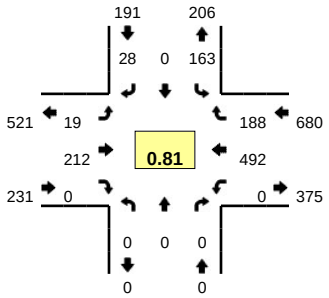
Type of peak hour being reported: Intersection Peak

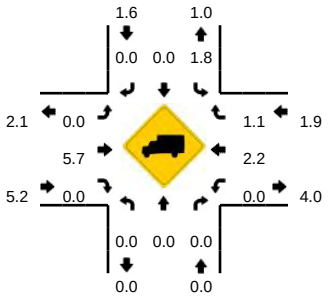
Method for determining peak hour: Total Entering Volume

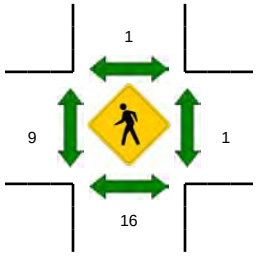
LOCATION: Wakea St -- Kapolei Pkwy
CITY/STATE: Honolulu, HI

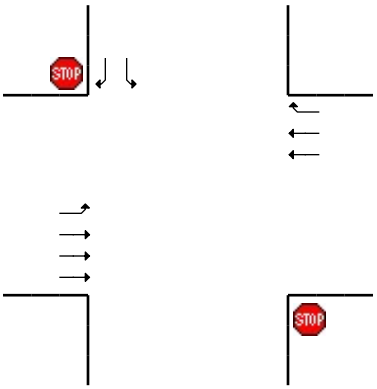
QC JOB #: 14567213
DATE: Wed, Nov 29 2017

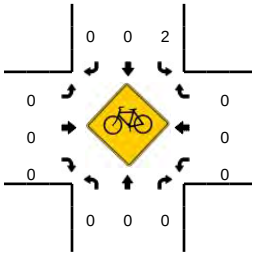
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

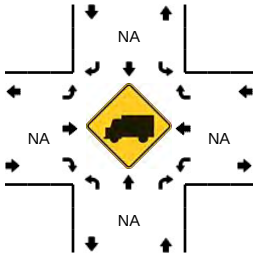


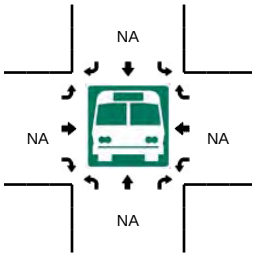












5-Min Count Period Beginning At	Wakea St (Northbound)				Wakea St (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	0	0	9	0	0	0	1	6	0	0	0	17	6	0	39	
6:35 AM	0	0	0	0	14	0	0	0	1	8	0	0	0	38	9	0	70	
6:40 AM	0	0	0	0	10	0	1	0	0	6	0	0	0	15	8	0	40	
6:45 AM	0	0	0	0	11	0	0	0	0	9	0	0	0	31	6	0	57	
6:50 AM	0	0	0	0	11	0	1	0	1	14	0	0	0	25	13	0	65	
6:55 AM	0	0	0	0	21	0	1	0	1	10	0	0	0	18	9	0	60	
7:00 AM	0	0	0	0	21	0	0	0	3	13	0	0	0	25	10	0	72	
7:05 AM	0	0	0	0	12	0	0	0	3	13	0	0	0	19	16	0	63	
7:10 AM	0	0	0	0	13	0	0	0	4	8	0	0	0	34	12	0	71	
7:15 AM	0	0	0	0	9	0	2	0	1	10	0	0	0	28	13	0	63	
7:20 AM	0	0	0	0	11	0	4	0	1	14	0	0	0	41	11	0	82	
7:25 AM	0	0	0	0	18	0	1	0	2	12	0	0	0	36	18	0	87	769
7:30 AM	0	0	0	0	26	0	1	0	3	22	0	0	0	21	10	0	83	813
7:35 AM	0	0	0	0	15	0	0	0	0	22	0	0	0	46	25	0	108	851
7:40 AM	0	0	0	0	13	0	4	0	0	25	0	0	0	44	20	0	106	917
7:45 AM	0	0	0	0	16	0	1	0	2	17	0	0	0	60	29	0	125	985
7:50 AM	0	0	0	0	16	0	6	0	3	19	0	0	0	30	20	0	94	1014
7:55 AM	0	0	0	0	13	0	1	0	1	19	0	0	0	57	20	0	111	1065
8:00 AM	0	0	0	0	11	0	1	0	1	23	0	1	0	56	6	0	99	1092
8:05 AM	0	0	0	0	12	0	4	0	2	15	0	0	0	26	6	0	65	1094
8:10 AM	0	0	0	0	3	0	3	0	2	14	0	0	0	47	10	0	79	1102
8:15 AM	0	0	0	0	13	0	1	0	2	14	0	0	0	24	9	0	63	1102
8:20 AM	0	0	0	0	6	0	0	0	1	13	0	0	0	28	6	0	54	1074
8:25 AM	0	0	0	0	9	0	1	0	1	15	0	0	0	18	13	0	57	1044

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	176	0	20	0	8	256	0	0	0	600	296	0	1356
Heavy Trucks	0	0	0		0	0	0		0	16	0		0	16	4		36
Pedestrians		20				0				16				4			40
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:09 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

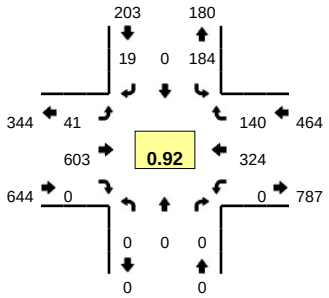
Type of peak hour being reported: Intersection Peak

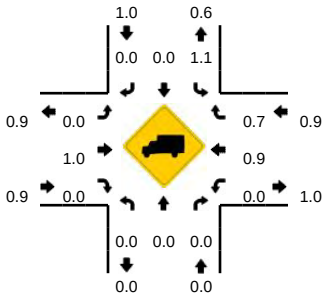
Method for determining peak hour: Total Entering Volume

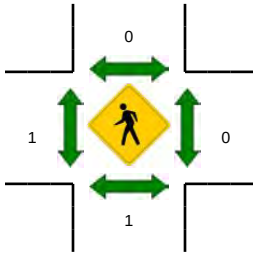
LOCATION: Wakea St -- Kapolei Pkwy
CITY/STATE: Honolulu, HI

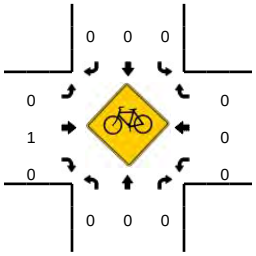
QC JOB #: 14567214
DATE: Wed, Nov 29 2017

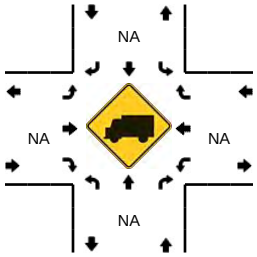
Peak-Hour: 4:05 PM -- 5:05 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

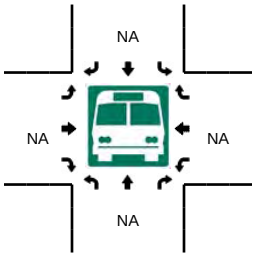












5-Min Count Period Beginning At	Wakea St (Northbound)				Wakea St (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	0	0	0	0	17	0	4	0	3	34	0	0	0	21	15	0	94	
3:35 PM	0	0	0	0	15	0	3	0	2	42	0	0	0	15	15	0	92	
3:40 PM	0	0	0	0	13	0	1	0	4	52	0	0	0	38	12	0	120	
3:45 PM	0	0	0	0	17	0	2	0	1	44	0	0	0	34	16	0	114	
3:50 PM	0	0	0	0	8	0	3	0	3	58	0	0	0	21	10	0	103	
3:55 PM	0	0	0	0	23	0	3	0	6	30	0	0	0	24	10	0	96	
4:00 PM	0	0	0	0	15	0	3	0	5	47	0	0	0	27	7	0	104	
4:05 PM	0	0	0	0	18	0	1	0	1	48	0	0	0	25	10	0	103	
4:10 PM	0	0	0	0	18	0	0	0	6	43	0	0	0	28	12	0	107	
4:15 PM	0	0	0	0	15	0	1	0	3	32	0	0	0	33	18	0	102	
4:20 PM	0	0	0	0	13	0	2	0	2	46	0	0	0	25	8	0	96	
4:25 PM	0	0	0	0	14	0	2	0	3	42	0	1	0	25	12	0	99	1230
4:30 PM	0	0	0	0	12	0	5	0	1	58	0	0	0	15	17	0	108	1244
4:35 PM	0	0	0	0	12	0	2	0	3	55	0	0	0	42	11	0	125	1277
4:40 PM	0	0	0	0	14	0	3	0	4	53	0	0	0	17	5	0	96	1253
4:45 PM	0	0	0	0	22	0	1	0	6	60	0	0	0	35	13	0	137	1276
4:50 PM	0	0	0	0	11	0	0	0	5	56	0	0	0	30	8	0	110	1283
4:55 PM	0	0	0	0	23	0	1	0	3	43	0	0	0	21	10	0	101	1288
5:00 PM	0	0	0	0	12	0	1	0	3	67	0	0	0	28	16	0	127	1311
5:05 PM	0	0	0	0	11	0	0	0	2	32	0	0	0	18	10	0	73	1281
5:10 PM	0	0	0	0	14	0	2	0	3	58	0	0	0	30	6	0	113	1287
5:15 PM	0	0	0	0	15	0	3	0	2	40	0	0	0	34	8	0	102	1287
5:20 PM	0	0	0	0	11	0	2	0	2	41	0	0	0	19	11	0	86	1277
5:25 PM	0	0	0	0	23	0	1	0	4	40	0	1	0	27	16	0	112	1290

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	192	0	24	0	52	672	0	0	0	376	116	0	1432
Heavy Trucks	0	0	0		0	0	0		0	8	0		0	0	0		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

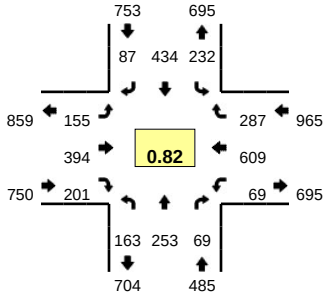
Type of peak hour being reported: Intersection Peak

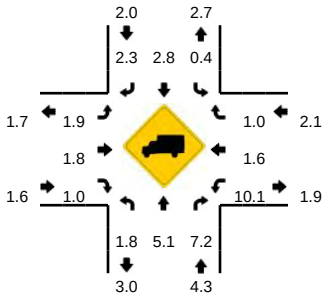
Method for determining peak hour: Total Entering Volume

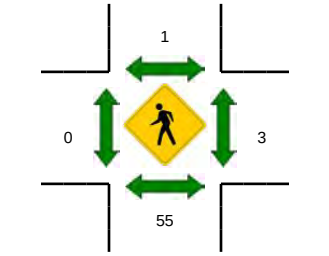
LOCATION: Fort Barrette Rd -- Kapolei Pkwy
CITY/STATE: Honolulu, HI

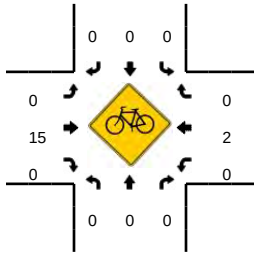
QC JOB #: 14567215
DATE: Thu, Nov 30 2017

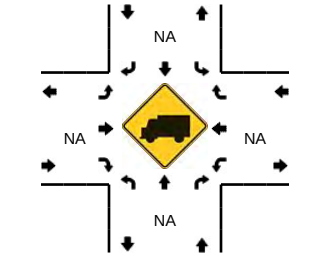
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

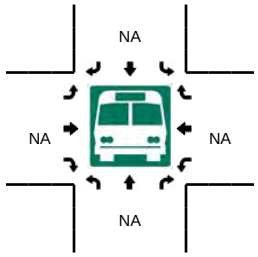












5-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	5	12	0	0	6	29	6	0	13	19	10	0	3	34	14	0	151	
6:35 AM	3	12	2	0	5	28	4	0	14	13	7	0	2	14	3	0	107	
6:40 AM	3	7	1	0	7	21	4	0	5	7	10	0	2	32	10	0	109	
6:45 AM	11	12	2	0	15	22	0	0	12	12	7	0	1	32	9	0	135	
6:50 AM	5	11	2	0	6	37	7	0	7	23	11	0	5	38	13	0	165	
6:55 AM	7	5	2	0	15	29	8	0	11	15	9	0	2	21	6	0	130	
7:00 AM	6	18	0	0	11	36	10	0	8	18	13	0	1	40	8	0	169	
7:05 AM	15	11	2	0	13	25	14	0	11	18	17	0	1	28	10	0	165	
7:10 AM	12	15	1	0	7	25	5	0	12	21	11	0	2	39	14	0	164	
7:15 AM	11	12	1	0	17	35	9	0	9	25	14	0	5	45	9	0	192	
7:20 AM	11	27	3	0	11	45	7	0	13	31	10	0	5	30	9	0	202	
7:25 AM	24	17	4	0	31	29	8	0	4	27	19	0	3	76	15	0	257	1946
7:30 AM	5	22	8	0	19	35	7	0	26	32	13	0	5	46	28	0	246	2041
7:35 AM	24	29	8	0	28	41	6	0	8	19	12	0	6	59	16	0	256	2190
7:40 AM	10	16	7	0	14	36	4	0	20	50	20	0	8	55	37	0	277	2358
7:45 AM	22	33	10	0	26	49	10	0	8	31	28	0	8	51	36	0	312	2535
7:50 AM	14	15	6	0	18	30	3	0	19	56	24	0	12	65	47	0	309	2679
7:55 AM	14	34	9	0	25	45	10	0	16	32	19	0	4	41	26	0	275	2824
8:00 AM	10	18	8	0	30	29	5	0	11	43	18	0	6	69	25	0	272	2927
8:05 AM	6	15	4	0	6	35	13	0	9	27	13	0	5	33	25	0	191	2953
8:10 AM	11	15	1	0	13	24	6	0	4	26	6	0	1	35	18	0	160	2949
8:15 AM	5	12	5	0	10	20	4	0	13	22	12	0	1	48	23	0	175	2932
8:20 AM	11	26	1	0	9	27	6	0	17	19	9	0	3	27	12	0	167	2897
8:25 AM	9	13	4	0	14	24	3	0	14	9	11	0	4	25	11	0	141	2781

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	184	256	92	0	232	460	68	0	188	548	288	0	112	684	480	0	3592
Heavy Trucks	4	8	12		4	24	4		4	0	4		8	8	4		84
Pedestrians		48				4				0				0			52
Bicycles	0	0	0		0	0	0		0	4	0		0	1	0		5
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

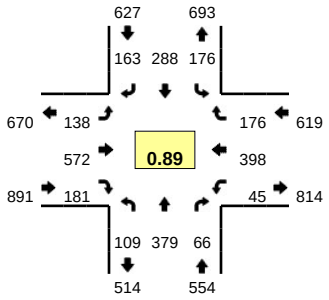
LOCATION: Fort Barrette Rd -- Kapolei Pkwy

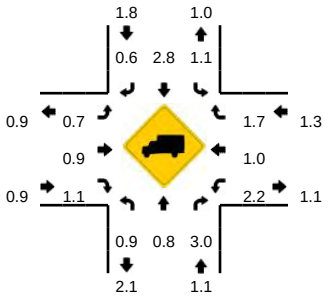
CITY/STATE: Honolulu, HI

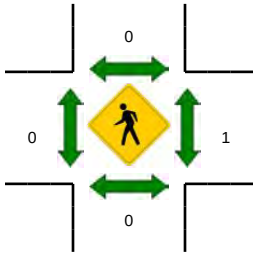
QC JOB #: 14567216

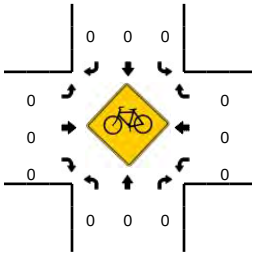
DATE: Wed, Nov 29 2017

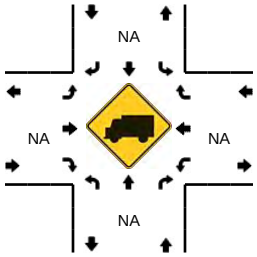
Peak-Hour: 4:10 PM -- 5:10 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

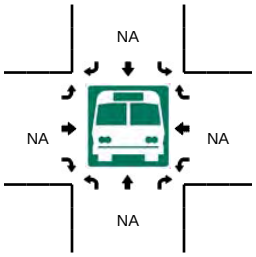












5-Min Count Period Beginning At	Fort Barrette Rd (Northbound)				Fort Barrette Rd (Southbound)				Kapolei Pkwy (Eastbound)				Kapolei Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	9	26	2	0	13	28	15	0	7	35	14	0	2	34	15	0	200	
3:35 PM	8	32	8	0	8	21	14	0	13	44	17	0	6	38	20	0	229	
3:40 PM	9	33	5	0	9	21	9	0	17	45	15	0	4	38	24	0	229	
3:45 PM	13	37	4	0	15	21	16	0	11	37	16	0	3	22	10	0	205	
3:50 PM	16	26	6	0	19	16	6	0	14	46	15	0	11	39	19	0	233	
3:55 PM	8	36	5	0	16	31	14	0	16	34	17	0	0	18	13	0	208	
4:00 PM	4	27	9	0	20	20	15	0	5	38	11	0	3	26	16	0	194	
4:05 PM	9	11	7	0	24	21	8	0	19	50	13	0	8	44	8	0	222	
4:10 PM	5	34	9	0	13	26	12	0	12	49	13	0	4	29	11	0	217	
4:15 PM	13	50	5	0	10	30	16	0	8	25	12	0	3	40	15	0	227	
4:20 PM	4	23	8	0	7	21	10	0	19	48	13	0	5	50	12	0	220	
4:25 PM	12	36	2	0	8	19	15	0	4	46	12	0	3	29	15	0	201	2585
4:30 PM	8	23	1	0	13	28	13	0	9	49	18	0	1	11	7	0	181	2566
4:35 PM	15	30	3	0	17	23	13	0	10	36	18	0	8	36	11	0	220	2557
4:40 PM	6	25	7	0	11	10	15	0	9	60	15	0	5	44	10	0	217	2545
4:45 PM	12	33	11	0	29	38	13	0	5	37	15	0	3	23	20	0	239	2579
4:50 PM	10	18	8	0	19	14	11	0	16	70	13	0	5	56	24	0	264	2610
4:55 PM	8	38	2	0	27	35	14	0	18	62	20	0	1	5	19	0	249	2651
5:00 PM	11	39	5	0	9	24	14	0	7	30	15	0	2	45	14	0	215	2672
5:05 PM	5	30	5	0	13	20	17	0	21	60	17	0	5	30	18	0	241	2691
5:10 PM	15	31	3	0	24	22	10	0	13	37	14	0	2	23	9	0	203	2677
5:15 PM	15	21	3	0	16	24	10	0	10	41	10	0	3	43	14	0	210	2660
5:20 PM	9	28	6	0	8	20	12	0	9	58	25	0	2	36	12	0	225	2665
5:25 PM	7	42	4	0	15	24	19	0	7	42	15	0	0	13	12	0	200	2664

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	120	356	84	0	300	348	152	0	156	676	192	0	36	336	252	0	3008
Heavy Trucks	0	4	4		8	12	0		0	4	0		0	4	4		40
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

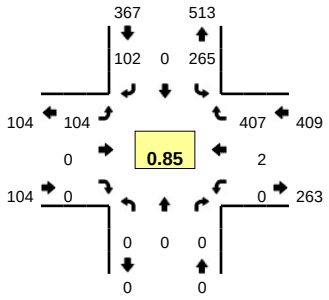
Type of peak hour being reported: Intersection Peak

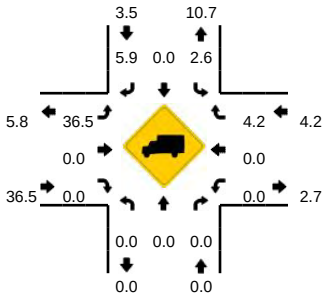
Method for determining peak hour: Total Entering Volume

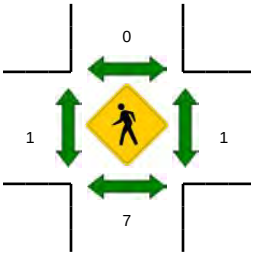
LOCATION: Kamokila Blvd -- Roosevelt Ave
CITY/STATE: Honolulu, HI

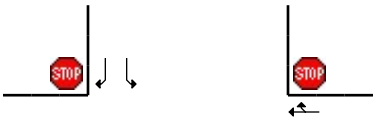
QC JOB #: 14567217
DATE: Wed, Nov 29 2017

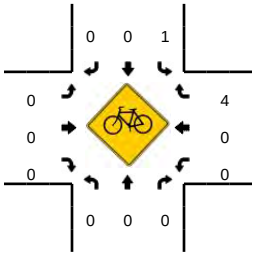
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

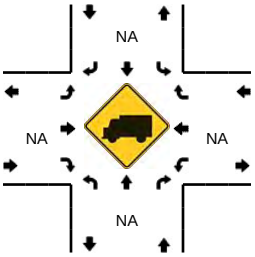


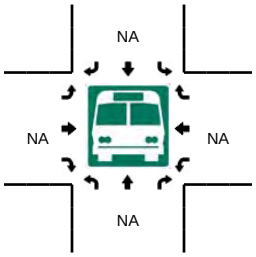












5-Min Count Period Beginning At	Kamokila Blvd (Northbound)				Kamokila Blvd (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	0	0	15	0	13	0	3	1	0	0	0	0	27	0	59	
6:35 AM	0	0	0	0	10	0	5	0	2	0	0	0	0	0	30	0	47	
6:40 AM	0	0	0	0	10	0	5	0	7	0	0	0	0	0	30	0	52	
6:45 AM	0	0	0	0	9	0	9	0	6	0	0	0	0	1	24	0	49	
6:50 AM	0	0	0	0	12	0	4	0	6	0	0	0	0	0	33	0	55	
6:55 AM	0	0	0	0	17	0	12	0	6	0	0	0	0	0	31	0	66	
7:00 AM	0	0	0	0	17	0	9	0	6	0	0	0	0	0	30	0	62	
7:05 AM	0	0	0	0	27	0	10	0	7	0	0	0	0	0	16	0	60	
7:10 AM	0	0	0	0	16	0	5	0	8	0	0	0	0	0	26	0	55	
7:15 AM	0	0	0	0	18	0	11	0	14	0	0	0	0	0	37	0	80	
7:20 AM	0	0	0	0	10	0	6	0	5	0	0	0	0	1	28	0	50	
7:25 AM	0	0	0	0	30	0	12	0	11	0	0	0	0	0	32	0	85	720
7:30 AM	0	0	0	0	19	0	9	1	10	0	0	0	0	1	40	0	80	741
7:35 AM	0	0	0	0	39	0	8	0	6	0	0	0	0	0	28	0	81	775
7:40 AM	0	0	0	0	35	0	12	0	9	0	0	0	0	0	41	0	97	820
7:45 AM	0	0	0	0	20	0	4	0	15	0	0	0	0	0	34	0	73	844
7:50 AM	0	0	0	0	15	0	10	0	16	0	0	0	0	0	40	0	81	870
7:55 AM	0	0	0	0	20	0	6	0	7	0	0	0	0	0	32	0	65	869
8:00 AM	0	0	0	0	20	0	3	1	5	0	0	0	0	0	36	0	65	872
8:05 AM	0	0	0	0	19	0	11	0	3	0	0	0	0	0	28	0	61	873
8:10 AM	0	0	0	0	18	0	10	0	3	0	0	0	0	0	31	0	62	880
8:15 AM	0	0	0	0	16	0	3	0	4	0	0	0	0	0	22	0	45	845
8:20 AM	0	0	0	0	18	0	4	0	10	1	0	0	0	0	28	0	61	856
8:25 AM	0	0	0	0	13	0	5	0	4	0	0	0	0	0	20	0	42	813

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	372	0	116	4	100	0	0	0	0	4	436	0	1032
Heavy Trucks	0	0	0		8	0	0		40	0	0		0	0	8		56
Pedestrians		4				0				0				4			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

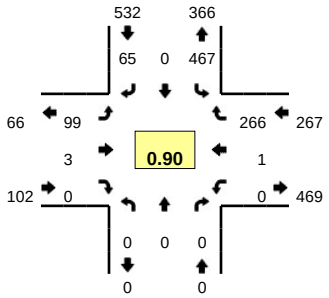
Type of peak hour being reported: Intersection Peak

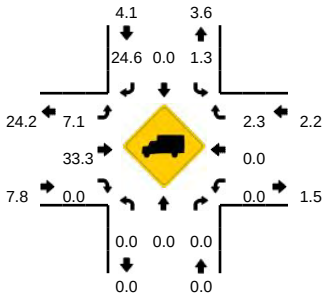
Method for determining peak hour: Total Entering Volume

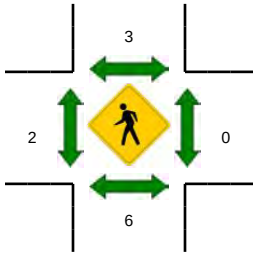
LOCATION: Kamokila Blvd -- Roosevelt Ave
CITY/STATE: Honolulu, HI

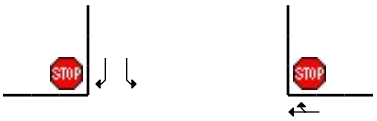
QC JOB #: 14567218
DATE: Wed, Nov 29 2017

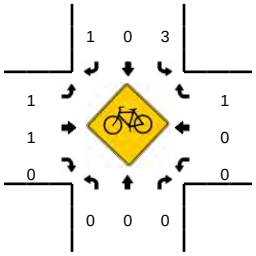
Peak-Hour: 3:40 PM -- 4:40 PM
Peak 15-Min: 3:40 PM -- 3:55 PM

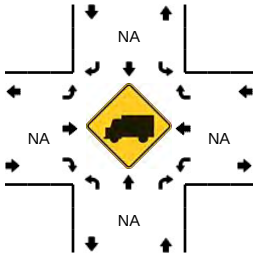


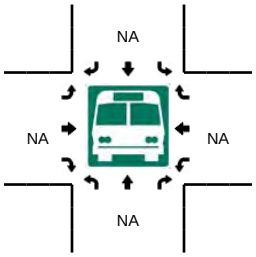












5-Min Count Period Beginning At	Kamokila Blvd (Northbound)				Kamokila Blvd (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	0	0	0	0	30	0	8	0	5	1	0	0	0	0	23	0	67	
3:35 PM	0	0	0	0	33	0	7	0	7	0	0	0	0	0	16	0	63	
3:40 PM	0	0	0	0	37	0	11	0	18	0	0	0	0	0	24	0	90	
3:45 PM	0	0	0	0	36	0	6	0	9	1	0	0	0	0	29	0	81	
3:50 PM	0	0	0	0	42	0	4	0	12	0	0	0	0	0	22	0	80	
3:55 PM	0	0	0	0	43	0	8	0	4	0	0	0	0	0	19	0	74	
4:00 PM	0	0	0	0	35	0	6	0	6	0	0	0	0	0	15	0	62	
4:05 PM	0	0	0	0	36	0	5	0	10	0	0	0	0	0	18	0	69	
4:10 PM	0	0	0	0	42	0	4	0	10	1	0	0	0	0	21	0	78	
4:15 PM	0	0	0	0	42	0	7	0	8	1	0	0	0	0	23	0	81	
4:20 PM	0	0	0	0	31	0	3	1	4	0	0	0	0	0	22	0	61	
4:25 PM	0	0	0	0	35	0	3	0	6	0	0	0	0	0	19	0	63	869
4:30 PM	0	0	0	0	48	0	4	0	5	0	0	0	0	0	32	0	89	891
4:35 PM	0	0	0	0	39	0	4	0	7	0	0	0	0	1	22	0	73	901
4:40 PM	0	0	0	0	31	0	9	0	13	0	0	0	0	0	21	0	74	885
4:45 PM	0	0	0	0	30	0	4	0	8	0	0	0	0	0	24	0	66	870
4:50 PM	0	0	0	0	36	0	2	0	5	0	0	0	0	0	24	0	67	857
4:55 PM	0	0	0	0	22	0	2	1	3	0	0	0	0	0	27	0	55	838
5:00 PM	0	0	0	0	28	0	5	0	7	1	0	0	0	1	27	0	69	845
5:05 PM	0	0	0	0	43	0	7	0	4	0	0	0	0	0	17	0	71	847
5:10 PM	0	0	0	0	42	0	2	0	4	1	0	0	0	0	17	0	66	835
5:15 PM	0	0	0	0	42	0	3	0	4	0	0	0	0	0	27	0	76	830
5:20 PM	0	0	0	0	28	0	1	0	5	0	0	0	0	0	25	0	59	828
5:25 PM	0	0	0	0	26	0	3	0	3	0	0	0	0	0	25	0	57	822

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	460	0	84	0	156	4	0	0	0	0	300	0	1004
Heavy Trucks	0	0	0		8	0	28		12	0	0		0	0	4		52
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

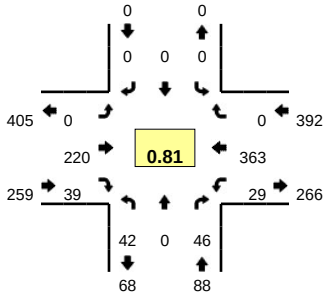
LOCATION: Copahee Ave -- Roosevelt Ave

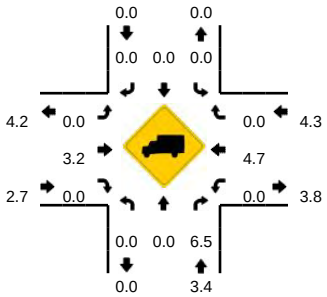
CITY/STATE: Honolulu, HI

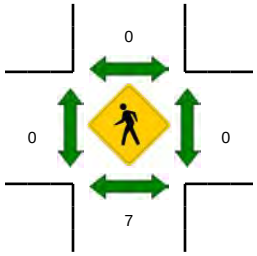
QC JOB #: 14567219

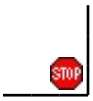
DATE: Wed, Nov 29 2017

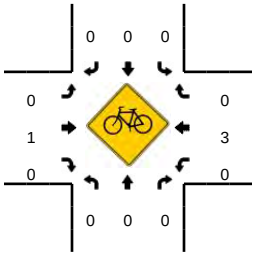
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

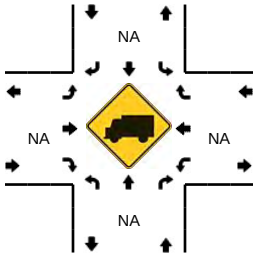


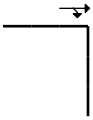


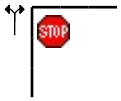


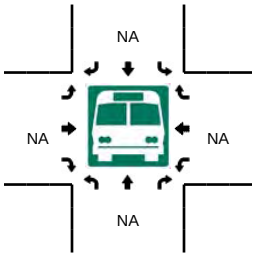












5-Min Count Period Beginning At	Copahee Ave (Northbound)				Copahee Ave (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	1	0	0	0	0	0	0	11	0	0	1	32	0	0	45	
6:35 AM	0	0	0	0	0	0	0	0	0	13	0	0	1	29	0	0	43	
6:40 AM	0	0	0	0	0	0	0	0	0	12	0	0	1	34	0	0	47	
6:45 AM	0	0	0	0	0	0	0	0	0	7	1	0	0	24	0	0	32	
6:50 AM	0	0	1	0	0	0	0	0	0	11	1	0	0	28	0	0	41	
6:55 AM	2	0	0	0	0	0	0	0	0	14	1	0	3	30	0	0	50	
7:00 AM	0	0	4	0	0	0	0	0	0	14	2	0	1	26	0	0	47	
7:05 AM	0	0	4	0	0	0	0	0	0	26	2	0	1	20	0	0	53	
7:10 AM	2	0	1	0	0	0	0	0	0	18	0	0	2	25	0	0	48	
7:15 AM	1	0	2	0	0	0	0	0	0	16	2	0	3	34	0	0	58	
7:20 AM	4	0	2	0	0	0	0	0	0	9	1	0	5	27	0	0	48	
7:25 AM	7	0	3	0	0	0	0	0	0	22	3	0	2	26	0	0	63	575
7:30 AM	2	0	4	0	0	0	0	0	0	15	8	0	5	32	0	0	66	596
7:35 AM	3	0	5	0	0	0	0	0	0	34	4	0	5	27	0	0	78	631
7:40 AM	5	0	7	0	0	0	0	0	0	27	7	0	2	36	0	0	84	668
7:45 AM	11	0	8	0	0	0	0	0	0	14	2	0	3	25	0	0	63	699
7:50 AM	5	0	5	0	0	0	0	0	0	17	3	0	1	33	0	0	64	722
7:55 AM	1	0	2	0	0	0	0	0	0	18	4	0	1	34	0	0	60	732
8:00 AM	1	0	1	0	0	0	0	0	0	16	3	0	0	30	0	0	51	736
8:05 AM	0	0	3	0	0	0	0	0	0	19	0	0	2	31	0	0	55	738
8:10 AM	2	0	4	0	0	0	0	0	0	13	2	0	0	28	0	0	49	739
8:15 AM	0	0	1	0	0	0	0	0	0	18	0	0	0	22	0	0	41	722
8:20 AM	0	0	0	0	0	0	0	0	0	14	0	0	1	26	0	0	41	715
8:25 AM	0	0	1	0	0	0	0	0	0	16	1	0	0	22	0	0	40	692

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	40	0	64	0	0	0	0	0	0	304	76	0	48	380	0	0	912
Heavy Trucks	0	0	4		0	0	0		0	8	0		0	8	0		20
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

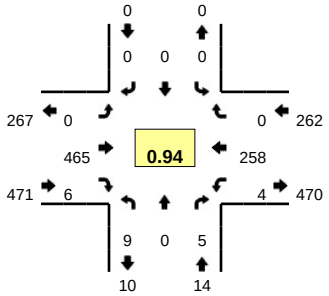
LOCATION: Copahee Ave -- Roosevelt Ave

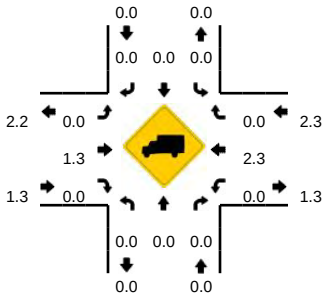
CITY/STATE: Honolulu, HI

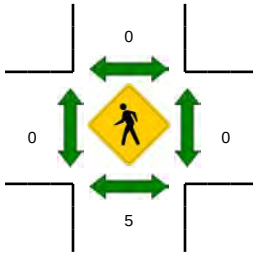
QC JOB #: 14567220

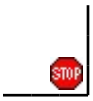
DATE: Wed, Nov 29 2017

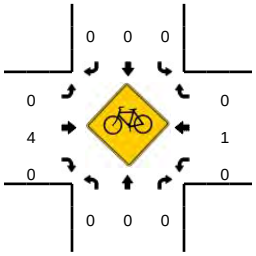
Peak-Hour: 3:40 PM -- 4:40 PM
Peak 15-Min: 3:40 PM -- 3:55 PM

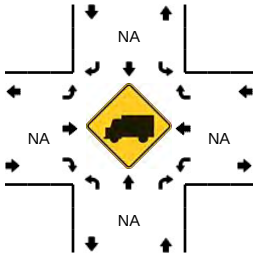


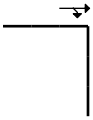


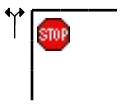


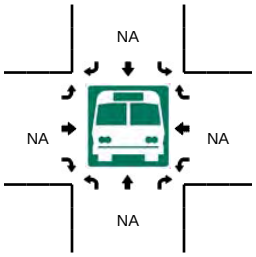












5-Min Count Period Beginning At	Copahee Ave (Northbound)				Copahee Ave (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	1	0	0	0	0	0	0	0	0	24	0	0	0	21	0	0	46	
3:35 PM	0	0	2	0	0	0	0	0	0	35	1	0	0	19	0	0	57	
3:40 PM	2	0	0	0	0	0	0	0	0	38	0	0	0	22	0	0	62	
3:45 PM	3	0	0	0	0	0	0	0	0	37	1	0	0	27	0	0	68	
3:50 PM	0	0	0	0	0	0	0	0	0	46	1	0	0	22	0	0	69	
3:55 PM	0	0	1	0	0	0	0	0	0	39	1	0	1	17	0	0	59	
4:00 PM	0	0	0	0	0	0	0	0	0	31	0	0	0	19	0	0	50	
4:05 PM	0	0	1	0	0	0	0	0	0	37	0	0	0	15	0	0	53	
4:10 PM	0	0	0	0	0	0	0	0	0	44	0	0	2	22	0	0	68	
4:15 PM	0	0	2	0	0	0	0	0	0	41	1	0	0	23	0	0	67	
4:20 PM	2	0	1	0	0	0	0	0	0	32	1	0	0	21	0	0	57	
4:25 PM	0	0	0	0	0	0	0	0	0	34	0	0	1	17	0	0	52	708
4:30 PM	2	0	0	0	0	0	0	0	0	46	1	0	0	30	0	0	79	741
4:35 PM	0	0	0	0	0	0	0	0	0	40	0	0	0	23	0	0	63	747
4:40 PM	0	0	0	0	0	0	0	0	0	29	0	0	0	19	0	0	48	733
4:45 PM	1	0	0	0	0	0	0	0	0	31	1	0	0	24	0	0	57	722
4:50 PM	0	0	0	0	0	0	0	0	0	32	1	0	0	24	0	0	57	710
4:55 PM	1	0	0	0	0	0	0	0	0	26	0	0	0	24	0	0	51	702
5:00 PM	0	0	0	0	0	0	0	0	0	25	1	0	0	27	0	0	53	705
5:05 PM	0	0	0	0	0	0	0	0	0	37	0	0	0	17	0	0	54	706
5:10 PM	1	0	0	0	0	0	0	0	0	52	1	0	0	21	0	0	75	713
5:15 PM	1	0	0	0	0	0	0	0	0	38	1	0	0	24	0	0	64	710
5:20 PM	0	0	0	0	0	0	0	0	0	24	0	0	0	22	0	0	46	699
5:25 PM	0	0	0	0	0	0	0	0	0	30	0	0	0	25	0	0	55	702

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	0	0	0	0	0	0	0	0	484	8	0	0	284	0	0	796
Heavy Trucks	0	0	0		0	0	0		0	8	0		0	0	0		8
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

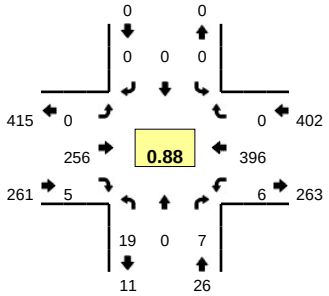
LOCATION: Hornet St -- Roosevelt Ave

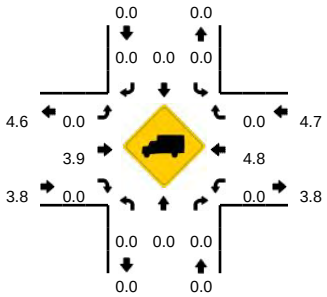
CITY/STATE: Honolulu, HI

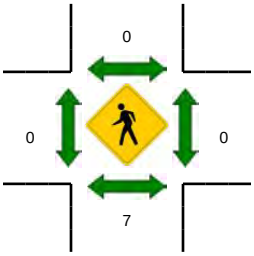
QC JOB #: 14567221

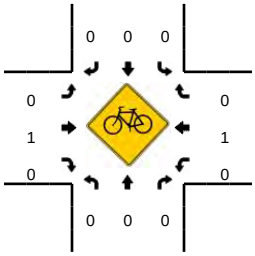
DATE: Wed, Nov 29 2017

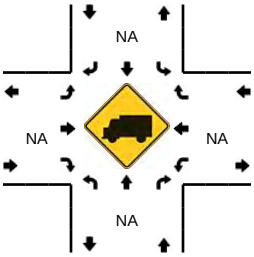
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

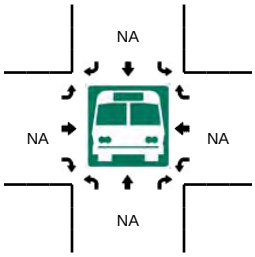












5-Min Count Period Beginning At	Hornet St (Northbound)				Hornet St (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	0	0	0	0	0	0	0	12	0	0	0	34	0	0	46	
6:35 AM	2	0	0	0	0	0	0	0	0	12	1	0	0	28	0	0	43	
6:40 AM	1	0	1	0	0	0	0	0	0	12	0	0	2	38	0	0	54	
6:45 AM	0	0	1	0	0	0	0	0	0	6	1	0	3	21	0	0	32	
6:50 AM	0	0	1	0	0	0	0	0	0	8	0	0	1	27	0	0	37	
6:55 AM	1	0	0	0	0	0	0	0	0	14	0	0	2	35	0	0	52	
7:00 AM	0	0	0	0	0	0	0	0	0	15	0	0	0	30	0	0	45	
7:05 AM	1	0	0	0	0	0	0	0	0	23	1	0	1	26	0	0	52	
7:10 AM	1	0	1	0	0	0	0	0	0	20	0	0	1	24	0	0	47	
7:15 AM	1	0	0	0	0	0	0	0	0	17	0	0	2	37	0	0	57	
7:20 AM	0	0	1	0	0	0	0	0	0	10	0	0	0	41	0	0	52	
7:25 AM	4	0	1	0	0	0	0	0	0	21	1	0	0	29	0	0	56	573
7:30 AM	0	0	1	0	0	0	0	0	0	20	0	0	0	41	0	0	62	589
7:35 AM	3	0	1	0	0	0	0	0	0	24	0	0	1	31	0	0	60	606
7:40 AM	2	0	3	0	0	0	0	0	0	32	0	0	0	37	0	0	74	626
7:45 AM	2	0	0	0	0	0	0	0	0	28	0	0	0	29	0	0	59	653
7:50 AM	4	0	0	0	0	0	0	0	0	29	1	0	1	24	0	0	59	675
7:55 AM	1	0	0	0	0	0	0	0	0	24	0	0	0	31	0	0	56	679
8:00 AM	0	0	0	0	0	0	0	0	0	16	0	0	0	35	0	0	51	685
8:05 AM	0	0	0	0	0	0	0	0	0	19	2	0	0	33	0	0	54	687
8:10 AM	2	0	0	0	0	0	0	0	0	16	1	0	2	28	0	0	49	689
8:15 AM	0	0	1	0	0	0	0	0	0	21	0	0	1	23	0	0	46	678
8:20 AM	1	0	0	0	0	0	0	0	0	12	1	0	3	28	0	0	45	671
8:25 AM	0	0	1	0	0	0	0	0	0	13	1	0	0	21	0	0	36	651

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	0	20	0	0	0	0	0	0	304	0	0	4	436	0	0	784
Heavy Trucks	0	0	0		0	0	0		0	12	0		0	12	0		24
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

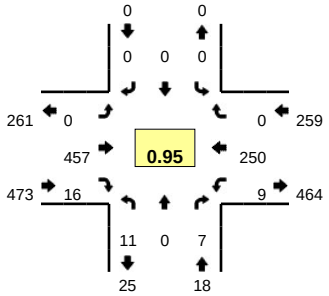
LOCATION: Hornet St -- Roosevelt Ave

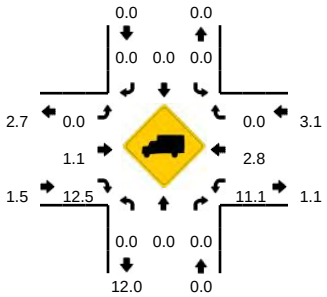
CITY/STATE: Honolulu, HI

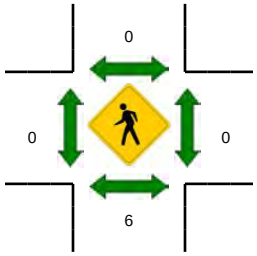
QC JOB #: 14567222

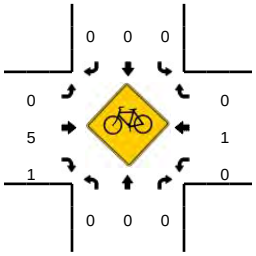
DATE: Wed, Nov 29 2017

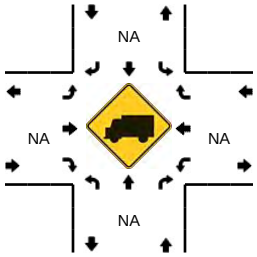
Peak-Hour: 3:40 PM -- 4:40 PM
Peak 15-Min: 4:25 PM -- 4:40 PM

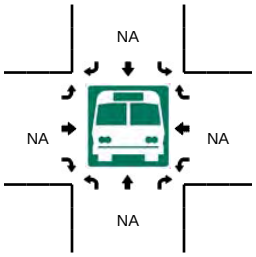












5-Min Count Period Beginning At	Hornet St (Northbound)				Hornet St (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	3	0	0	0	0	0	0	0	0	25	0	0	1	19	0	0	48	
3:35 PM	1	0	4	0	0	0	0	0	0	34	0	0	1	17	0	0	57	
3:40 PM	2	0	1	0	0	0	0	0	0	40	1	0	0	21	0	0	65	
3:45 PM	1	0	0	0	0	0	0	0	0	31	2	0	0	23	0	0	57	
3:50 PM	1	0	0	0	0	0	0	0	0	42	2	0	1	24	0	0	70	
3:55 PM	0	0	0	0	0	0	0	0	0	44	1	0	1	17	0	0	63	
4:00 PM	0	0	0	0	0	0	0	0	0	27	2	0	1	18	0	0	48	
4:05 PM	1	0	1	0	0	0	0	0	0	42	1	0	0	13	0	0	58	
4:10 PM	1	0	1	0	0	0	0	0	0	37	1	0	0	22	0	0	62	
4:15 PM	1	0	1	0	0	0	0	0	0	46	1	0	3	22	0	0	74	
4:20 PM	2	0	0	0	0	0	0	0	0	31	2	0	1	20	0	0	56	
4:25 PM	1	0	1	0	0	0	0	0	0	35	0	0	0	20	0	0	57	715
4:30 PM	0	0	1	0	0	0	0	0	0	44	2	0	1	25	0	0	73	740
4:35 PM	1	0	1	0	0	0	0	0	0	38	1	0	1	25	0	0	67	750
4:40 PM	0	0	1	0	0	0	0	0	0	33	1	0	1	20	0	0	56	741
4:45 PM	1	0	2	0	0	0	0	0	0	33	0	0	0	23	0	0	59	743
4:50 PM	1	0	1	0	0	0	0	0	0	32	0	0	1	26	0	0	61	734
4:55 PM	1	0	1	0	0	0	0	0	0	28	0	0	1	27	0	0	58	729
5:00 PM	2	0	0	0	0	0	0	0	0	22	2	0	2	20	0	0	48	729
5:05 PM	1	0	2	0	0	0	0	0	0	32	2	0	1	15	0	0	53	724
5:10 PM	0	0	0	0	0	0	0	0	0	51	1	0	1	24	0	0	77	739
5:15 PM	1	0	2	0	0	0	0	0	0	39	0	0	2	23	0	0	67	732
5:20 PM	1	0	0	0	0	0	0	0	0	25	0	0	1	18	0	0	45	721
5:25 PM	2	0	0	0	0	0	0	0	0	31	1	0	0	25	0	0	59	723

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	0	12	0	0	0	0	0	0	468	12	0	8	280	0	0	788
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	16	0		20
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	1	0		0	1	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

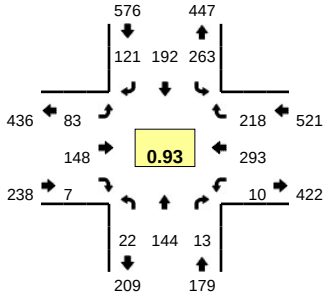
LOCATION: Fort Barrette Rd/Enterprise St -- Roosevelt Ave

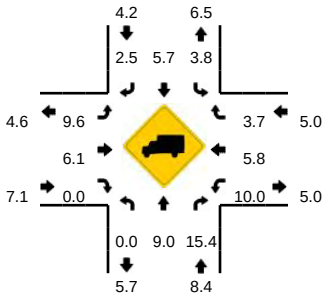
QC JOB #: 14567223

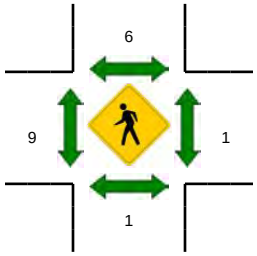
CITY/STATE: Honolulu, HI

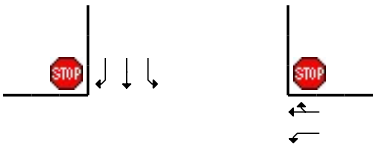
DATE: Wed, Nov 29 2017

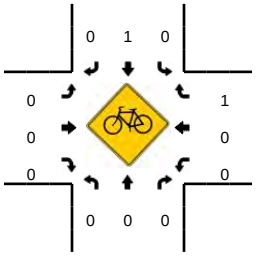
Peak-Hour: 7:10 AM -- 8:10 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

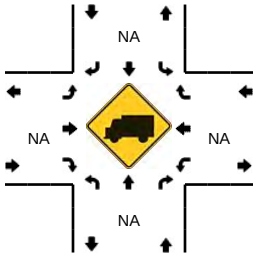


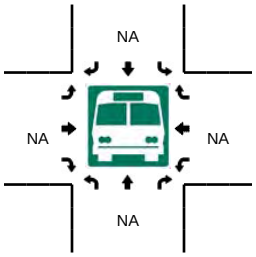












5-Min Count Period Beginning At	Fort Barrette Rd/Enterprise St (Northbound)				Fort Barrette Rd/Enterprise St (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	2	3	0	17	15	5	0	2	6	1	0	0	32	6	0	89	
6:35 AM	1	3	0	0	15	10	3	0	4	8	0	0	3	22	13	0	82	
6:40 AM	0	2	0	0	15	10	5	0	4	11	0	0	0	29	16	0	92	
6:45 AM	0	1	0	0	15	20	4	0	2	2	0	0	2	26	20	0	92	
6:50 AM	0	3	0	0	17	19	7	0	3	8	2	0	2	24	14	0	99	
6:55 AM	1	5	8	0	17	9	8	0	2	7	1	0	4	32	15	0	109	
7:00 AM	1	3	2	0	17	14	2	0	4	12	2	0	4	24	16	0	101	
7:05 AM	0	5	2	0	24	16	5	0	4	13	0	0	3	19	15	0	106	
7:10 AM	0	6	1	0	17	13	7	0	6	19	1	0	3	27	19	0	119	
7:15 AM	1	5	1	0	27	16	10	0	2	5	0	0	0	30	15	0	112	
7:20 AM	0	7	1	0	30	14	10	0	3	10	0	0	0	30	14	0	119	
7:25 AM	4	12	3	0	24	8	8	0	7	10	2	0	0	24	26	0	128	1248
7:30 AM	2	15	0	0	23	19	11	0	6	10	0	0	0	26	18	0	130	1289
7:35 AM	4	17	1	0	15	12	11	0	11	13	0	0	0	20	21	0	125	1332
7:40 AM	2	23	0	0	17	13	10	1	7	14	0	0	2	20	22	0	131	1371
7:45 AM	3	16	2	0	17	15	9	0	11	19	0	0	1	19	19	0	131	1410
7:50 AM	2	18	0	0	28	20	5	0	13	20	0	0	0	16	21	0	143	1454
7:55 AM	3	7	2	0	27	22	11	0	8	9	1	0	1	29	15	0	135	1480
8:00 AM	0	6	1	0	19	22	15	1	6	10	1	0	1	28	11	0	121	1500
8:05 AM	1	12	1	0	17	18	14	0	3	9	2	0	2	24	17	0	120	1514
8:10 AM	0	9	1	0	13	18	10	0	7	7	0	0	1	19	15	0	100	1495
8:15 AM	1	10	0	0	12	21	11	0	6	14	2	0	1	24	18	0	120	1503
8:20 AM	1	15	2	0	9	18	5	0	2	9	0	0	2	29	17	0	109	1493
8:25 AM	0	8	2	1	16	21	9	0	6	6	1	0	3	13	10	0	96	1461

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	32	164	16	0	288	228	100	0	128	192	4	0	8	256	220	0	1636
Heavy Trucks	0	8	4		12	8	0		12	12	0		0	20	16		92
Pedestrians		0				8				16				0			24
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

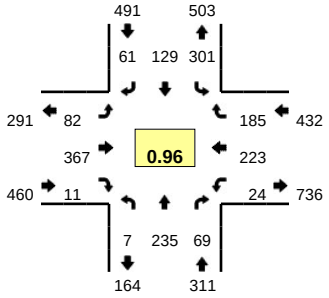
LOCATION: Fort Barrette Rd/Enterprise St -- Roosevelt Ave

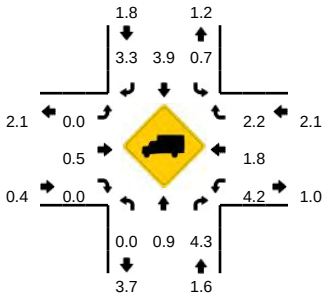
QC JOB #: 14567224

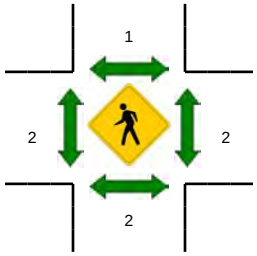
CITY/STATE: Honolulu, HI

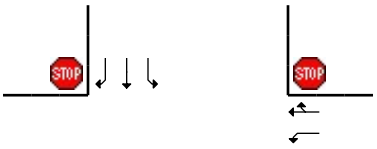
DATE: Wed, Nov 29 2017

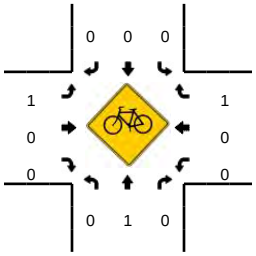
Peak-Hour: 4:10 PM -- 5:10 PM
Peak 15-Min: 4:10 PM -- 4:25 PM

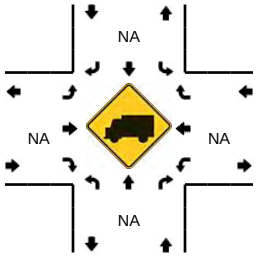


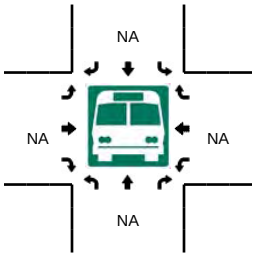












5-Min Count Period Beginning At	Fort Barrette Rd/Enterprise St (Northbound)				Fort Barrette Rd/Enterprise St (Southbound)				Roosevelt Ave (Eastbound)				Roosevelt Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
3:30 PM	1	13	2	0	26	11	7	0	4	20	2	0	2	13	14	0	115	
3:35 PM	1	19	11	0	28	7	3	0	7	26	2	0	1	13	14	0	132	
3:40 PM	2	20	1	0	31	9	4	0	2	30	3	0	2	19	19	0	142	
3:45 PM	0	21	3	0	20	13	1	0	2	28	1	0	3	18	23	0	133	
3:50 PM	3	23	5	0	25	8	4	0	3	31	1	0	3	18	18	0	142	
3:55 PM	1	17	0	0	21	10	5	0	2	38	4	0	6	10	15	0	129	
4:00 PM	1	17	4	0	28	8	1	0	3	35	0	0	3	15	14	0	129	
4:05 PM	2	20	3	0	22	6	2	0	8	25	1	0	3	9	13	0	114	
4:10 PM	2	27	5	0	29	14	7	0	7	29	3	0	1	16	11	0	151	
4:15 PM	0	17	5	0	22	9	4	0	6	38	0	0	4	17	19	0	141	
4:20 PM	1	24	5	0	22	16	5	0	3	32	1	0	5	22	11	0	147	
4:25 PM	0	20	5	0	19	15	2	0	8	32	2	0	1	22	18	0	144	1619
4:30 PM	0	14	8	0	26	8	5	0	5	33	1	0	2	26	10	0	138	1642
4:35 PM	0	20	6	0	29	9	5	0	3	32	0	0	3	17	17	0	141	1651
4:40 PM	1	19	6	0	21	9	6	0	14	32	1	0	2	19	16	0	146	1655
4:45 PM	0	19	7	0	23	9	3	1	8	33	1	0	1	19	16	0	140	1662
4:50 PM	2	25	7	0	30	10	10	0	7	28	0	0	0	20	13	0	152	1672
4:55 PM	0	11	8	0	26	9	10	0	6	30	1	0	3	19	16	0	139	1682
5:00 PM	1	22	2	0	31	7	1	0	8	17	1	0	2	15	21	0	128	1681
5:05 PM	0	17	5	0	22	14	3	0	7	31	0	0	0	11	17	0	127	1694
5:10 PM	0	11	6	0	27	6	12	0	9	39	0	0	1	19	17	0	147	1690
5:15 PM	4	25	13	0	15	3	7	0	5	35	1	0	1	15	13	0	137	1686
5:20 PM	1	15	4	0	30	8	6	0	9	28	0	0	5	20	18	0	144	1683
5:25 PM	1	18	7	0	32	5	3	0	3	29	0	0	1	17	23	0	139	1678

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	272	60	0	292	156	64	0	64	396	16	0	40	220	164	0	1756
Heavy Trucks	0	4	4		0	4	4		0	4	0		0	0	4		24
Pedestrians		4				4				4				4			16
Bicycles	0	0	0		0	0	0		1	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 12/7/2017 5:10 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

APPENDIX B: EXISTING LOS WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	280	224	124	49	266	216	194	419	88	298	674	876
Future Volume (veh/h)	280	224	124	49	266	216	194	419	88	298	674	876
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	304	243	0	53	289	0	211	455	0	324	1011	459
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	413	1018	455	78	748	934	312	1204	539	439	1391	576
Arrive On Green	0.12	0.29	0.00	0.04	0.21	0.00	0.09	0.34	0.00	0.12	0.37	0.37
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1544
Grp Volume(v), veh/h	304	243	0	53	289	0	211	455	0	324	1011	459
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1544
Q Serve(g_s), s	6.7	4.1	0.0	2.3	5.5	0.0	4.6	7.6	0.0	6.9	18.2	20.7
Cycle Q Clear(g_c), s	6.7	4.1	0.0	2.3	5.5	0.0	4.6	7.6	0.0	6.9	18.2	20.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	413	1018	455	78	748	934	312	1204	539	439	1391	576
V/C Ratio(X)	0.74	0.24	0.00	0.68	0.39	0.00	0.68	0.38	0.00	0.74	0.73	0.80
Avail Cap(c_a), veh/h	793	1630	729	409	1630	1628	837	1404	628	862	1478	612
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	21.3	0.0	36.8	26.5	0.0	34.4	19.5	0.0	33.0	21.1	21.8
Incr Delay (d2), s/veh	2.6	0.1	0.0	10.1	0.3	0.0	2.6	0.2	0.0	2.4	1.7	6.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	2.0	0.0	1.4	2.7	0.0	2.3	3.8	0.0	3.5	9.6	9.9
LnGrp Delay(d),s/veh	35.8	21.4	0.0	46.9	26.8	0.0	37.0	19.7	0.0	35.5	22.8	28.7
LnGrp LOS	D	C		D	C		D	B		D	C	C
Approach Vol, veh/h		547			342			666			1794	
Approach Delay, s/veh		29.4			29.9			25.2			26.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.7	30.6	7.4	26.5	11.1	33.2	13.4	20.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	18.0	36.0	19.0	31.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	8.9	9.6	4.3	6.1	6.6	22.7	8.7	7.5
Green Ext Time (p_c), s	0.8	12.2	0.1	3.6	0.5	6.1	0.7	3.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.1
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	223	37	96	394	181	8	296	58	245	301	134
Future Volume (veh/h)	71	223	37	96	394	181	8	296	58	245	301	134
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	83	259	28	112	458	155	9	344	53	285	350	121
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	108	937	100	147	812	272	20	800	122	399	943	321
Arrive On Green	0.06	0.29	0.29	0.08	0.31	0.31	0.01	0.26	0.26	0.12	0.36	0.36
Sat Flow, veh/h	1774	3217	344	1774	2594	871	1774	3073	469	3442	2586	879
Grp Volume(v), veh/h	83	141	146	112	311	302	9	197	200	285	238	233
Grp Sat Flow(s),veh/h/ln	1774	1770	1792	1774	1770	1695	1774	1770	1772	1721	1770	1696
Q Serve(g_s), s	3.0	3.9	4.0	4.0	9.4	9.5	0.3	5.9	6.0	5.1	6.3	6.5
Cycle Q Clear(g_c), s	3.0	3.9	4.0	4.0	9.4	9.5	0.3	5.9	6.0	5.1	6.3	6.5
Prop In Lane	1.00		0.19	1.00		0.51	1.00		0.26	1.00		0.52
Lane Grp Cap(c), veh/h	108	515	522	147	554	530	20	461	461	399	646	619
V/C Ratio(X)	0.77	0.27	0.28	0.76	0.56	0.57	0.44	0.43	0.43	0.71	0.37	0.38
Avail Cap(c_a), veh/h	443	1684	1705	443	1684	1613	304	994	995	591	994	952
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.6	17.5	17.5	28.8	18.4	18.4	31.5	19.7	19.8	27.3	14.9	15.0
Incr Delay (d2), s/veh	10.6	0.3	0.3	8.0	0.9	1.0	14.1	0.6	0.6	2.4	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.0	2.0	2.3	4.7	4.6	0.2	3.0	3.0	2.5	3.1	3.1
LnGrp Delay(d),s/veh	40.3	17.8	17.8	36.7	19.3	19.4	45.6	20.4	20.4	29.7	15.3	15.4
LnGrp LOS	D	B	B	D	B	B	D	C	C	C	B	B
Approach Vol, veh/h		370			725			406			756	
Approach Delay, s/veh		22.8			22.0			20.9			20.7	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.4	20.7	9.3	22.7	4.7	27.4	7.9	24.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	61.0	11.0	36.0	16.0	61.0
Max Q Clear Time (g_c+I1), s	7.1	8.0	6.0	6.0	2.3	8.5	5.0	11.5
Green Ext Time (p_c), s	0.4	6.2	0.2	7.2	0.0	6.2	0.1	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	21.5
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	13.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	68	46	4	43	175	119	1	210	28	72	138	29
Future Vol, veh/h	68	46	4	43	175	119	1	210	28	72	138	29
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	86	58	5	54	222	151	1	266	35	91	175	37
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	12.5	13.6	13.3	13.9
HCM LOS	B	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	1%	0%	100%	0%	0%	100%	0%	0%	51%	0%
Vol Thru, %	99%	79%	0%	100%	79%	0%	100%	33%	49%	70%
Vol Right, %	0%	21%	0%	0%	21%	0%	0%	67%	0%	30%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	106	133	68	31	19	43	117	177	141	98
LT Vol	1	0	68	0	0	43	0	0	72	0
Through Vol	105	105	0	31	15	0	117	58	69	69
RT Vol	0	28	0	0	4	0	0	119	0	29
Lane Flow Rate	134	168	86	39	24	54	148	224	178	124
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.275	0.338	0.202	0.086	0.053	0.118	0.298	0.423	0.378	0.247
Departure Headway (Hd)	7.391	7.237	8.465	7.951	7.803	7.781	7.269	6.789	7.625	7.16
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	486	497	423	450	458	461	495	530	471	501
Service Time	5.136	4.983	6.222	5.708	5.559	5.526	5.015	4.534	5.37	4.904
HCM Lane V/C Ratio	0.276	0.338	0.203	0.087	0.052	0.117	0.299	0.423	0.378	0.248
HCM Control Delay	12.9	13.7	13.4	11.5	11	11.6	13.1	14.5	15	12.3
HCM Lane LOS	B	B	B	B	B	B	B	B	B	B
HCM 95th-tile Q	1.1	1.5	0.7	0.3	0.2	0.4	1.2	2.1	1.7	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	103	27	30	255	147	164	537	37	104	667	154
Future Volume (veh/h)	51	103	27	30	255	147	164	537	37	104	667	154
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	59	118	3	34	293	0	189	617	0	120	767	72
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	430	363	59	406	345	276	827	703	152	838	708
Arrive On Green	0.05	0.23	0.23	0.03	0.22	0.00	0.08	0.44	0.00	0.09	0.45	0.45
Sat Flow, veh/h	1774	1863	1573	1774	1863	1583	3442	1863	1583	1774	1863	1574
Grp Volume(v), veh/h	59	118	3	34	293	0	189	617	0	120	767	72
Grp Sat Flow(s),veh/h/ln	1774	1863	1573	1774	1863	1583	1721	1863	1583	1774	1863	1574
Q Serve(g_s), s	2.6	4.0	0.1	1.5	11.4	0.0	4.2	21.4	0.0	5.2	30.0	2.1
Cycle Q Clear(g_c), s	2.6	4.0	0.1	1.5	11.4	0.0	4.2	21.4	0.0	5.2	30.0	2.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	82	430	363	59	406	345	276	827	703	152	838	708
V/C Ratio(X)	0.72	0.27	0.01	0.57	0.72	0.00	0.68	0.75	0.00	0.79	0.92	0.10
Avail Cap(c_a), veh/h	183	958	809	183	958	814	443	862	733	228	862	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.6	24.6	23.0	37.0	28.2	0.0	34.8	18.0	0.0	34.8	20.0	12.3
Incr Delay (d2), s/veh	11.1	0.3	0.0	8.4	2.4	0.0	3.0	3.4	0.0	10.1	14.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	2.1	0.1	0.9	6.1	0.0	2.1	11.8	0.0	3.0	18.6	0.9
LnGrp Delay(d),s/veh	47.7	24.9	23.1	45.5	30.7	0.0	37.8	21.4	0.0	45.0	34.1	12.4
LnGrp LOS	D	C	C	D	C		D	C		D	C	B
Approach Vol, veh/h		180			327			806			959	
Approach Delay, s/veh		32.3			32.2			25.2			33.8	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	38.5	6.6	21.9	10.2	39.0	7.6	20.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	40.0	10.0	36.0	8.0	40.0
Max Q Clear Time (g_c+I1), s	7.2	23.4	3.5	6.0	6.2	32.0	4.6	13.4
Green Ext Time (p_c), s	0.1	7.2	0.0	2.8	0.2	2.9	0.0	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	30.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	78	35	456	165	331	19	459	195	600	967	175
Future Volume (veh/h)	48	78	35	456	165	331	19	459	195	600	967	175
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	49	80	0	470	170	0	20	473	0	619	997	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	68	402	125	596	1088	339	36	1026	0	749	2402	0
Arrive On Green	0.04	0.09	0.00	0.19	0.23	0.00	0.02	0.30	0.00	0.23	0.51	0.00
Sat Flow, veh/h	1645	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	49	80	0	470	170	0	20	473	0	619	997	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	2.4	1.3	0.0	11.4	2.3	0.0	1.0	9.1	0.0	15.0	10.7	0.0
Cycle Q Clear(g_c), s	2.4	1.3	0.0	11.4	2.3	0.0	1.0	9.1	0.0	15.0	10.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	68	402	125	596	1088	339	36	1026	0	749	2402	0
V/C Ratio(X)	0.72	0.20	0.00	0.79	0.16	0.00	0.55	0.46	0.00	0.83	0.42	0.00
Avail Cap(c_a), veh/h	626	2084	649	1411	2084	649	615	1739	0	1215	2402	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	38.6	34.7	0.0	31.6	25.0	0.0	39.4	23.3	0.0	29.6	12.4	0.0
Incr Delay (d2), s/veh	13.6	0.2	0.0	2.4	0.1	0.0	12.6	0.3	0.0	2.6	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.6	0.0	5.2	1.0	0.0	0.6	2.9	0.0	6.9	4.6	0.0
LnGrp Delay(d),s/veh	52.2	34.9	0.0	34.0	25.1	0.0	52.0	23.7	0.0	32.1	12.5	0.0
LnGrp LOS	D	C		C	C		D	C		C	B	
Approach Vol, veh/h		129			640			493			1616	
Approach Delay, s/veh		41.5			31.6			24.8			20.0	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.1	28.2	19.2	10.9	5.8	45.5	7.3	22.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	17.0	11.1	13.4	3.3	3.0	12.7	4.4	4.3
Green Ext Time (p_c), s	2.1	12.7	1.8	1.9	0.0	13.4	0.1	1.8

Intersection Summary	
HCM 2010 Ctrl Delay	24.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	210	330	88	395	20	280	164	23	27	133	124
Future Volume (veh/h)	159	210	330	88	395	20	280	164	23	27	133	124
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	173	228	64	96	429	17	304	178	15	29	145	21
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	292	1130	297	126	1351	53	346	1087	91	57	518	73
Arrive On Green	0.08	0.28	0.28	0.07	0.27	0.27	0.19	0.33	0.33	0.03	0.17	0.17
Sat Flow, veh/h	3442	3984	1046	1774	5012	197	1774	3298	275	1774	3094	439
Grp Volume(v), veh/h	173	192	100	96	289	157	304	95	98	29	82	84
Grp Sat Flow(s),veh/h/ln	1721	1695	1640	1774	1695	1819	1774	1770	1803	1774	1770	1763
Q Serve(g_s), s	2.7	2.4	2.6	3.0	3.8	3.9	9.4	2.1	2.2	0.9	2.3	2.4
Cycle Q Clear(g_c), s	2.7	2.4	2.6	3.0	3.8	3.9	9.4	2.1	2.2	0.9	2.3	2.4
Prop In Lane	1.00		0.64	1.00		0.11	1.00		0.15	1.00		0.25
Lane Grp Cap(c), veh/h	292	961	465	126	914	490	346	583	595	57	296	295
V/C Ratio(X)	0.59	0.20	0.22	0.76	0.32	0.32	0.88	0.16	0.17	0.51	0.28	0.29
Avail Cap(c_a), veh/h	975	2161	1045	503	2161	1160	346	1128	1150	346	1128	1124
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	15.4	15.4	25.8	16.5	16.5	22.1	13.4	13.4	26.9	20.5	20.6
Incr Delay (d2), s/veh	1.9	0.1	0.2	9.1	0.2	0.4	22.0	0.1	0.1	6.7	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	1.1	1.2	1.8	1.8	2.0	6.7	1.0	1.1	0.6	1.2	1.2
LnGrp Delay(d),s/veh	26.8	15.5	15.7	34.9	16.7	16.9	44.1	13.5	13.5	33.6	21.0	21.1
LnGrp LOS	C	B	B	C	B	B	D	B	B	C	C	C
Approach Vol, veh/h		465			542			497			195	
Approach Delay, s/veh		19.7			19.9			32.2			22.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.8	22.6	8.0	20.0	15.0	13.4	8.8	19.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	36.0	11.0	36.0	16.0	36.0
Max Q Clear Time (g_c+I1), s	2.9	4.2	5.0	4.6	11.4	4.4	4.7	5.9
Green Ext Time (p_c), s	0.0	2.2	0.1	5.6	0.0	2.2	0.4	5.5

Intersection Summary	
HCM 2010 Ctrl Delay	23.8
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	212	492	188	163	28
Future Vol, veh/h	18	212	492	188	163	28
Conflicting Peds, #/hr	10	0	0	2	2	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	255	593	227	196	34

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	603	0	-	0	751	316
Stage 1	-	-	-	-	603	-
Stage 2	-	-	-	-	148	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	606	-	-	-	413	580
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	794	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	601	-	-	-	391	570
Mov Cap-2 Maneuver	-	-	-	-	391	-
Stage 1	-	-	-	-	417	-
Stage 2	-	-	-	-	759	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	21.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	601	-	-	-	391	570
HCM Lane V/C Ratio	0.036	-	-	-	0.502	0.059
HCM Control Delay (s)	11.2	-	-	-	23.1	11.7
HCM Lane LOS	B	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	2.7	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	399	196	68	605	291	162	253	69	238	433	88
Future Volume (veh/h)	147	399	196	68	605	291	162	253	69	238	433	88
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.81	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	179	487	109	83	738	0	198	309	0	290	528	102
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	292	307	210	564	592	503	188	482	410	292	482	93
Arrive On Green	0.16	0.16	0.16	0.32	0.32	0.00	0.11	0.26	0.00	0.16	0.32	0.32
Sat Flow, veh/h	1774	1863	1275	1774	1863	1583	1774	1863	1583	1774	1517	293
Grp Volume(v), veh/h	179	487	109	83	738	0	198	309	0	290	0	630
Grp Sat Flow(s),veh/h/ln	1774	1863	1275	1774	1863	1583	1774	1863	1583	1774	0	1810
Q Serve(g_s), s	15.9	28.0	13.3	5.7	54.0	0.0	18.0	25.1	0.0	27.7	0.0	54.0
Cycle Q Clear(g_c), s	15.9	28.0	13.3	5.7	54.0	0.0	18.0	25.1	0.0	27.7	0.0	54.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	292	307	210	564	592	503	188	482	410	292	0	575
V/C Ratio(X)	0.61	1.59	0.52	0.15	1.25	0.00	1.05	0.64	0.00	0.99	0.00	1.10
Avail Cap(c_a), veh/h	292	307	210	564	592	503	188	592	503	292	0	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	66.0	71.0	64.8	41.5	58.0	0.0	76.0	56.0	0.0	70.9	0.0	58.0
Incr Delay (d2), s/veh	3.7	279.3	2.2	0.1	124.9	0.0	80.7	1.7	0.0	50.5	0.0	66.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	38.2	4.8	2.8	48.3	0.0	13.0	13.1	0.0	17.7	0.0	37.6
LnGrp Delay(d),s/veh	69.7	350.3	67.1	41.6	182.9	0.0	156.7	57.6	0.0	121.4	0.0	124.4
LnGrp LOS	E	F	E	D	F		F	E		F		F
Approach Vol, veh/h		775			821			507			920	
Approach Delay, s/veh		245.7			168.7			96.3			123.5	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.0	48.0		32.0	22.0	58.0		58.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	28.0	54.0		28.0	18.0	54.0		54.0
Max Q Clear Time (g_c+I1), s	29.7	27.1		30.0	20.0	56.0		56.0
Green Ext Time (p_c), s	0.0	7.1		0.0	0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	162.5
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	15.1
Intersection LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	104	0	2	407	263	102
Future Vol, veh/h	104	0	2	407	263	102
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	122	0	2	479	309	120
Number of Lanes	0	1	1	0	1	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	10.7	16.1	15.3
HCM LOS	B	C	C

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%
Vol Thru, %	0%	0%	0%	0%
Vol Right, %	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	104	409	263	102
LT Vol	104	0	263	0
Through Vol	0	2	0	0
RT Vol	0	407	0	102
Lane Flow Rate	122	481	309	120
Geometry Grp	2	2	7	7
Degree of Util (X)	0.206	0.644	0.566	0.179
Departure Headway (Hd)	6.064	4.815	6.58	5.364
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	591	755	548	668
Service Time	4.117	2.815	4.319	3.103
HCM Lane V/C Ratio	0.206	0.637	0.564	0.18
HCM Control Delay	10.7	16.1	17.6	9.3
HCM Lane LOS	B	C	C	A
HCM 95th-tile Q	0.8	4.7	3.5	0.6

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	220	39	29	363	42	46
Future Vol, veh/h	220	39	29	363	42	46
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	272	48	36	448	52	57

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	327	0	830	310
Stage 1	-	-	-	-	303	-
Stage 2	-	-	-	-	527	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1233	-	340	730
Stage 1	-	-	-	-	749	-
Stage 2	-	-	-	-	592	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1226	-	323	722
Mov Cap-2 Maneuver	-	-	-	-	323	-
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	566	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	15.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	454	-	-	1226	-
HCM Lane V/C Ratio	0.239	-	-	0.029	-
HCM Control Delay (s)	15.4	-	-	8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	256	5	6	396	19	7
Future Vol, veh/h	256	5	6	396	19	7
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	291	6	7	450	22	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	304	0	772	308
Stage 1	-	-	-	-	301	-
Stage 2	-	-	-	-	471	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1257	-	368	732
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	628	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1250	-	361	723
Mov Cap-2 Maneuver	-	-	-	-	361	-
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	620	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	417	-	-	1250	-
HCM Lane V/C Ratio	0.071	-	-	0.005	-
HCM Control Delay (s)	14.3	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Intersection Delay, s/veh	77.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	84	136	6	8	285	214	22	147	13	257	197	124
Future Vol, veh/h	84	136	6	8	285	214	22	147	13	257	197	124
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	92	149	7	9	313	235	24	162	14	282	216	136
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	17.9	161.5	16.4	45.9
HCM LOS	C	F	C	E

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	31%	0%	0%	100%	0%	0%	100%	0%	72%	0%
Vol Thru, %	69%	100%	0%	0%	100%	0%	0%	57%	28%	44%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	43%	0%	56%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	71	98	13	84	136	6	8	499	356	223
LT Vol	22	0	0	84	0	0	8	0	257	0
Through Vol	49	98	0	0	136	0	0	285	99	99
RT Vol	0	0	13	0	0	6	0	214	0	124
Lane Flow Rate	78	108	14	92	149	7	9	548	391	245
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.21	0.285	0.035	0.252	0.387	0.016	0.022	1.27	0.936	0.536
Departure Headway (Hd)	10.514	10.352	9.62	10.553	10.032	9.301	9.154	8.335	9.279	8.506
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	343	349	374	342	362	387	391	439	395	428
Service Time	8.214	8.052	7.32	8.253	7.732	7.001	6.905	6.086	6.979	6.206
HCM Lane V/C Ratio	0.227	0.309	0.037	0.269	0.412	0.018	0.023	1.248	0.99	0.572
HCM Control Delay	16	17.1	12.7	16.8	18.9	12.2	12.1	163.9	61.7	20.6
HCM Lane LOS	C	C	B	C	C	B	B	F	F	C
HCM 95th-tile Q	0.8	1.2	0.1	1	1.8	0	0.1	23.3	10.2	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	669	429	248	49	296	323	144	517	94	239	570	535
Future Volume (veh/h)	669	429	248	49	296	323	144	517	94	239	570	535
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	704	452	0	52	312	0	152	544	0	252	615	305
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	843	1452	650	70	725	844	231	1003	449	348	1171	479
Arrive On Green	0.24	0.41	0.00	0.04	0.20	0.00	0.07	0.28	0.00	0.10	0.31	0.31
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1523
Grp Volume(v), veh/h	704	452	0	52	312	0	152	544	0	252	615	305
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1523
Q Serve(g_s), s	18.4	8.2	0.0	2.7	7.3	0.0	4.1	12.3	0.0	6.5	12.8	16.3
Cycle Q Clear(g_c), s	18.4	8.2	0.0	2.7	7.3	0.0	4.1	12.3	0.0	6.5	12.8	16.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	843	1452	650	70	725	844	231	1003	449	348	1171	479
V/C Ratio(X)	0.84	0.31	0.00	0.75	0.43	0.00	0.66	0.54	0.00	0.72	0.53	0.64
Avail Cap(c_a), veh/h	3741	4296	1922	543	1531	1479	835	2279	1019	1086	2634	1077
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.0	18.9	0.0	45.0	32.9	0.0	43.1	28.7	0.0	41.5	26.7	27.8
Incr Delay (d2), s/veh	2.3	0.1	0.0	14.5	0.4	0.0	3.2	0.5	0.0	2.9	0.4	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.0	4.0	0.0	1.6	3.6	0.0	2.0	6.1	0.0	3.3	6.6	7.0
LnGrp Delay(d),s/veh	36.2	19.0	0.0	59.5	33.3	0.0	46.3	29.2	0.0	44.3	27.0	29.3
LnGrp LOS	D	B		E	C		D	C		D	C	C
Approach Vol, veh/h		1156			364			696			1172	
Approach Delay, s/veh		29.5			37.0			32.9			31.3	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	30.8	7.7	42.9	10.4	33.8	27.2	23.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	61.0	29.0	115.0	23.0	67.0	103.0	41.0
Max Q Clear Time (g_c+I1), s	8.5	14.3	4.7	10.2	6.1	18.3	20.4	9.3
Green Ext Time (p_c), s	0.8	11.4	0.1	5.8	0.4	11.4	2.8	5.5

Intersection Summary	
HCM 2010 Ctrl Delay	31.6
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	245	460	30	63	338	299	42	455	69	299	184	31
Future Volume (veh/h)	245	460	30	63	338	299	42	455	69	299	184	31
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	263	495	29	68	363	204	45	489	64	322	198	21
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	308	1316	77	89	574	316	66	825	107	425	1126	118
Arrive On Green	0.17	0.39	0.39	0.05	0.26	0.26	0.04	0.26	0.26	0.12	0.35	0.35
Sat Flow, veh/h	1774	3393	198	1774	2170	1194	1774	3138	409	3442	3227	338
Grp Volume(v), veh/h	263	258	266	68	295	272	45	275	278	322	108	111
Grp Sat Flow(s),veh/h/ln	1774	1770	1821	1774	1770	1594	1774	1770	1777	1721	1770	1796
Q Serve(g_s), s	13.1	9.5	9.6	3.4	13.4	13.8	2.3	12.3	12.5	8.2	3.8	3.9
Cycle Q Clear(g_c), s	13.1	9.5	9.6	3.4	13.4	13.8	2.3	12.3	12.5	8.2	3.8	3.9
Prop In Lane	1.00		0.11	1.00		0.75	1.00		0.23	1.00		0.19
Lane Grp Cap(c), veh/h	308	686	706	89	468	422	66	465	467	425	618	627
V/C Ratio(X)	0.85	0.38	0.38	0.77	0.63	0.65	0.68	0.59	0.60	0.76	0.17	0.18
Avail Cap(c_a), veh/h	623	816	840	390	583	525	156	719	722	945	1049	1065
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.5	20.0	20.0	42.7	29.5	29.7	43.3	29.3	29.3	38.6	20.5	20.6
Incr Delay (d2), s/veh	6.8	0.3	0.3	12.7	1.5	1.9	11.5	1.2	1.2	2.8	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	4.7	4.9	2.0	6.7	6.3	1.3	6.2	6.3	4.1	1.9	2.0
LnGrp Delay(d),s/veh	43.3	20.3	20.3	55.4	31.0	31.6	54.8	30.5	30.5	41.4	20.7	20.7
LnGrp LOS	D	C	C	E	C	C	D	C	C	D	C	C
Approach Vol, veh/h		787			635			598			541	
Approach Delay, s/veh		28.0			33.9			32.3			33.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.2	27.9	8.6	39.3	7.4	35.8	19.8	28.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	37.0	20.0	42.0	8.0	54.0	32.0	30.0
Max Q Clear Time (g_c+I1), s	10.2	14.5	5.4	11.6	4.3	5.9	15.1	15.8
Green Ext Time (p_c), s	1.0	5.1	0.1	8.5	0.0	5.8	0.7	6.1

Intersection Summary	
HCM 2010 Ctrl Delay	31.5
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	61	185	10	79	89	54	2	156	66	97	173	17
Future Vol, veh/h	61	185	10	79	89	54	2	156	66	97	173	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	68	206	11	88	99	60	2	173	73	108	192	19
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	12.3	11.8	12.5	14
HCM LOS	B	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	3%	0%	100%	0%	0%	100%	0%	0%	53%	0%
Vol Thru, %	97%	54%	0%	100%	86%	0%	100%	35%	47%	84%
Vol Right, %	0%	46%	0%	0%	14%	0%	0%	65%	0%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	144	61	123	72	79	59	84	184	104
LT Vol	2	0	61	0	0	79	0	0	97	0
Through Vol	78	78	0	123	62	0	59	30	87	87
RT Vol	0	66	0	0	10	0	0	54	0	17
Lane Flow Rate	89	160	68	137	80	88	66	93	204	115
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.181	0.31	0.148	0.28	0.16	0.194	0.137	0.181	0.417	0.223
Departure Headway (Hd)	7.322	6.986	7.861	7.35	7.25	7.97	7.459	6.996	7.367	6.985
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	490	515	456	489	495	450	481	513	489	514
Service Time	5.064	4.728	5.605	5.094	4.994	5.713	5.201	4.738	5.107	4.726
HCM Lane V/C Ratio	0.182	0.311	0.149	0.28	0.162	0.196	0.137	0.181	0.417	0.224
HCM Control Delay	11.7	12.9	12	12.9	11.4	12.6	11.4	11.3	15.3	11.7
HCM Lane LOS	B	B	B	B	B	B	B	B	C	B
HCM 95th-tile Q	0.7	1.3	0.5	1.1	0.6	0.7	0.5	0.7	2	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	264	35	26	166	92	75	559	39	154	537	159
Future Volume (veh/h)	135	264	35	26	166	92	75	559	39	154	537	159
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	142	278	8	27	175	0	79	588	0	162	565	81
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	122	401	334	41	316	269	151	794	675	207	929	786
Arrive On Green	0.07	0.22	0.22	0.02	0.17	0.00	0.04	0.43	0.00	0.12	0.50	0.50
Sat Flow, veh/h	1774	1863	1554	1774	1863	1583	3442	1863	1583	1774	1863	1575
Grp Volume(v), veh/h	142	278	8	27	175	0	79	588	0	162	565	81
Grp Sat Flow(s),veh/h/ln	1774	1863	1554	1774	1863	1583	1721	1863	1583	1774	1863	1575
Q Serve(g_s), s	5.0	10.0	0.3	1.1	6.3	0.0	1.6	19.3	0.0	6.5	15.9	2.0
Cycle Q Clear(g_c), s	5.0	10.0	0.3	1.1	6.3	0.0	1.6	19.3	0.0	6.5	15.9	2.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	122	401	334	41	316	269	151	794	675	207	929	786
V/C Ratio(X)	1.17	0.69	0.02	0.66	0.55	0.00	0.52	0.74	0.00	0.78	0.61	0.10
Avail Cap(c_a), veh/h	122	1021	852	146	1047	890	613	2400	2040	584	2681	2266
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.0	26.4	22.6	35.4	27.8	0.0	34.1	17.6	0.0	31.3	13.2	9.7
Incr Delay (d2), s/veh	133.8	2.2	0.0	16.5	1.5	0.0	2.8	1.4	0.0	6.4	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	5.4	0.1	0.7	3.3	0.0	0.8	10.1	0.0	3.5	8.3	0.9
LnGrp Delay(d),s/veh	167.8	28.6	22.6	51.9	29.3	0.0	37.0	18.9	0.0	37.8	13.8	9.7
LnGrp LOS	F	C	C	D	C		D	B		D	B	A
Approach Vol, veh/h		428			202			667			808	
Approach Delay, s/veh		74.7			32.3			21.1			18.2	
Approach LOS		E			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.5	35.1	5.7	19.7	7.2	40.4	9.0	16.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	24.0	94.0	6.0	40.0	13.0	105.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	8.5	21.3	3.1	12.0	3.6	17.9	7.0	8.3
Green Ext Time (p_c), s	0.3	9.8	0.0	3.0	0.1	9.8	0.0	3.1

Intersection Summary	
HCM 2010 Ctrl Delay	31.9
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	209	477	37	183	307	417	69	1182	419	424	307	291
Future Volume (veh/h)	209	477	37	183	307	417	69	1182	419	424	307	291
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	225	513	0	197	330	0	74	1271	0	456	330	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	238	1315	392	229	971	302	72	1568	0	490	2325	0
Arrive On Green	0.14	0.28	0.00	0.07	0.21	0.00	0.04	0.43	0.00	0.15	0.54	0.00
Sat Flow, veh/h	1645	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	225	513	0	197	330	0	74	1271	0	456	330	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	34.2	22.2	0.0	15.4	15.1	0.0	11.0	77.4	0.0	35.6	9.6	0.0
Cycle Q Clear(g_c), s	34.2	22.2	0.0	15.4	15.1	0.0	11.0	77.4	0.0	35.6	9.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	238	1315	392	229	971	302	72	1568	0	490	2325	0
V/C Ratio(X)	0.94	0.39	0.00	0.86	0.34	0.00	1.03	0.81	0.00	0.93	0.14	0.00
Avail Cap(c_a), veh/h	287	1315	392	809	971	302	72	1568	0	581	2325	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	107.0	73.7	0.0	116.0	85.7	0.0	120.8	62.7	0.0	105.6	28.7	0.0
Incr Delay (d2), s/veh	35.1	0.9	0.0	9.0	1.0	0.0	115.8	4.7	0.0	19.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.0	9.8	0.0	7.1	6.7	0.0	7.3	26.6	0.0	17.1	3.8	0.0
LnGrp Delay(d),s/veh	142.1	74.6	0.0	125.0	86.6	0.0	237.2	67.3	0.0	125.4	28.8	0.0
LnGrp LOS	F	E		F	F		F	E		F	C	
Approach Vol, veh/h		738			527			1345			786	
Approach Delay, s/veh		95.2			101.0			76.7			84.8	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	42.8	113.2	22.2	74.5	15.0	141.0	40.6	56.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	46.0	102.0	64.0	32.0	11.0	137.0	44.0	52.0
Max Q Clear Time (g_c+I1), s	37.6	79.4	17.4	24.2	13.0	11.6	36.2	17.1
Green Ext Time (p_c), s	1.2	13.1	0.7	3.5	0.0	22.0	0.4	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	86.4
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	288	570	169	82	300	20	233	172	101	42	109	173
Future Volume (veh/h)	288	570	169	82	300	20	233	172	101	42	109	173
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	303	600	135	86	316	16	245	181	43	44	115	22
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	443	1463	322	112	1421	71	301	880	203	73	540	101
Arrive On Green	0.13	0.35	0.35	0.06	0.29	0.29	0.17	0.31	0.31	0.04	0.18	0.18
Sat Flow, veh/h	3442	4148	914	1774	4956	248	1774	2838	656	1774	2967	553
Grp Volume(v), veh/h	303	488	247	86	215	117	245	111	113	44	67	70
Grp Sat Flow(s),veh/h/ln	1721	1695	1671	1774	1695	1814	1774	1770	1724	1774	1770	1750
Q Serve(g_s), s	5.8	7.5	7.7	3.3	3.3	3.4	9.1	3.2	3.3	1.7	2.2	2.3
Cycle Q Clear(g_c), s	5.8	7.5	7.7	3.3	3.3	3.4	9.1	3.2	3.3	1.7	2.2	2.3
Prop In Lane	1.00		0.55	1.00		0.14	1.00		0.38	1.00		0.32
Lane Grp Cap(c), veh/h	443	1195	589	112	972	520	301	549	534	73	322	318
V/C Ratio(X)	0.68	0.41	0.42	0.77	0.22	0.22	0.82	0.20	0.21	0.60	0.21	0.22
Avail Cap(c_a), veh/h	1806	2273	1120	284	1779	952	672	1496	1457	129	1057	1046
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.6	16.8	16.9	31.7	18.6	18.7	27.5	17.4	17.5	32.3	23.9	23.9
Incr Delay (d2), s/veh	1.9	0.2	0.5	10.6	0.1	0.2	5.4	0.2	0.2	7.6	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	3.5	3.6	1.9	1.6	1.7	4.9	1.6	1.6	1.0	1.1	1.2
LnGrp Delay(d),s/veh	30.4	17.0	17.3	42.3	18.8	18.9	32.8	17.6	17.7	39.9	24.2	24.3
LnGrp LOS	C	B	B	D	B	B	C	B	B	D	C	C
Approach Vol, veh/h		1038			418			469			181	
Approach Delay, s/veh		21.0			23.6			25.6			28.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.8	25.3	8.3	28.2	15.6	16.5	12.8	23.7
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	11.0	46.0	26.0	41.0	36.0	36.0
Max Q Clear Time (g_c+I1), s	3.7	5.3	5.3	9.7	11.1	4.3	7.8	5.4
Green Ext Time (p_c), s	0.0	2.3	0.1	9.1	0.6	2.3	1.1	8.7

Intersection Summary	
HCM 2010 Ctrl Delay	23.2
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	38	603	316	131	180	21
Future Vol, veh/h	38	603	316	131	180	21
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	41	648	340	141	194	23

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	341	0	-	0	683	172
Stage 1	-	-	-	-	341	-
Stage 2	-	-	-	-	342	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	804	-	-	-	446	716
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	633	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	803	-	-	-	423	715
Mov Cap-2 Maneuver	-	-	-	-	423	-
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	600	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	19.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	803	-	-	-	423	715
HCM Lane V/C Ratio	0.051	-	-	-	0.458	0.032
HCM Control Delay (s)	9.7	-	-	-	20.5	10.2
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	2.3	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	139	560	182	43	392	174	119	376	60	187	284	161
Future Volume (veh/h)	139	560	182	43	392	174	119	376	60	187	284	161
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	156	629	122	48	440	0	134	422	0	210	319	168
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	373	392	331	373	392	333	73	664	564	230	512	270
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.00	0.04	0.36	0.00	0.13	0.45	0.45
Sat Flow, veh/h	1774	1863	1576	1774	1863	1583	1774	1863	1583	1774	1150	606
Grp Volume(v), veh/h	156	629	122	48	440	0	134	422	0	210	0	487
Grp Sat Flow(s),veh/h/ln	1774	1863	1576	1774	1863	1583	1774	1863	1583	1774	0	1755
Q Serve(g_s), s	13.0	36.0	11.3	3.8	36.0	0.0	7.0	32.3	0.0	20.0	0.0	36.5
Cycle Q Clear(g_c), s	13.0	36.0	11.3	3.8	36.0	0.0	7.0	32.3	0.0	20.0	0.0	36.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	373	392	331	373	392	333	73	664	564	230	0	781
V/C Ratio(X)	0.42	1.61	0.37	0.13	1.12	0.00	1.85	0.64	0.00	0.91	0.00	0.62
Avail Cap(c_a), veh/h	373	392	331	373	392	333	73	664	564	269	0	781
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	58.5	67.6	57.9	54.9	67.6	0.0	82.1	45.9	0.0	73.5	0.0	36.5
Incr Delay (d2), s/veh	0.7	284.4	0.7	0.2	83.4	0.0	429.4	4.6	0.0	30.2	0.0	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	49.4	5.0	1.9	27.6	0.0	12.1	17.5	0.0	11.7	0.0	18.5
LnGrp Delay(d),s/veh	59.3	352.0	58.6	55.0	151.0	0.0	511.5	50.5	0.0	103.7	0.0	40.2
LnGrp LOS	E	F	E	E	F		F	D		F		D
Approach Vol, veh/h		907			488			556			697	
Approach Delay, s/veh		262.2			141.6			161.6			59.3	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	26.2	65.0		40.0	11.0	80.2		40.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	26.0	61.0		36.0	7.0	61.0		36.0
Max Q Clear Time (g_c+I1), s	22.0	34.3		38.0	9.0	38.5		38.0
Green Ext Time (p_c), s	0.2	6.7		0.0	0.0	6.3		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	165.4
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	21.8
Intersection LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	94	3	1	263	460	63
Future Vol, veh/h	94	3	1	263	460	63
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	100	3	1	280	489	67
Number of Lanes	0	1	1	0	1	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	10.6	11.7	29
HCM LOS	B	B	D

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	97%	0%	100%	0%
Vol Thru, %	3%	0%	0%	0%
Vol Right, %	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	97	264	460	63
LT Vol	94	0	460	0
Through Vol	3	1	0	0
RT Vol	0	263	0	63
Lane Flow Rate	103	281	489	67
Geometry Grp	2	2	7	7
Degree of Util (X)	0.178	0.405	0.83	0.091
Departure Headway (Hd)	6.22	5.19	6.107	4.896
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	576	697	592	733
Service Time	4.272	3.19	3.834	2.623
HCM Lane V/C Ratio	0.179	0.403	0.826	0.091
HCM Control Delay	10.6	11.7	31.9	8.1
HCM Lane LOS	B	B	D	A
HCM 95th-tile Q	0.6	2	8.6	0.3

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	456	6	4	255	7	5
Future Vol, veh/h	456	6	4	255	7	5
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	490	6	4	274	8	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	503	0	789	506
Stage 1	-	-	-	-	500	-
Stage 2	-	-	-	-	289	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1061	-	359	566
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	760	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1056	-	354	560
Mov Cap-2 Maneuver	-	-	-	-	354	-
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	753	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	418	-	-	1056	-
HCM Lane V/C Ratio	0.031	-	-	0.004	-
HCM Control Delay (s)	13.9	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	450	16	10	249	9	7
Future Vol, veh/h	450	16	10	249	9	7
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	474	17	11	262	9	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	496	0	775	492
Stage 1	-	-	-	-	487	-
Stage 2	-	-	-	-	288	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1068	-	366	577
Stage 1	-	-	-	-	618	-
Stage 2	-	-	-	-	761	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1064	-	359	572
Mov Cap-2 Maneuver	-	-	-	-	359	-
Stage 1	-	-	-	-	615	-
Stage 2	-	-	-	-	749	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	13.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	429	-	-	1064	-
HCM Lane V/C Ratio	0.039	-	-	0.01	-
HCM Control Delay (s)	13.7	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Intersection Delay, s/veh	75.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	84	377	8	24	226	191	5	219	70	298	121	66
Future Vol, veh/h	84	377	8	24	226	191	5	219	70	298	121	66
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	86	385	8	24	231	195	5	223	71	304	123	67
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	79.6	113.5	19.6	70.9
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	6%	0%	0%	100%	0%	0%	100%	0%	83%	0%
Vol Thru, %	94%	100%	0%	0%	100%	0%	0%	54%	17%	48%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	46%	0%	52%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	78	146	70	84	377	8	24	417	359	127
LT Vol	5	0	0	84	0	0	24	0	298	0
Through Vol	73	146	0	0	377	0	0	226	61	61
RT Vol	0	0	70	0	0	8	0	191	0	66
Lane Flow Rate	80	149	71	86	385	8	24	426	366	129
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.235	0.439	0.197	0.245	1.049	0.021	0.071	1.132	1.027	0.335
Departure Headway (Hd)	11.325	11.291	10.551	10.889	10.365	9.633	10.743	9.89	10.638	9.824
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	319	322	342	332	354	374	336	370	344	368
Service Time	9.025	8.991	8.251	8.589	8.065	7.333	8.443	7.59	8.338	7.524
HCM Lane V/C Ratio	0.251	0.463	0.208	0.259	1.088	0.021	0.071	1.151	1.064	0.351
HCM Control Delay	17.5	22.5	15.8	17.1	94.9	12.5	14.3	119.2	89.8	17.4
HCM Lane LOS	C	C	C	C	F	B	B	F	F	C
HCM 95th-tile Q	0.9	2.1	0.7	0.9	12.8	0.1	0.2	15.8	12	1.4

APPENDIX C: NEAR TERM LOS WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	280	130	90	360	240	200	430	100	320	720	690
Future Volume (veh/h)	320	280	130	90	360	240	200	430	100	320	720	690
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	348	304	0	98	391	0	217	467	0	348	861	418
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	452	1039	465	127	828	1012	314	1100	492	458	1299	537
Arrive On Green	0.13	0.29	0.00	0.07	0.23	0.00	0.09	0.31	0.00	0.13	0.35	0.35
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1541
Grp Volume(v), veh/h	348	304	0	98	391	0	217	467	0	348	861	418
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1541
Q Serve(g_s), s	8.0	5.5	0.0	4.5	7.8	0.0	5.0	8.6	0.0	7.8	16.1	19.9
Cycle Q Clear(g_c), s	8.0	5.5	0.0	4.5	7.8	0.0	5.0	8.6	0.0	7.8	16.1	19.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	452	1039	465	127	828	1012	314	1100	492	458	1299	537
V/C Ratio(X)	0.77	0.29	0.00	0.77	0.47	0.00	0.69	0.42	0.00	0.76	0.66	0.78
Avail Cap(c_a), veh/h	754	1551	694	389	1551	1581	796	1335	597	821	1406	581
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.5	22.4	0.0	37.5	27.1	0.0	36.2	22.5	0.0	34.5	22.7	23.9
Incr Delay (d2), s/veh	2.8	0.2	0.0	9.3	0.4	0.0	2.7	0.3	0.0	2.6	1.1	6.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	2.7	0.0	2.5	3.8	0.0	2.5	4.3	0.0	4.0	8.4	9.3
LnGrp Delay(d),s/veh	37.3	22.6	0.0	46.8	27.5	0.0	38.9	22.7	0.0	37.2	23.7	30.1
LnGrp LOS	D	C		D	C		D	C		D	C	C
Approach Vol, veh/h		652			489			684			1627	
Approach Delay, s/veh		30.4			31.4			27.9			28.2	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.6	29.5	9.9	28.1	11.5	32.6	14.8	23.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	18.0	36.0	19.0	31.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	9.8	10.6	6.5	7.5	7.0	21.9	10.0	9.8
Green Ext Time (p_c), s	0.8	10.6	0.2	4.8	0.5	6.1	0.8	4.7

Intersection Summary	
HCM 2010 Ctrl Delay	29.0
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	260	40	120	450	190	10	330	90	300	420	240
Future Volume (veh/h)	80	260	40	120	450	190	10	330	90	300	420	240
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	93	302	33	140	523	174	12	384	84	349	488	224
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	121	923	100	178	831	275	26	808	175	436	923	421
Arrive On Green	0.07	0.29	0.29	0.10	0.32	0.32	0.01	0.28	0.28	0.13	0.39	0.39
Sat Flow, veh/h	1774	3213	348	1774	2604	862	1774	2887	625	3442	2355	1074
Grp Volume(v), veh/h	93	165	170	140	355	342	12	234	234	349	366	346
Grp Sat Flow(s),veh/h/ln	1774	1770	1791	1774	1770	1697	1774	1770	1742	1721	1770	1659
Q Serve(g_s), s	4.0	5.7	5.8	6.0	13.3	13.4	0.5	8.5	8.7	7.7	12.3	12.4
Cycle Q Clear(g_c), s	4.0	5.7	5.8	6.0	13.3	13.4	0.5	8.5	8.7	7.7	12.3	12.4
Prop In Lane	1.00		0.19	1.00		0.51	1.00		0.36	1.00		0.65
Lane Grp Cap(c), veh/h	121	508	514	178	565	542	26	495	488	436	694	650
V/C Ratio(X)	0.77	0.32	0.33	0.79	0.63	0.63	0.46	0.47	0.48	0.80	0.53	0.53
Avail Cap(c_a), veh/h	365	1389	1406	365	1389	1332	251	820	807	487	820	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.6	21.8	21.8	34.2	22.5	22.6	38.0	23.2	23.3	33.0	18.1	18.2
Incr Delay (d2), s/veh	9.6	0.4	0.4	7.5	1.2	1.2	12.1	0.7	0.7	8.4	0.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	2.8	2.9	3.3	6.7	6.5	0.3	4.3	4.3	4.1	6.1	5.8
LnGrp Delay(d),s/veh	45.2	22.1	22.2	41.6	23.7	23.8	50.1	23.9	24.0	41.4	18.7	18.8
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	B	B
Approach Vol, veh/h		428			837			480			1061	
Approach Delay, s/veh		27.2			26.7			24.6			26.2	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.8	25.8	11.8	26.3	5.1	34.5	9.3	28.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	61.0	11.0	36.0	16.0	61.0
Max Q Clear Time (g_c+I1), s	10.7	10.7	8.0	7.8	2.5	14.4	6.0	15.4
Green Ext Time (p_c), s	0.2	8.9	0.2	8.7	0.0	8.3	0.1	8.6

Intersection Summary	
HCM 2010 Ctrl Delay	26.2
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	80	20	50	250	130	20	220	30	80	210	40
Future Vol, veh/h	80	80	20	50	250	130	20	220	30	80	210	40
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	101	25	63	316	165	25	278	38	101	266	51
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.1	20.4	17.9	20.5
HCM LOS	C	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	15%	0%	100%	0%	0%	100%	0%	0%	43%	0%
Vol Thru, %	85%	79%	0%	100%	57%	0%	100%	39%	57%	72%
Vol Right, %	0%	21%	0%	0%	43%	0%	0%	61%	0%	28%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	130	140	80	53	47	50	167	213	185	145
LT Vol	20	0	80	0	0	50	0	0	80	0
Through Vol	110	110	0	53	27	0	167	83	105	105
RT Vol	0	30	0	0	20	0	0	130	0	40
Lane Flow Rate	165	177	101	68	59	63	211	270	234	184
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.409	0.429	0.28	0.177	0.15	0.159	0.501	0.608	0.576	0.43
Departure Headway (Hd)	8.943	8.713	9.965	9.444	9.131	9.071	8.553	8.112	8.857	8.442
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	403	413	361	380	393	396	422	446	407	426
Service Time	6.695	6.465	7.724	7.203	6.89	6.819	6.302	5.861	6.608	6.193
HCM Lane V/C Ratio	0.409	0.429	0.28	0.179	0.15	0.159	0.5	0.605	0.575	0.432
HCM Control Delay	17.8	17.9	16.6	14.2	13.5	13.5	19.6	22.7	23	17.4
HCM Lane LOS	C	C	C	B	B	B	C	C	C	C
HCM 95th-tile Q	1.9	2.1	1.1	0.6	0.5	0.6	2.7	3.9	3.5	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	110	30	40	270	150	170	550	40	110	710	160
Future Volume (veh/h)	60	110	30	40	270	150	170	550	40	110	710	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	69	126	5	46	310	0	195	632	0	126	816	81
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	438	370	71	419	356	280	815	693	159	830	701
Arrive On Green	0.05	0.24	0.24	0.04	0.22	0.00	0.08	0.44	0.00	0.09	0.45	0.45
Sat Flow, veh/h	1774	1863	1573	1774	1863	1583	3442	1863	1583	1774	1863	1574
Grp Volume(v), veh/h	69	126	5	46	310	0	195	632	0	126	816	81
Grp Sat Flow(s),veh/h/ln	1774	1863	1573	1774	1863	1583	1721	1863	1583	1774	1863	1574
Q Serve(g_s), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	23.3	0.0	5.6	34.9	2.4
Cycle Q Clear(g_c), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	23.3	0.0	5.6	34.9	2.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	438	370	71	419	356	280	815	693	159	830	701
V/C Ratio(X)	0.78	0.29	0.01	0.65	0.74	0.00	0.70	0.78	0.00	0.79	0.98	0.12
Avail Cap(c_a), veh/h	176	922	779	176	922	784	426	830	706	220	830	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	25.3	23.7	38.2	29.1	0.0	36.1	19.4	0.0	36.0	22.1	13.1
Incr Delay (d2), s/veh	13.5	0.4	0.0	9.7	2.6	0.0	3.1	4.6	0.0	12.7	27.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.4	0.1	1.2	6.8	0.0	2.2	13.0	0.0	3.3	23.9	1.1
LnGrp Delay(d),s/veh	51.4	25.7	23.7	47.9	31.7	0.0	39.3	23.9	0.0	48.8	49.1	13.2
LnGrp LOS	D	C	C	D	C		D	C		D	D	B
Approach Vol, veh/h		200			356			827			1023	
Approach Delay, s/veh		34.5			33.8			27.5			46.2	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	39.3	7.2	23.0	10.6	40.0	8.0	22.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	40.0	10.0	36.0	8.0	40.0
Max Q Clear Time (g_c+I1), s	7.6	25.3	4.1	6.5	6.5	36.9	5.1	14.5
Green Ext Time (p_c), s	0.1	6.7	0.0	3.0	0.2	0.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	37.0
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	90	40	510	180	360	20	470	230	630	990	180
Future Volume (veh/h)	50	90	40	510	180	360	20	470	230	630	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	93	0	526	186	0	21	485	0	649	1021	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	68	426	133	650	1191	371	37	955	0	773	2337	0
Arrive On Green	0.04	0.09	0.00	0.20	0.25	0.00	0.02	0.28	0.00	0.24	0.50	0.00
Sat Flow, veh/h	1645	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	93	0	526	186	0	21	485	0	649	1021	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	2.7	1.6	0.0	13.4	2.6	0.0	1.1	10.1	0.0	16.5	11.9	0.0
Cycle Q Clear(g_c), s	2.7	1.6	0.0	13.4	2.6	0.0	1.1	10.1	0.0	16.5	11.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	68	426	133	650	1191	371	37	955	0	773	2337	0
V/C Ratio(X)	0.76	0.22	0.00	0.81	0.16	0.00	0.57	0.51	0.00	0.84	0.44	0.00
Avail Cap(c_a), veh/h	598	1989	619	1346	1989	619	587	1660	0	1159	2337	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.5	36.0	0.0	32.4	24.8	0.0	41.3	26.0	0.0	30.8	13.9	0.0
Incr Delay (d2), s/veh	15.8	0.3	0.0	2.5	0.1	0.0	12.8	0.4	0.0	3.6	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.7	0.0	6.1	1.1	0.0	0.6	3.2	0.0	7.6	5.1	0.0
LnGrp Delay(d),s/veh	56.3	36.3	0.0	34.9	24.9	0.0	54.1	26.4	0.0	34.4	14.0	0.0
LnGrp LOS	E	D		C	C		D	C		C	B	
Approach Vol, veh/h		145			712			506			1670	
Approach Delay, s/veh		43.5			32.3			27.6			21.9	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.7	27.6	21.4	11.7	6.0	46.3	7.5	25.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	19.5	12.1	15.4	3.6	3.1	13.9	4.7	4.6
Green Ext Time (p_c), s	2.2	11.1	2.0	2.1	0.0	13.5	0.1	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	26.3
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	340	90	440	30	290	170	30	50	140	160
Future Volume (veh/h)	180	260	340	90	440	30	290	170	30	50	140	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	130	98	478	24	315	185	20	54	152	24
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	317	1074	452	129	1432	71	325	973	104	88	516	80
Arrive On Green	0.09	0.31	0.31	0.07	0.29	0.29	0.18	0.30	0.30	0.05	0.17	0.17
Sat Flow, veh/h	3442	3478	1465	1774	4952	247	1774	3215	343	1774	3054	471
Grp Volume(v), veh/h	196	275	138	98	326	176	315	101	104	54	87	89
Grp Sat Flow(s),veh/h/ln	1721	1695	1553	1774	1695	1808	1774	1770	1788	1774	1770	1755
Q Serve(g_s), s	3.3	3.7	4.0	3.3	4.5	4.6	10.6	2.5	2.6	1.8	2.6	2.7
Cycle Q Clear(g_c), s	3.3	3.7	4.0	3.3	4.5	4.6	10.6	2.5	2.6	1.8	2.6	2.7
Prop In Lane	1.00		0.94	1.00		0.14	1.00		0.19	1.00		0.27
Lane Grp Cap(c), veh/h	317	1047	480	129	980	523	325	536	541	88	299	297
V/C Ratio(X)	0.62	0.26	0.29	0.76	0.33	0.34	0.97	0.19	0.19	0.62	0.29	0.30
Avail Cap(c_a), veh/h	917	2033	931	473	2033	1084	325	1061	1072	325	1061	1052
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.2	15.6	15.7	27.3	16.8	16.8	24.4	15.5	15.5	28.0	21.8	21.8
Incr Delay (d2), s/veh	2.0	0.1	0.3	8.9	0.2	0.4	41.5	0.2	0.2	6.8	0.5	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	1.7	1.8	1.9	2.2	2.4	8.9	1.3	1.3	1.0	1.3	1.3
LnGrp Delay(d),s/veh	28.2	15.7	16.1	36.3	17.0	17.2	65.9	15.6	15.7	34.8	22.3	22.4
LnGrp LOS	C	B	B	D	B	B	E	B	B	C	C	C
Approach Vol, veh/h		609			600			520			230	
Approach Delay, s/veh		19.8			20.2			46.1			25.3	
Approach LOS		B			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.0	22.2	8.4	22.5	15.0	14.2	9.5	21.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	36.0	11.0	36.0	16.0	36.0
Max Q Clear Time (g_c+I1), s	3.8	4.6	5.3	6.0	12.6	4.7	5.3	6.6
Green Ext Time (p_c), s	0.0	2.3	0.2	7.2	0.0	2.3	0.5	7.1

Intersection Summary	
HCM 2010 Ctrl Delay	27.6
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	310	550	210	210	30
Future Vol, veh/h	20	310	550	210	210	30
Conflicting Peds, #/hr	10	0	0	2	2	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	373	663	253	253	36

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	673	0	-	0	873	351
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	200	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	561	-	-	-	359	551
Stage 1	-	-	-	-	381	-
Stage 2	-	-	-	-	748	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	556	-	-	-	338	542
Mov Cap-2 Maneuver	-	-	-	-	338	-
Stage 1	-	-	-	-	378	-
Stage 2	-	-	-	-	710	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	37.8
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	556	-	-	-	338	542
HCM Lane V/C Ratio	0.043	-	-	-	0.749	0.067
HCM Control Delay (s)	11.8	-	-	-	41.5	12.1
HCM Lane LOS	B	-	-	-	E	B
HCM 95th %tile Q(veh)	0.1	-	-	-	5.8	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	560	200	70	680	300	170	260	80	270	440	90
Future Volume (veh/h)	150	560	200	70	680	300	170	260	80	270	440	90
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.81	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	183	683	103	85	829	0	207	317	0	329	537	105
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	124	490	219	94	963	463	195	500	425	303	499	97
Arrive On Green	0.17	0.17	0.17	0.29	0.29	0.00	0.11	0.27	0.00	0.17	0.33	0.33
Sat Flow, veh/h	726	2870	1285	321	3295	1583	1774	1863	1583	1774	1513	296
Grp Volume(v), veh/h	460	406	103	488	426	0	207	317	0	329	0	642
Grp Sat Flow(s),veh/h/ln	1826	1770	1285	1847	1770	1583	1774	1863	1583	1774	0	1809
Q Serve(g_s), s	28.0	28.0	11.8	41.7	36.8	0.0	18.0	24.6	0.0	28.0	0.0	54.0
Cycle Q Clear(g_c), s	28.0	28.0	11.8	41.7	36.8	0.0	18.0	24.6	0.0	28.0	0.0	54.0
Prop In Lane	0.40		1.00	0.17		1.00	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	312	302	219	540	517	463	195	500	425	303	0	596
V/C Ratio(X)	1.48	1.34	0.47	0.90	0.82	0.00	1.06	0.63	0.00	1.09	0.00	1.08
Avail Cap(c_a), veh/h	312	302	219	608	583	522	195	614	522	303	0	596
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.0	68.0	61.3	55.8	54.0	0.0	73.0	52.9	0.0	68.0	0.0	55.0
Incr Delay (d2), s/veh	230.4	174.7	1.6	15.9	8.4	0.0	82.0	1.5	0.0	76.5	0.0	59.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	34.1	28.4	4.3	23.7	19.2	0.0	13.3	12.9	0.0	20.2	0.0	36.8
LnGrp Delay(d),s/veh	298.4	242.6	62.8	71.7	62.5	0.0	155.0	54.4	0.0	144.5	0.0	114.3
LnGrp LOS	F	F	E	E	E		F	D		F		F
Approach Vol, veh/h		969			914			524			971	
Approach Delay, s/veh		250.0			67.4			94.1			124.5	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.0	48.0		32.0	22.0	58.0		51.9
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	28.0	54.0		28.0	18.0	54.0		54.0
Max Q Clear Time (g_c+I1), s	30.0	26.6		30.0	20.0	56.0		43.7
Green Ext Time (p_c), s	0.0	7.3		0.0	0.0	0.0		4.2

Intersection Summary	
HCM 2010 Ctrl Delay	140.4
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	16.3
Intersection LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	110	0	10	420	270	110
Future Vol, veh/h	110	0	10	420	270	110
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	129	0	12	494	318	129
Number of Lanes	0	1	1	0	1	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	11	18	16
HCM LOS	B	C	C

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%
Vol Thru, %	0%	2%	0%	0%
Vol Right, %	0%	98%	0%	100%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	110	430	270	110
LT Vol	110	0	270	0
Through Vol	0	10	0	0
RT Vol	0	420	0	110
Lane Flow Rate	129	506	318	129
Geometry Grp	2	2	7	7
Degree of Util (X)	0.222	0.688	0.589	0.196
Departure Headway (Hd)	6.166	4.897	6.679	5.463
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	580	744	540	656
Service Time	4.225	2.897	4.423	3.206
HCM Lane V/C Ratio	0.222	0.68	0.589	0.197
HCM Control Delay	11	18	18.6	9.5
HCM Lane LOS	B	C	C	A
HCM 95th-tile Q	0.8	5.5	3.8	0.7

Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	230	40	30	370	50	60
Future Vol, veh/h	230	40	30	370	50	60
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	284	49	37	457	62	74

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	340	0	854	323
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	538	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1219	-	329	718
Stage 1	-	-	-	-	739	-
Stage 2	-	-	-	-	585	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1212	-	312	710
Mov Cap-2 Maneuver	-	-	-	-	312	-
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	558	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	16.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	449	-	-	1212	-
HCM Lane V/C Ratio	0.302	-	-	0.031	-
HCM Control Delay (s)	16.5	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	270	10	10	410	20	20
Future Vol, veh/h	270	10	10	410	20	20
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	307	11	11	466	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	325	0	816	327
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	496	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1235	-	347	714
Stage 1	-	-	-	-	736	-
Stage 2	-	-	-	-	612	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1228	-	339	706
Mov Cap-2 Maneuver	-	-	-	-	339	-
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	601	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	13.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	458	-	-	1228	-
HCM Lane V/C Ratio	0.099	-	-	0.009	-
HCM Control Delay (s)	13.7	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Intersection Delay, s/veh	95.2
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	150	10	10	300	220	30	150	20	270	200	130
Future Vol, veh/h	90	150	10	10	300	220	30	150	20	270	200	130
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	99	165	11	11	330	242	33	165	22	297	220	143
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	19.5	204.3	17.3	56.4
HCM LOS	C	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	38%	0%	0%	100%	0%	0%	100%	0%	73%	0%
Vol Thru, %	62%	100%	0%	0%	100%	0%	0%	58%	27%	43%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	42%	0%	57%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	100	20	90	150	10	10	520	370	230
LT Vol	30	0	0	90	0	0	10	0	270	0
Through Vol	50	100	0	0	150	0	0	300	100	100
RT Vol	0	0	20	0	0	10	0	220	0	130
Lane Flow Rate	88	110	22	99	165	11	11	571	407	253
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.243	0.298	0.055	0.276	0.437	0.027	0.029	1.376	0.996	0.566
Departure Headway (Hd)	11.033	10.837	10.101	10.991	10.467	9.734	9.483	8.667	9.7	8.915
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	328	334	357	329	346	370	378	423	378	407
Service Time	8.733	8.537	7.801	8.691	8.167	7.434	7.228	6.411	7.4	6.615
HCM Lane V/C Ratio	0.268	0.329	0.062	0.301	0.477	0.03	0.029	1.35	1.077	0.622
HCM Control Delay	17.2	18.1	13.4	17.8	21	12.7	12.5	208	77.4	22.6
HCM Lane LOS	C	C	B	C	C	B	B	F	F	C
HCM 95th-tile Q	0.9	1.2	0.2	1.1	2.1	0.1	0.1	27.2	11.7	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	700	560	260	90	400	350	150	550	120	280	590	430
Future Volume (veh/h)	700	560	260	90	400	350	150	550	120	280	590	430
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	737	589	0	95	421	0	158	579	0	295	621	218
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	863	1434	642	122	791	924	230	945	423	384	1148	469
Arrive On Green	0.25	0.41	0.00	0.07	0.22	0.00	0.07	0.27	0.00	0.11	0.31	0.31
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1522
Grp Volume(v), veh/h	737	589	0	95	421	0	158	579	0	295	621	218
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1522
Q Serve(g_s), s	21.7	12.6	0.0	5.6	11.1	0.0	4.8	15.2	0.0	8.6	14.7	12.3
Cycle Q Clear(g_c), s	21.7	12.6	0.0	5.6	11.1	0.0	4.8	15.2	0.0	8.6	14.7	12.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	863	1434	642	122	791	924	230	945	423	384	1148	469
V/C Ratio(X)	0.85	0.41	0.00	0.78	0.53	0.00	0.69	0.61	0.00	0.77	0.54	0.46
Avail Cap(c_a), veh/h	3336	3830	1713	484	1366	1377	745	2032	909	968	2349	960
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.0	22.5	0.0	48.7	36.4	0.0	48.5	34.1	0.0	46.1	30.5	29.7
Incr Delay (d2), s/veh	2.5	0.2	0.0	10.0	0.6	0.0	3.6	0.6	0.0	3.3	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.6	6.2	0.0	3.1	5.5	0.0	2.4	7.5	0.0	4.4	7.7	5.3
LnGrp Delay(d),s/veh	40.5	22.7	0.0	58.7	36.9	0.0	52.1	34.8	0.0	49.3	30.9	30.4
LnGrp LOS	D	C		E	D		D	C		D	C	C
Approach Vol, veh/h		1326			516			737			1134	
Approach Delay, s/veh		32.6			40.9			38.5			35.6	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.5	32.4	11.3	47.1	11.1	36.8	30.7	27.7
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	61.0	29.0	115.0	23.0	67.0	103.0	41.0
Max Q Clear Time (g_c+I1), s	10.6	17.2	7.6	14.6	6.8	16.7	23.7	13.1
Green Ext Time (p_c), s	0.9	11.1	0.2	8.4	0.4	11.4	3.0	7.5

Intersection Summary	
HCM 2010 Ctrl Delay	35.8
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	540	40	100	400	310	50	480	90	340	280	110
Future Volume (veh/h)	260	540	40	100	400	310	50	480	90	340	280	110
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	280	581	39	108	430	231	54	516	85	366	301	85
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	319	1233	83	137	582	309	69	810	133	458	985	273
Arrive On Green	0.18	0.37	0.37	0.08	0.26	0.26	0.04	0.27	0.27	0.13	0.36	0.36
Sat Flow, veh/h	1774	3360	225	1774	2201	1169	1774	3031	497	3442	2728	756
Grp Volume(v), veh/h	280	306	314	108	345	316	54	300	301	366	193	193
Grp Sat Flow(s),veh/h/ln	1774	1770	1815	1774	1770	1600	1774	1770	1759	1721	1770	1714
Q Serve(g_s), s	15.8	13.6	13.7	6.2	18.3	18.7	3.1	15.4	15.6	10.6	8.1	8.3
Cycle Q Clear(g_c), s	15.8	13.6	13.7	6.2	18.3	18.7	3.1	15.4	15.6	10.6	8.1	8.3
Prop In Lane	1.00		0.12	1.00		0.73	1.00		0.28	1.00		0.44
Lane Grp Cap(c), veh/h	319	650	666	137	468	423	69	473	470	458	639	619
V/C Ratio(X)	0.88	0.47	0.47	0.79	0.74	0.75	0.78	0.63	0.64	0.80	0.30	0.31
Avail Cap(c_a), veh/h	551	721	740	344	515	466	138	635	632	835	927	898
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.1	24.9	25.0	46.7	34.6	34.7	49.1	33.3	33.4	43.3	23.6	23.7
Incr Delay (d2), s/veh	8.0	0.5	0.5	9.5	5.0	5.9	16.7	1.4	1.5	3.3	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.5	6.7	6.9	3.4	9.6	9.0	1.9	7.7	7.7	5.2	4.0	4.0
LnGrp Delay(d),s/veh	49.2	25.5	25.5	56.2	39.6	40.7	65.8	34.7	34.8	46.6	23.9	24.0
LnGrp LOS	D	C	C	E	D	D	E	C	C	D	C	C
Approach Vol, veh/h		900			769			655			752	
Approach Delay, s/veh		32.9			42.4			37.3			35.0	
Approach LOS		C			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.7	31.5	12.0	41.8	8.0	41.2	22.5	31.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	37.0	20.0	42.0	8.0	54.0	32.0	30.0
Max Q Clear Time (g_c+I1), s	12.6	17.6	8.2	15.7	5.1	10.3	17.8	20.7
Green Ext Time (p_c), s	1.1	6.4	0.2	9.9	0.0	7.9	0.7	5.4

Intersection Summary	
HCM 2010 Ctrl Delay	36.7
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	16.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	250	20	80	140	60	20	180	70	110	220	30
Future Vol, veh/h	90	250	20	80	140	60	20	180	70	110	220	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	278	22	89	156	67	22	200	78	122	244	33
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.9	14.4	15.9	19.7
HCM LOS	C	B	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	18%	0%	100%	0%	0%	100%	0%	0%	50%	0%
Vol Thru, %	82%	56%	0%	100%	81%	0%	100%	44%	50%	79%
Vol Right, %	0%	44%	0%	0%	19%	0%	0%	56%	0%	21%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	110	160	90	167	103	80	93	107	220	140
LT Vol	20	0	90	0	0	80	0	0	110	0
Through Vol	90	90	0	167	83	0	93	47	110	110
RT Vol	0	70	0	0	20	0	0	60	0	30
Lane Flow Rate	122	178	100	185	115	89	104	119	244	156
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.294	0.408	0.25	0.435	0.266	0.228	0.252	0.274	0.581	0.352
Departure Headway (Hd)	8.665	8.262	8.983	8.466	8.326	9.249	8.731	8.324	8.555	8.15
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	414	436	400	426	432	388	412	431	425	443
Service Time	6.418	6.014	6.733	6.216	6.076	7.002	6.484	6.076	6.255	5.85
HCM Lane V/C Ratio	0.295	0.408	0.25	0.434	0.266	0.229	0.252	0.276	0.574	0.352
HCM Control Delay	15	16.6	14.7	17.6	14.1	14.7	14.4	14.2	22.5	15.2
HCM Lane LOS	B	C	B	C	B	B	B	B	C	C
HCM 95th-tile Q	1.2	1.9	1	2.2	1.1	0.9	1	1.1	3.6	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	280	40	30	180	100	80	590	40	160	550	170
Future Volume (veh/h)	140	280	40	30	180	100	80	590	40	160	550	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	295	8	32	189	0	84	621	0	168	579	88
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	112	398	332	45	328	279	147	818	695	211	960	811
Arrive On Green	0.06	0.21	0.21	0.03	0.18	0.00	0.04	0.44	0.00	0.12	0.52	0.52
Sat Flow, veh/h	1774	1863	1554	1774	1863	1583	3442	1863	1583	1774	1863	1575
Grp Volume(v), veh/h	147	295	8	32	189	0	84	621	0	168	579	88
Grp Sat Flow(s),veh/h/ln	1774	1863	1554	1774	1863	1583	1721	1863	1583	1774	1863	1575
Q Serve(g_s), s	5.0	11.7	0.3	1.4	7.3	0.0	1.9	22.1	0.0	7.3	17.3	2.3
Cycle Q Clear(g_c), s	5.0	11.7	0.3	1.4	7.3	0.0	1.9	22.1	0.0	7.3	17.3	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	112	398	332	45	328	279	147	818	695	211	960	811
V/C Ratio(X)	1.31	0.74	0.02	0.71	0.58	0.00	0.57	0.76	0.00	0.80	0.60	0.11
Avail Cap(c_a), veh/h	112	944	788	135	968	823	567	2219	1886	540	2479	2096
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.0	29.0	24.5	38.2	29.8	0.0	37.1	18.6	0.0	33.8	13.5	9.8
Incr Delay (d2), s/veh	188.5	2.7	0.0	18.1	1.6	0.0	3.5	1.5	0.0	6.7	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	6.3	0.1	0.9	3.9	0.0	1.0	11.5	0.0	3.9	9.0	1.0
LnGrp Delay(d),s/veh	225.4	31.7	24.5	56.3	31.4	0.0	40.5	20.1	0.0	40.5	14.1	9.9
LnGrp LOS	F	C	C	E	C		D	C		D	B	A
Approach Vol, veh/h		450			221			705			835	
Approach Delay, s/veh		94.9			35.0			22.5			19.0	
Approach LOS		F			D			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.4	38.6	6.0	20.9	7.4	44.7	9.0	17.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	24.0	94.0	6.0	40.0	13.0	105.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	9.3	24.1	3.4	13.7	3.9	19.3	7.0	9.3
Green Ext Time (p_c), s	0.4	10.5	0.0	3.2	0.1	10.6	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	37.2
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	510	40	230	330	460	70	1210	530	460	320	300
Future Volume (veh/h)	220	510	40	230	330	460	70	1210	530	460	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	548	0	247	355	0	75	1301	0	495	344	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	250	1264	376	281	963	300	71	1510	0	526	2306	0
Arrive On Green	0.15	0.27	0.00	0.09	0.20	0.00	0.04	0.42	0.00	0.16	0.54	0.00
Sat Flow, veh/h	1645	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	548	0	247	355	0	75	1301	0	495	344	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	36.4	24.5	0.0	19.5	16.5	0.0	11.0	83.1	0.0	39.1	10.3	0.0
Cycle Q Clear(g_c), s	36.4	24.5	0.0	19.5	16.5	0.0	11.0	83.1	0.0	39.1	10.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	250	1264	376	281	963	300	71	1510	0	526	2306	0
V/C Ratio(X)	0.95	0.43	0.00	0.88	0.37	0.00	1.06	0.86	0.00	0.94	0.15	0.00
Avail Cap(c_a), veh/h	284	1264	376	802	963	300	71	1510	0	576	2306	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	107.0	77.2	0.0	114.8	87.2	0.0	121.9	67.7	0.0	105.1	29.6	0.0
Incr Delay (d2), s/veh	37.4	1.1	0.0	8.7	1.1	0.0	122.9	6.7	0.0	22.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.2	10.8	0.0	8.9	7.3	0.0	7.4	28.8	0.0	18.9	4.1	0.0
LnGrp Delay(d),s/veh	144.4	78.3	0.0	123.5	88.3	0.0	246.1	74.4	0.0	128.0	29.7	0.0
LnGrp LOS	F	E		F	F		F	E		F	C	
Approach Vol, veh/h		785			602			1376			839	
Approach Delay, s/veh		98.2			102.8			83.7			87.7	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	46.0	110.0	26.4	72.3	15.0	141.0	42.7	56.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	46.0	102.0	64.0	32.0	11.0	137.0	44.0	52.0
Max Q Clear Time (g_c+I1), s	41.1	85.1	21.5	26.5	13.0	12.3	38.4	18.5
Green Ext Time (p_c), s	0.9	11.0	0.9	2.9	0.0	23.3	0.3	7.8

Intersection Summary	
HCM 2010 Ctrl Delay	91.0
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	180	90	380	40	240	180	110	90	120	200
Future Volume (veh/h)	310	700	180	90	380	40	240	180	110	90	120	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	154	95	400	34	253	189	43	95	126	22
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	457	1548	320	123	1455	122	304	811	180	118	538	92
Arrive On Green	0.13	0.37	0.37	0.07	0.30	0.30	0.17	0.28	0.28	0.07	0.18	0.18
Sat Flow, veh/h	3442	4204	868	1774	4775	400	1774	2862	634	1774	3014	514
Grp Volume(v), veh/h	326	593	298	95	282	152	253	115	117	95	73	75
Grp Sat Flow(s),veh/h/ln	1721	1695	1682	1774	1695	1785	1774	1770	1727	1774	1770	1758
Q Serve(g_s), s	6.8	10.1	10.3	4.0	4.8	4.9	10.4	3.7	3.9	4.0	2.7	2.8
Cycle Q Clear(g_c), s	6.8	10.1	10.3	4.0	4.8	4.9	10.4	3.7	3.9	4.0	2.7	2.8
Prop In Lane	1.00		0.52	1.00		0.22	1.00		0.37	1.00		0.29
Lane Grp Cap(c), veh/h	457	1249	619	123	1033	544	304	502	490	118	316	314
V/C Ratio(X)	0.71	0.47	0.48	0.77	0.27	0.28	0.83	0.23	0.24	0.81	0.23	0.24
Avail Cap(c_a), veh/h	1645	2071	1027	259	1621	853	612	1363	1330	118	963	957
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.3	18.2	18.3	34.5	19.9	19.9	30.1	20.7	20.7	34.7	26.5	26.6
Incr Delay (d2), s/veh	2.1	0.3	0.6	9.8	0.1	0.3	5.9	0.2	0.2	32.4	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	4.7	4.8	2.3	2.3	2.4	5.6	1.9	1.9	3.0	1.3	1.4
LnGrp Delay(d),s/veh	33.4	18.5	18.8	44.3	20.0	20.2	36.0	20.9	21.0	67.0	26.9	26.9
LnGrp LOS	C	B	B	D	B	C	D	C	C	E	C	C
Approach Vol, veh/h		1217			529			485			243	
Approach Delay, s/veh		22.6			24.4			28.8			42.6	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	25.4	9.2	31.7	16.9	17.4	14.0	27.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	11.0	46.0	26.0	41.0	36.0	36.0
Max Q Clear Time (g_c+I1), s	6.8	5.9	6.0	12.3	12.4	4.8	8.8	6.9
Green Ext Time (p_c), s	0.0	2.4	0.1	11.8	0.6	2.4	1.2	11.2

Intersection Summary	
HCM 2010 Ctrl Delay	26.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	850	420	170	230	30
Future Vol, veh/h	40	850	420	170	230	30
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	914	452	183	247	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	453	0	-	0	906	228
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	453	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	713	-	-	-	346	660
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	555	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	712	-	-	-	325	659
Mov Cap-2 Maneuver	-	-	-	-	325	-
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	521	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	40.2
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	712	-	-	-	325	659
HCM Lane V/C Ratio	0.06	-	-	-	0.761	0.049
HCM Control Delay (s)	10.4	-	-	-	44.1	10.7
HCM Lane LOS	B	-	-	-	E	B
HCM 95th %tile Q(veh)	0.2	-	-	-	5.9	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	890	190	50	550	200	130	390	70	200	290	170
Future Volume (veh/h)	150	890	190	50	550	200	130	390	70	200	290	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	169	1000	125	56	618	0	146	438	0	225	326	178
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	650	329	59	687	326	72	660	561	244	512	279
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.00	0.04	0.35	0.00	0.14	0.45	0.45
Sat Flow, veh/h	498	3109	1576	287	3331	1583	1774	1863	1583	1774	1134	619
Grp Volume(v), veh/h	623	546	125	360	314	0	146	438	0	225	0	504
Grp Sat Flow(s),veh/h/ln	1838	1770	1576	1848	1770	1583	1774	1863	1583	1774	0	1753
Q Serve(g_s), s	36.0	36.0	11.7	33.1	29.5	0.0	7.0	34.2	0.0	21.6	0.0	38.1
Cycle Q Clear(g_c), s	36.0	36.0	11.7	33.1	29.5	0.0	7.0	34.2	0.0	21.6	0.0	38.1
Prop In Lane	0.27		1.00	0.16		1.00	1.00		1.00	1.00		0.35
Lane Grp Cap(c), veh/h	384	370	329	381	365	326	72	660	561	244	0	791
V/C Ratio(X)	1.62	1.47	0.38	0.95	0.86	0.00	2.02	0.66	0.00	0.92	0.00	0.64
Avail Cap(c_a), veh/h	384	370	329	386	370	331	72	660	561	268	0	791
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.1	68.1	58.5	67.4	66.0	0.0	82.6	47.0	0.0	73.3	0.0	36.4
Incr Delay (d2), s/veh	292.1	227.8	0.7	31.9	18.0	0.0	506.1	5.2	0.0	33.2	0.0	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	49.4	41.0	5.2	20.3	16.3	0.0	13.6	18.6	0.0	12.9	0.0	19.3
LnGrp Delay(d),s/veh	360.2	295.9	59.2	99.3	83.9	0.0	588.7	52.2	0.0	106.5	0.0	40.3
LnGrp LOS	F	F	E	F	F		F	D		F		D
Approach Vol, veh/h		1294			674			584			729	
Approach Delay, s/veh		304.0			92.2			186.3			60.7	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.7	65.0		40.0	11.0	81.7		39.5
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	26.0	61.0		36.0	7.0	61.0		36.0
Max Q Clear Time (g_c+I1), s	23.6	36.2		38.0	9.0	40.1		35.1
Green Ext Time (p_c), s	0.2	6.8		0.0	0.0	6.4		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	185.5
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	23.9
Intersection LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	100	10	10	270	470	70
Future Vol, veh/h	100	10	10	270	470	70
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	106	11	11	287	500	74
Number of Lanes	0	1	1	0	1	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	1
HCM Control Delay	11	12.3	32.6
HCM LOS	B	B	D

Lane	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	91%	0%	100%	0%
Vol Thru, %	9%	4%	0%	0%
Vol Right, %	0%	96%	0%	100%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	110	280	470	70
LT Vol	100	0	470	0
Through Vol	10	10	0	0
RT Vol	0	270	0	70
Lane Flow Rate	117	298	500	74
Geometry Grp	2	2	7	7
Degree of Util (X)	0.205	0.435	0.863	0.103
Departure Headway (Hd)	6.307	5.258	6.21	4.998
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	568	682	585	718
Service Time	4.364	3.307	3.934	2.722
HCM Lane V/C Ratio	0.206	0.437	0.855	0.103
HCM Control Delay	11	12.3	36.2	8.3
HCM Lane LOS	B	B	E	A
HCM 95th-tile Q	0.8	2.2	9.6	0.3

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	470	10	10	260	10	10
Future Vol, veh/h	470	10	10	260	10	10
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	505	11	11	280	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	522	0	824	523
Stage 1	-	-	-	-	517	-
Stage 2	-	-	-	-	307	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1044	-	343	554
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	746	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1039	-	335	548
Mov Cap-2 Maneuver	-	-	-	-	335	-
Stage 1	-	-	-	-	595	-
Stage 2	-	-	-	-	733	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	416	-	-	1039	-
HCM Lane V/C Ratio	0.052	-	-	0.01	-
HCM Control Delay (s)	14.1	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	460	20	20	260	10	10
Future Vol, veh/h	460	20	20	260	10	10
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	484	21	21	274	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	510	0	821	505
Stage 1	-	-	-	-	500	-
Stage 2	-	-	-	-	321	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1055	-	344	567
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	735	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1051	-	333	562
Mov Cap-2 Maneuver	-	-	-	-	333	-
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	714	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	418	-	-	1051	-
HCM Lane V/C Ratio	0.05	-	-	0.02	-
HCM Control Delay (s)	14.1	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	91.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	390	10	30	240	200	10	230	80	310	130	80
Future Vol, veh/h	90	390	10	30	240	200	10	230	80	310	130	80
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	92	398	10	31	245	204	10	235	82	316	133	82
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	94.5	143	20.9	85.2
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	12%	0%	0%	100%	0%	0%	100%	0%	83%	0%
Vol Thru, %	88%	100%	0%	0%	100%	0%	0%	55%	17%	45%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	45%	0%	55%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	153	80	90	390	10	30	440	375	145
LT Vol	10	0	0	90	0	0	30	0	310	0
Through Vol	77	153	0	0	390	0	0	240	65	65
RT Vol	0	0	80	0	0	10	0	200	0	80
Lane Flow Rate	88	156	82	92	398	10	31	449	383	148
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.264	0.465	0.227	0.268	1.105	0.026	0.09	1.218	1.091	0.389
Departure Headway (Hd)	11.836	11.775	11.032	11.348	10.823	10.087	11.13	10.277	11.045	10.209
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	305	308	327	319	338	357	324	359	333	355
Service Time	9.536	9.475	8.732	9.048	8.523	7.787	8.83	7.977	8.745	7.909
HCM Lane V/C Ratio	0.289	0.506	0.251	0.288	1.178	0.028	0.096	1.251	1.15	0.417
HCM Control Delay	18.7	24.3	16.9	18.2	114.2	13.1	14.9	151.7	110.7	19.3
HCM Lane LOS	C	C	C	C	F	B	B	F	F	C
HCM 95th-tile Q	1	2.3	0.9	1.1	14.1	0.1	0.3	18.3	13.5	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	283	130	91	361	240	200	455	102	320	728	690
Future Volume (veh/h)	320	283	130	91	361	240	200	455	102	320	728	690
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	348	308	0	99	392	0	217	495	0	348	866	421
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	452	1036	464	129	829	1012	314	1102	493	458	1301	538
Arrive On Green	0.13	0.29	0.00	0.07	0.23	0.00	0.09	0.31	0.00	0.13	0.35	0.35
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1541
Grp Volume(v), veh/h	348	308	0	99	392	0	217	495	0	348	866	421
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1541
Q Serve(g_s), s	8.1	5.6	0.0	4.5	7.9	0.0	5.0	9.2	0.0	7.8	16.2	20.2
Cycle Q Clear(g_c), s	8.1	5.6	0.0	4.5	7.9	0.0	5.0	9.2	0.0	7.8	16.2	20.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	452	1036	464	129	829	1012	314	1102	493	458	1301	538
V/C Ratio(X)	0.77	0.30	0.00	0.77	0.47	0.00	0.69	0.45	0.00	0.76	0.67	0.78
Avail Cap(c_a), veh/h	752	1546	692	387	1546	1577	793	1331	596	818	1401	580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	22.6	0.0	37.5	27.2	0.0	36.3	22.7	0.0	34.7	22.7	24.0
Incr Delay (d2), s/veh	2.8	0.2	0.0	9.2	0.4	0.0	2.7	0.3	0.0	2.6	1.1	6.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	2.7	0.0	2.5	3.9	0.0	2.5	4.5	0.0	4.0	8.5	9.5
LnGrp Delay(d),s/veh	37.4	22.7	0.0	46.8	27.6	0.0	39.1	23.0	0.0	37.3	23.8	30.4
LnGrp LOS	D	C		D	C		D	C		D	C	C
Approach Vol, veh/h		656			491			712			1635	
Approach Delay, s/veh		30.5			31.5			27.9			28.4	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.6	29.7	10.0	28.1	11.5	32.8	14.8	23.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	18.0	36.0	19.0	31.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	9.8	11.2	6.5	7.6	7.0	22.2	10.1	9.9
Green Ext Time (p_c), s	0.8	10.7	0.2	4.9	0.5	6.1	0.8	4.8

Intersection Summary	
HCM 2010 Ctrl Delay	29.1
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	277	43	120	455	190	11	330	90	300	420	252
Future Volume (veh/h)	118	277	43	120	455	190	11	330	90	300	420	252
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	137	322	37	140	529	173	13	384	84	349	488	230
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	173	997	114	177	822	268	28	782	169	428	886	415
Arrive On Green	0.10	0.31	0.31	0.10	0.31	0.31	0.02	0.27	0.27	0.12	0.38	0.38
Sat Flow, veh/h	1774	3194	364	1774	2617	852	1774	2887	625	3442	2332	1093
Grp Volume(v), veh/h	137	177	182	140	357	345	13	234	234	349	370	348
Grp Sat Flow(s),veh/h/ln	1774	1770	1788	1774	1770	1699	1774	1770	1742	1721	1770	1656
Q Serve(g_s), s	6.3	6.3	6.5	6.4	14.4	14.5	0.6	9.2	9.4	8.2	13.6	13.7
Cycle Q Clear(g_c), s	6.3	6.3	6.5	6.4	14.4	14.5	0.6	9.2	9.4	8.2	13.6	13.7
Prop In Lane	1.00		0.20	1.00		0.50	1.00		0.36	1.00		0.66
Lane Grp Cap(c), veh/h	173	553	558	177	556	534	28	479	472	428	672	629
V/C Ratio(X)	0.79	0.32	0.33	0.79	0.64	0.65	0.47	0.49	0.50	0.82	0.55	0.55
Avail Cap(c_a), veh/h	342	1302	1316	342	1302	1250	235	768	756	457	768	719
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.6	21.8	21.8	36.5	24.4	24.5	40.5	25.4	25.5	35.4	20.2	20.2
Incr Delay (d2), s/veh	7.8	0.3	0.3	7.8	1.2	1.3	11.9	0.8	0.8	10.4	0.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	3.2	3.2	3.5	7.2	7.0	0.4	4.6	4.6	4.5	6.7	6.3
LnGrp Delay(d),s/veh	44.4	22.1	22.2	44.3	25.7	25.8	52.3	26.2	26.3	45.8	20.9	21.0
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		496			842			481			1067	
Approach Delay, s/veh		28.3			28.8			26.9			29.1	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.3	26.5	12.3	29.9	5.3	35.5	12.1	30.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	61.0	11.0	36.0	16.0	61.0
Max Q Clear Time (g_c+I1), s	10.2	11.4	8.4	8.5	2.6	15.7	8.3	16.5
Green Ext Time (p_c), s	0.1	8.8	0.2	9.0	0.0	8.1	0.2	8.8

Intersection Summary	
HCM 2010 Ctrl Delay	28.5
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	80	20	50	250	130	20	222	30	80	211	40
Future Vol, veh/h	80	80	20	50	250	130	20	222	30	80	211	40
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	101	25	63	316	165	25	281	38	101	267	51
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.1	20.6	18	20.7
HCM LOS	C	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	15%	0%	100%	0%	0%	100%	0%	0%	43%	0%
Vol Thru, %	85%	79%	0%	100%	57%	0%	100%	39%	57%	73%
Vol Right, %	0%	21%	0%	0%	43%	0%	0%	61%	0%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	131	141	80	53	47	50	167	213	186	146
LT Vol	20	0	80	0	0	50	0	0	80	0
Through Vol	111	111	0	53	27	0	167	83	106	106
RT Vol	0	30	0	0	20	0	0	130	0	40
Lane Flow Rate	166	178	101	68	59	63	211	270	235	184
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.413	0.433	0.281	0.178	0.15	0.16	0.503	0.61	0.579	0.433
Departure Headway (Hd)	8.957	8.728	9.989	9.468	9.156	9.092	8.575	8.133	8.876	8.462
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	401	412	359	379	392	395	420	443	406	425
Service Time	6.712	6.483	7.751	7.23	6.917	6.842	6.325	5.883	6.628	6.214
HCM Lane V/C Ratio	0.414	0.432	0.281	0.179	0.151	0.159	0.502	0.609	0.579	0.433
HCM Control Delay	17.9	18	16.6	14.3	13.5	13.6	19.7	22.9	23.2	17.6
HCM Lane LOS	C	C	C	B	B	B	C	C	C	C
HCM 95th-tile Q	2	2.1	1.1	0.6	0.5	0.6	2.7	4	3.5	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	110	30	40	270	150	170	577	40	110	718	160
Future Volume (veh/h)	60	110	30	40	270	150	170	577	40	110	718	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	69	126	5	46	310	0	195	663	0	126	825	82
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	438	370	71	419	356	280	815	693	159	830	701
Arrive On Green	0.05	0.24	0.24	0.04	0.22	0.00	0.08	0.44	0.00	0.09	0.45	0.45
Sat Flow, veh/h	1774	1863	1573	1774	1863	1583	3442	1863	1583	1774	1863	1574
Grp Volume(v), veh/h	69	126	5	46	310	0	195	663	0	126	825	82
Grp Sat Flow(s),veh/h/ln	1774	1863	1573	1774	1863	1583	1721	1863	1583	1774	1863	1574
Q Serve(g_s), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	25.1	0.0	5.6	35.6	2.5
Cycle Q Clear(g_c), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	25.1	0.0	5.6	35.6	2.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	438	370	71	419	356	280	815	693	159	830	701
V/C Ratio(X)	0.78	0.29	0.01	0.65	0.74	0.00	0.70	0.81	0.00	0.79	0.99	0.12
Avail Cap(c_a), veh/h	176	922	779	176	922	784	426	830	706	220	830	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	25.3	23.7	38.2	29.1	0.0	36.1	19.9	0.0	36.0	22.3	13.1
Incr Delay (d2), s/veh	13.5	0.4	0.0	9.7	2.6	0.0	3.1	6.2	0.0	12.7	29.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.4	0.1	1.2	6.8	0.0	2.2	14.3	0.0	3.3	24.9	1.1
LnGrp Delay(d),s/veh	51.4	25.7	23.7	47.9	31.7	0.0	39.3	26.0	0.0	48.8	51.9	13.2
LnGrp LOS	D	C	C	D	C		D	C		D	D	B
Approach Vol, veh/h		200			356			858			1033	
Approach Delay, s/veh		34.5			33.8			29.0			48.5	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	39.3	7.2	23.0	10.6	40.0	8.0	22.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	40.0	10.0	36.0	8.0	40.0
Max Q Clear Time (g_c+I1), s	7.6	27.1	4.1	6.5	6.5	37.6	5.1	14.5
Green Ext Time (p_c), s	0.1	6.0	0.0	3.0	0.2	0.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	38.4
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	93	40	542	191	371	20	470	240	633	990	180
Future Volume (veh/h)	50	93	40	542	191	371	20	470	240	633	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	96	0	559	197	0	21	485	0	653	1021	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	68	432	134	683	1247	388	37	927	0	774	2301	0
Arrive On Green	0.04	0.09	0.00	0.21	0.26	0.00	0.02	0.27	0.00	0.24	0.49	0.00
Sat Flow, veh/h	1645	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	96	0	559	197	0	21	485	0	653	1021	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	2.7	1.6	0.0	14.5	2.8	0.0	1.1	10.4	0.0	17.0	12.3	0.0
Cycle Q Clear(g_c), s	2.7	1.6	0.0	14.5	2.8	0.0	1.1	10.4	0.0	17.0	12.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	68	432	134	683	1247	388	37	927	0	774	2301	0
V/C Ratio(X)	0.77	0.22	0.00	0.82	0.16	0.00	0.57	0.52	0.00	0.84	0.44	0.00
Avail Cap(c_a), veh/h	585	1949	607	1319	1949	607	575	1626	0	1136	2301	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.4	36.7	0.0	32.6	24.6	0.0	42.1	27.1	0.0	31.4	14.6	0.0
Incr Delay (d2), s/veh	16.5	0.3	0.0	2.5	0.1	0.0	13.0	0.5	0.0	4.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.7	0.0	6.6	1.2	0.0	0.6	3.4	0.0	7.9	5.3	0.0
LnGrp Delay(d),s/veh	57.9	36.9	0.0	35.1	24.7	0.0	55.1	27.6	0.0	35.4	14.7	0.0
LnGrp LOS	E	D		D	C		E	C		D	B	
Approach Vol, veh/h		148			756			506			1674	
Approach Delay, s/veh		44.3			32.4			28.7			22.8	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.1	27.4	22.6	12.0	6.0	46.5	7.6	27.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	21.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	19.0	12.4	16.5	3.6	3.1	14.3	4.7	4.8
Green Ext Time (p_c), s	2.1	10.6	2.1	2.2	0.0	13.4	0.1	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	27.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	356	101	440	30	343	242	67	50	162	160
Future Volume (veh/h)	180	260	356	101	440	30	343	242	67	50	162	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	135	110	478	24	373	263	49	54	176	25
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	314	1015	442	144	1413	70	316	937	172	87	578	81
Arrive On Green	0.09	0.30	0.30	0.08	0.29	0.29	0.18	0.32	0.32	0.05	0.19	0.19
Sat Flow, veh/h	3442	3436	1498	1774	4952	247	1774	2970	544	1774	3103	432
Grp Volume(v), veh/h	196	279	139	110	326	176	373	155	157	54	99	102
Grp Sat Flow(s),veh/h/ln	1721	1695	1544	1774	1695	1808	1774	1770	1744	1774	1770	1766
Q Serve(g_s), s	3.4	3.9	4.3	3.8	4.7	4.8	11.0	4.1	4.2	1.8	3.0	3.1
Cycle Q Clear(g_c), s	3.4	3.9	4.3	3.8	4.7	4.8	11.0	4.1	4.2	1.8	3.0	3.1
Prop In Lane	1.00		0.97	1.00		0.14	1.00		0.31	1.00		0.24
Lane Grp Cap(c), veh/h	314	1001	456	144	967	516	316	558	550	87	330	329
V/C Ratio(X)	0.62	0.28	0.31	0.76	0.34	0.34	1.18	0.28	0.29	0.62	0.30	0.31
Avail Cap(c_a), veh/h	891	1976	900	460	1976	1054	316	1031	1017	316	1031	1029
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.0	16.7	16.9	27.8	17.5	17.5	25.4	15.9	15.9	28.8	21.7	21.7
Incr Delay (d2), s/veh	2.0	0.1	0.4	8.0	0.2	0.4	109.1	0.3	0.3	7.1	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	1.8	1.9	2.2	2.2	2.4	14.8	2.0	2.1	1.1	1.5	1.6
LnGrp Delay(d),s/veh	29.1	16.9	17.2	35.8	17.7	17.9	134.4	16.1	16.2	35.9	22.2	22.2
LnGrp LOS	C	B	B	D	B	B	F	B	B	D	C	C
Approach Vol, veh/h		614			612			685			255	
Approach Delay, s/veh		20.8			21.0			80.6			25.1	
Approach LOS		C			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.0	23.5	9.0	22.2	15.0	15.5	9.6	21.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	36.0	11.0	36.0	16.0	36.0
Max Q Clear Time (g_c+I1), s	3.8	6.2	5.8	6.3	13.0	5.1	5.4	6.8
Green Ext Time (p_c), s	0.0	3.2	0.2	7.2	0.0	3.2	0.5	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	40.3
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	22	345	561	210	210	31
Future Vol, veh/h	22	345	561	210	210	31
Conflicting Peds, #/hr	10	0	0	2	2	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	416	676	253	253	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	686	0	-	0	907	358
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	221	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	553	-	-	-	346	545
Stage 1	-	-	-	-	374	-
Stage 2	-	-	-	-	730	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	548	-	-	-	323	536
Mov Cap-2 Maneuver	-	-	-	-	323	-
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	688	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	42.3
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	548	-	-	-	323	536
HCM Lane V/C Ratio	0.048	-	-	-	0.783	0.07
HCM Control Delay (s)	11.9	-	-	-	46.8	12.2
HCM Lane LOS	B	-	-	-	E	B
HCM 95th %tile Q(veh)	0.2	-	-	-	6.3	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	164	579	200	74	686	300	170	273	93	270	444	94
Future Volume (veh/h)	164	579	200	74	686	300	170	273	93	270	444	94
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	200	706	107	90	837	0	207	333	0	329	541	110
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	120	449	200	97	946	456	180	568	483	281	543	110
Arrive On Green	0.16	0.16	0.16	0.29	0.29	0.00	0.10	0.31	0.00	0.16	0.36	0.36
Sat Flow, veh/h	758	2836	1264	336	3280	1583	1774	1863	1583	1774	1502	305
Grp Volume(v), veh/h	481	425	107	495	432	0	207	333	0	329	0	651
Grp Sat Flow(s),veh/h/ln	1825	1770	1264	1846	1770	1583	1774	1863	1583	1774	0	1808
Q Serve(g_s), s	28.0	28.0	13.8	46.2	40.7	0.0	18.0	26.8	0.0	28.0	0.0	63.6
Cycle Q Clear(g_c), s	28.0	28.0	13.8	46.2	40.7	0.0	18.0	26.8	0.0	28.0	0.0	63.6
Prop In Lane	0.42		1.00	0.18		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	289	280	200	532	510	456	180	568	483	281	0	653
V/C Ratio(X)	1.67	1.52	0.54	0.93	0.85	0.00	1.15	0.59	0.00	1.17	0.00	1.00
Avail Cap(c_a), veh/h	289	280	200	563	540	483	180	568	483	281	0	653
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	74.5	74.5	68.5	61.3	59.3	0.0	79.5	52.1	0.0	74.5	0.0	56.4
Incr Delay (d2), s/veh	315.3	250.4	2.8	21.7	11.5	0.0	112.3	4.4	0.0	108.8	0.0	34.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	39.4	33.1	5.0	26.7	21.5	0.0	14.4	14.5	0.0	22.2	0.0	38.1
LnGrp Delay(d),s/veh	389.8	324.9	71.3	82.9	70.8	0.0	191.8	56.4	0.0	183.3	0.0	90.7
LnGrp LOS	F	F	E	F	E		F	E		F		F
Approach Vol, veh/h		1013			927			540			980	
Approach Delay, s/veh		328.9			77.3			108.3			121.8	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.0	58.0		32.0	22.0	68.0		55.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	28.0	54.0		28.0	18.0	54.0		54.0
Max Q Clear Time (g_c+I1), s	30.0	28.8		30.0	20.0	65.6		48.2
Green Ext Time (p_c), s	0.0	7.4		0.0	0.0	0.0		2.9

Intersection Summary	
HCM 2010 Ctrl Delay	168.4
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	23.2
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	446	258	2	278	162
Future Vol, veh/h	11	446	258	2	278	162
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	525	304	2	327	191
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	30.1	17.5	19.3
HCM LOS	D	C	C

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	2%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	98%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	260	457	278	162
LT Vol	0	11	278	0
Through Vol	258	0	0	162
RT Vol	2	446	0	0
Lane Flow Rate	306	538	327	191
Geometry Grp	5	2	7	7
Degree of Util (X)	0.553	0.83	0.656	0.356
Departure Headway (Hd)	6.511	5.555	7.226	6.715
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	551	645	497	532
Service Time	4.608	3.638	5.025	4.513
HCM Lane V/C Ratio	0.555	0.834	0.658	0.359
HCM Control Delay	17.5	30.1	22.9	13.2
HCM Lane LOS	C	D	C	B
HCM 95th-tile Q	3.3	8.9	4.7	1.6

Intersection	
Int Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	232	48	44	371	76	105
Future Vol, veh/h	232	48	44	371	76	105
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	258	53	49	412	84	117

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	318	0	808	298
Stage 1	-	-	-	-	291	-
Stage 2	-	-	-	-	517	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1242	-	350	741
Stage 1	-	-	-	-	759	-
Stage 2	-	-	-	-	598	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1235	-	328	732
Mov Cap-2 Maneuver	-	-	-	-	328	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	564	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	17.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	482	-	-	1235	-
HCM Lane V/C Ratio	0.417	-	-	0.04	-
HCM Control Delay (s)	17.7	-	-	8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	317	10	10	424	20	20
Future Vol, veh/h	317	10	10	424	20	20
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	360	11	11	482	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	379	0	885	380
Stage 1	-	-	-	-	373	-
Stage 2	-	-	-	-	512	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1179	-	315	667
Stage 1	-	-	-	-	696	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1172	-	307	659
Mov Cap-2 Maneuver	-	-	-	-	307	-
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	591	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	419	-	-	1172	-
HCM Lane V/C Ratio	0.108	-	-	0.01	-
HCM Control Delay (s)	14.6	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Intersection Delay, s/veh	100
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	116	171	10	10	306	220	30	150	20	270	200	138
Future Vol, veh/h	116	171	10	10	306	220	30	150	20	270	200	138
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	127	188	11	11	336	242	33	165	22	297	220	152
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	21.8	218.1	17.9	61.2
HCM LOS	C	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	38%	0%	0%	100%	0%	0%	100%	0%	73%	0%
Vol Thru, %	62%	100%	0%	0%	100%	0%	0%	58%	27%	42%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	42%	0%	58%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	100	20	116	171	10	10	526	370	238
LT Vol	30	0	0	116	0	0	10	0	270	0
Through Vol	50	100	0	0	171	0	0	306	100	100
RT Vol	0	0	20	0	0	10	0	220	0	138
Lane Flow Rate	88	110	22	127	188	11	11	578	407	262
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.25	0.307	0.057	0.359	0.503	0.027	0.029	1.407	1.019	0.6
Departure Headway (Hd)	11.409	11.211	10.474	11.145	10.621	9.887	9.818	9.003	9.981	9.183
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	316	323	344	325	342	364	367	410	366	395
Service Time	9.109	8.911	8.174	8.845	8.321	7.587	7.518	6.703	7.681	6.883
HCM Lane V/C Ratio	0.278	0.341	0.064	0.391	0.55	0.03	0.03	1.41	1.112	0.663
HCM Control Delay	17.9	18.8	13.8	20	23.6	12.9	12.8	222	84.7	24.7
HCM Lane LOS	C	C	B	C	C	B	B	F	F	C
HCM 95th-tile Q	1	1.3	0.2	1.6	2.7	0.1	0.1	27.9	12.2	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	700	561	260	92	403	350	150	565	121	280	615	430
Future Volume (veh/h)	700	561	260	92	403	350	150	565	121	280	615	430
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	737	591	0	97	424	0	158	595	0	295	647	218
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	861	1422	636	125	785	918	229	965	432	382	1169	478
Arrive On Green	0.25	0.40	0.00	0.07	0.22	0.00	0.07	0.27	0.00	0.11	0.31	0.31
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1523
Grp Volume(v), veh/h	737	591	0	97	424	0	158	595	0	295	647	218
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1523
Q Serve(g_s), s	22.1	13.0	0.0	5.8	11.5	0.0	4.9	15.9	0.0	8.8	15.6	12.4
Cycle Q Clear(g_c), s	22.1	13.0	0.0	5.8	11.5	0.0	4.9	15.9	0.0	8.8	15.6	12.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	861	1422	636	125	785	918	229	965	432	382	1169	478
V/C Ratio(X)	0.86	0.42	0.00	0.78	0.54	0.00	0.69	0.62	0.00	0.77	0.55	0.46
Avail Cap(c_a), veh/h	3272	3756	1681	475	1339	1355	731	1993	891	950	2304	942
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.8	23.3	0.0	49.5	37.3	0.0	49.5	34.4	0.0	47.0	30.9	29.8
Incr Delay (d2), s/veh	2.6	0.2	0.0	10.0	0.6	0.0	3.7	0.6	0.0	3.3	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.9	6.4	0.0	3.2	5.7	0.0	2.4	7.9	0.0	4.5	8.1	5.3
LnGrp Delay(d),s/veh	41.4	23.5	0.0	59.6	37.9	0.0	53.2	35.1	0.0	50.4	31.3	30.4
LnGrp LOS	D	C		E	D		D	D		D	C	C
Approach Vol, veh/h		1328			521			753			1160	
Approach Delay, s/veh		33.4			41.9			38.9			36.0	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.7	33.5	11.6	47.5	11.2	38.0	31.1	28.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	61.0	29.0	115.0	23.0	67.0	103.0	41.0
Max Q Clear Time (g_c+I1), s	10.8	17.9	7.8	15.0	6.9	17.6	24.1	13.5
Green Ext Time (p_c), s	0.9	11.6	0.2	8.5	0.4	11.9	3.0	7.5

Intersection Summary	
HCM 2010 Ctrl Delay	36.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	550	41	100	417	310	53	480	90	340	280	148
Future Volume (veh/h)	282	550	41	100	417	310	53	480	90	340	280	148
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	303	591	40	108	448	235	57	516	85	366	301	102
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	341	1266	86	137	581	302	73	799	131	454	921	305
Arrive On Green	0.19	0.38	0.38	0.08	0.26	0.26	0.04	0.26	0.26	0.13	0.35	0.35
Sat Flow, veh/h	1774	3358	227	1774	2220	1153	1774	3031	497	3442	2600	862
Grp Volume(v), veh/h	303	311	320	108	356	327	57	300	301	366	203	200
Grp Sat Flow(s),veh/h/ln	1774	1770	1815	1774	1770	1603	1774	1770	1759	1721	1770	1692
Q Serve(g_s), s	17.7	14.2	14.2	6.4	19.8	20.1	3.4	16.0	16.2	11.0	8.9	9.2
Cycle Q Clear(g_c), s	17.7	14.2	14.2	6.4	19.8	20.1	3.4	16.0	16.2	11.0	8.9	9.2
Prop In Lane	1.00		0.13	1.00		0.72	1.00		0.28	1.00		0.51
Lane Grp Cap(c), veh/h	341	667	684	137	464	420	73	467	464	454	627	600
V/C Ratio(X)	0.89	0.47	0.47	0.79	0.77	0.78	0.78	0.64	0.65	0.81	0.32	0.33
Avail Cap(c_a), veh/h	533	698	715	333	498	451	133	615	611	808	897	858
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.9	25.1	25.1	48.3	36.3	36.4	50.6	34.8	34.8	44.9	25.1	25.2
Incr Delay (d2), s/veh	11.2	0.5	0.5	9.7	6.7	7.9	15.9	1.5	1.5	3.4	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	7.0	7.2	3.5	10.6	9.8	2.0	8.0	8.1	5.5	4.4	4.3
LnGrp Delay(d),s/veh	53.1	25.6	25.6	58.0	43.0	44.3	66.5	36.3	36.4	48.3	25.4	25.5
LnGrp LOS	D	C	C	E	D	D	E	D	D	D	C	C
Approach Vol, veh/h		934			791			658			769	
Approach Delay, s/veh		34.5			45.6			38.9			36.3	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.1	32.1	12.2	44.2	8.4	41.8	24.5	31.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	37.0	20.0	42.0	8.0	54.0	32.0	30.0
Max Q Clear Time (g_c+I1), s	13.0	18.2	8.4	16.2	5.4	11.2	19.7	22.1
Green Ext Time (p_c), s	1.1	6.5	0.2	10.1	0.0	8.1	0.7	4.9

Intersection Summary	
HCM 2010 Ctrl Delay	38.7
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	250	20	80	140	60	20	181	70	110	222	30
Future Vol, veh/h	90	250	20	80	140	60	20	181	70	110	222	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	278	22	89	156	67	22	201	78	122	247	33
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.9	14.4	16	19.7
HCM LOS	C	B	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	18%	0%	100%	0%	0%	100%	0%	0%	50%	0%
Vol Thru, %	82%	56%	0%	100%	81%	0%	100%	44%	50%	79%
Vol Right, %	0%	44%	0%	0%	19%	0%	0%	56%	0%	21%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	111	161	90	167	103	80	93	107	221	141
LT Vol	20	0	90	0	0	80	0	0	110	0
Through Vol	91	91	0	167	83	0	93	47	111	111
RT Vol	0	70	0	0	20	0	0	60	0	30
Lane Flow Rate	123	178	100	185	115	89	104	119	246	157
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.296	0.41	0.25	0.436	0.266	0.229	0.252	0.275	0.581	0.353
Departure Headway (Hd)	8.679	8.277	8.999	8.482	8.342	9.266	8.748	8.34	8.522	8.119
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	415	435	400	426	431	388	411	431	425	443
Service Time	6.423	6.021	6.743	6.226	6.086	7.011	6.493	6.085	6.264	5.861
HCM Lane V/C Ratio	0.296	0.409	0.25	0.434	0.267	0.229	0.253	0.276	0.579	0.354
HCM Control Delay	15	16.7	14.7	17.7	14.1	14.8	14.4	14.2	22.5	15.2
HCM Lane LOS	B	C	B	C	B	B	B	B	C	C
HCM 95th-tile Q	1.2	2	1	2.2	1.1	0.9	1	1.1	3.6	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	280	40	30	180	100	80	606	40	160	577	170
Future Volume (veh/h)	140	280	40	30	180	100	80	606	40	160	577	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	295	8	32	189	0	84	638	0	168	607	85
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	109	394	329	45	327	278	146	836	710	210	977	826
Arrive On Green	0.06	0.21	0.21	0.03	0.18	0.00	0.04	0.45	0.00	0.12	0.52	0.52
Sat Flow, veh/h	1774	1863	1553	1774	1863	1583	3442	1863	1583	1774	1863	1575
Grp Volume(v), veh/h	147	295	8	32	189	0	84	638	0	168	607	85
Grp Sat Flow(s),veh/h/ln	1774	1863	1553	1774	1863	1583	1721	1863	1583	1774	1863	1575
Q Serve(g_s), s	5.0	12.1	0.3	1.5	7.6	0.0	2.0	23.5	0.0	7.5	18.8	2.2
Cycle Q Clear(g_c), s	5.0	12.1	0.3	1.5	7.6	0.0	2.0	23.5	0.0	7.5	18.8	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	109	394	329	45	327	278	146	836	710	210	977	826
V/C Ratio(X)	1.35	0.75	0.02	0.71	0.58	0.00	0.57	0.76	0.00	0.80	0.62	0.10
Avail Cap(c_a), veh/h	109	913	761	130	935	795	548	2145	1823	521	2396	2026
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.3	30.1	25.5	39.5	30.9	0.0	38.4	18.9	0.0	35.1	13.7	9.8
Incr Delay (d2), s/veh	207.5	2.9	0.0	18.8	1.6	0.0	3.5	1.5	0.0	6.9	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	6.5	0.1	0.9	4.0	0.0	1.0	12.4	0.0	4.1	9.8	1.0
LnGrp Delay(d),s/veh	245.8	33.0	25.5	58.3	32.5	0.0	41.9	20.4	0.0	41.9	14.3	9.8
LnGrp LOS	F	C	C	E	C		D	C		D	B	A
Approach Vol, veh/h		450			221			722			860	
Approach Delay, s/veh		102.4			36.2			22.9			19.3	
Approach LOS		F			D			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.7	40.6	6.1	21.3	7.5	46.8	9.0	18.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	24.0	94.0	6.0	40.0	13.0	105.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	9.5	25.5	3.5	14.1	4.0	20.8	7.0	9.6
Green Ext Time (p_c), s	0.4	11.2	0.0	3.2	0.1	11.2	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	38.7
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	520	40	248	336	466	70	1210	561	470	320	300
Future Volume (veh/h)	220	520	40	248	336	466	70	1210	561	470	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	559	0	267	361	0	75	1301	0	505	344	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	250	1234	367	302	963	300	71	1500	0	535	2306	0
Arrive On Green	0.15	0.26	0.00	0.09	0.20	0.00	0.04	0.41	0.00	0.17	0.54	0.00
Sat Flow, veh/h	1645	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	559	0	267	361	0	75	1301	0	505	344	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	36.4	25.3	0.0	21.1	16.8	0.0	11.0	83.5	0.0	39.9	10.3	0.0
Cycle Q Clear(g_c), s	36.4	25.3	0.0	21.1	16.8	0.0	11.0	83.5	0.0	39.9	10.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	250	1234	367	302	963	300	71	1500	0	535	2306	0
V/C Ratio(X)	0.95	0.45	0.00	0.89	0.37	0.00	1.06	0.87	0.00	0.94	0.15	0.00
Avail Cap(c_a), veh/h	284	1234	367	802	963	300	71	1500	0	576	2306	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	107.0	78.8	0.0	114.0	87.3	0.0	121.9	68.3	0.0	104.8	29.6	0.0
Incr Delay (d2), s/veh	37.4	1.2	0.0	8.5	1.1	0.0	122.9	7.0	0.0	23.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.2	11.2	0.0	9.7	7.4	0.0	7.4	28.9	0.0	19.4	4.1	0.0
LnGrp Delay(d),s/veh	144.4	80.0	0.0	122.5	88.5	0.0	246.1	75.3	0.0	128.5	29.7	0.0
LnGrp LOS	F	E		F	F		F	E		F	C	
Approach Vol, veh/h		796			628			1376			849	
Approach Delay, s/veh		99.2			102.9			84.6			88.5	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	46.7	109.3	28.1	70.6	15.0	141.0	42.7	56.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	46.0	102.0	64.0	32.0	11.0	137.0	44.0	52.0
Max Q Clear Time (g_c+I1), s	41.9	85.5	23.1	27.3	13.0	12.3	38.4	18.8
Green Ext Time (p_c), s	0.8	10.8	1.0	2.6	0.0	23.3	0.3	7.9

Intersection Summary	
HCM 2010 Ctrl Delay	91.8
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	232	126	380	40	271	222	131	90	192	200
Future Volume (veh/h)	310	700	232	126	380	40	271	222	131	90	192	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	197	133	400	34	285	234	77	95	202	65
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	438	1347	355	165	1453	122	329	867	277	100	535	167
Arrive On Green	0.13	0.34	0.34	0.09	0.30	0.30	0.19	0.33	0.33	0.06	0.20	0.20
Sat Flow, veh/h	3442	3982	1050	1774	4775	400	1774	2620	836	1774	2642	823
Grp Volume(v), veh/h	326	626	308	133	282	152	285	156	155	95	133	134
Grp Sat Flow(s),veh/h/ln	1721	1695	1642	1774	1695	1785	1774	1770	1686	1774	1770	1696
Q Serve(g_s), s	8.1	13.3	13.5	6.5	5.6	5.7	13.8	5.7	6.0	4.7	5.7	6.0
Cycle Q Clear(g_c), s	8.1	13.3	13.5	6.5	5.6	5.7	13.8	5.7	6.0	4.7	5.7	6.0
Prop In Lane	1.00		0.64	1.00		0.22	1.00		0.50	1.00		0.49
Lane Grp Cap(c), veh/h	438	1147	555	165	1032	543	329	586	558	100	358	343
V/C Ratio(X)	0.74	0.55	0.55	0.80	0.27	0.28	0.87	0.27	0.28	0.95	0.37	0.39
Avail Cap(c_a), veh/h	1401	1763	854	221	1380	726	521	1160	1106	100	820	786
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.2	23.8	23.8	39.3	23.4	23.4	35.0	21.7	21.8	41.6	30.4	30.6
Incr Delay (d2), s/veh	2.5	0.4	0.9	14.5	0.1	0.3	9.0	0.2	0.3	72.8	0.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	6.2	6.2	3.8	2.6	2.9	7.5	2.8	2.8	4.3	2.9	2.9
LnGrp Delay(d),s/veh	39.8	24.2	24.7	53.8	23.5	23.7	43.9	21.9	22.1	114.4	31.1	31.3
LnGrp LOS	D	C	C	D	C	C	D	C	C	F	C	C
Approach Vol, veh/h		1260			567			596			362	
Approach Delay, s/veh		28.3			30.6			32.5			53.0	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	33.3	12.2	33.9	20.4	21.9	15.3	30.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	11.0	46.0	26.0	41.0	36.0	36.0
Max Q Clear Time (g_c+I1), s	10.7	8.0	8.5	15.5	15.8	8.0	10.1	7.7
Green Ext Time (p_c), s	0.0	3.9	0.1	11.9	0.6	3.8	1.2	11.6

Intersection Summary	
HCM 2010 Ctrl Delay	32.9
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	41	870	455	170	230	32
Future Vol, veh/h	41	870	455	170	230	32
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	935	489	183	247	34

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	490	0	-	0	953	247
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	463	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	685	-	-	-	328	642
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	549	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	684	-	-	-	306	641
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	513	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	47
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	684	-	-	-	306	641
HCM Lane V/C Ratio	0.064	-	-	-	0.808	0.054
HCM Control Delay (s)	10.6	-	-	-	52	10.9
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	6.6	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	901	190	63	569	200	130	398	77	200	303	184
Future Volume (veh/h)	158	901	190	63	569	200	130	398	77	200	303	184
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	178	1012	126	71	639	0	146	447	0	225	340	192
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	644	328	72	681	330	72	658	559	244	504	284
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.00	0.04	0.35	0.00	0.14	0.45	0.45
Sat Flow, veh/h	515	3091	1576	345	3270	1583	1774	1863	1583	1774	1119	632
Grp Volume(v), veh/h	635	555	126	379	331	0	146	447	0	225	0	532
Grp Sat Flow(s),veh/h/ln	1837	1770	1576	1845	1770	1583	1774	1863	1583	1774	0	1751
Q Serve(g_s), s	36.0	36.0	11.9	35.4	31.4	0.0	7.0	35.3	0.0	21.6	0.0	41.5
Cycle Q Clear(g_c), s	36.0	36.0	11.9	35.4	31.4	0.0	7.0	35.3	0.0	21.6	0.0	41.5
Prop In Lane	0.28		1.00	0.19		1.00	1.00		1.00	1.00		0.36
Lane Grp Cap(c), veh/h	383	369	328	384	369	330	72	658	559	244	0	788
V/C Ratio(X)	1.66	1.51	0.38	0.99	0.90	0.00	2.03	0.68	0.00	0.92	0.00	0.67
Avail Cap(c_a), veh/h	383	369	328	384	369	330	72	658	559	267	0	788
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.4	68.4	58.9	68.2	66.6	0.0	82.9	47.6	0.0	73.6	0.0	37.5
Incr Delay (d2), s/veh	307.6	241.6	0.7	42.1	23.6	0.0	509.1	5.6	0.0	33.4	0.0	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	50.9	42.3	5.2	22.5	17.9	0.0	13.6	19.2	0.0	12.9	0.0	21.1
LnGrp Delay(d),s/veh	376.0	310.0	59.6	110.3	90.2	0.0	592.0	53.2	0.0	107.0	0.0	42.1
LnGrp LOS	F	F	E	F	F		F	D		F		D
Approach Vol, veh/h		1316			710			593			757	
Approach Delay, s/veh		317.8			100.9			185.8			61.4	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.8	65.0		40.0	11.0	81.8		40.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	26.0	61.0		36.0	7.0	61.0		36.0
Max Q Clear Time (g_c+I1), s	23.6	37.3		38.0	9.0	43.5		37.4
Green Ext Time (p_c), s	0.2	7.1		0.0	0.0	6.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	191.5
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	26.5
Intersection LOS	D

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	285	201	1	496	217
Future Vol, veh/h	12	285	201	1	496	217
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	303	214	1	528	231
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	14	12.3	35.7
HCM LOS	B	B	E

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	4%	100%	0%
Vol Thru, %	100%	0%	0%	100%
Vol Right, %	0%	96%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	202	297	496	217
LT Vol	0	12	496	0
Through Vol	201	0	0	217
RT Vol	1	285	0	0
Lane Flow Rate	215	316	528	231
Geometry Grp	5	2	7	7
Degree of Util (X)	0.356	0.493	0.924	0.372
Departure Headway (Hd)	5.961	5.62	6.305	5.799
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	604	641	575	621
Service Time	4.003	3.665	4.039	3.532
HCM Lane V/C Ratio	0.356	0.493	0.918	0.372
HCM Control Delay	12.3	14	46.1	11.9
HCM Lane LOS	B	B	E	B
HCM 95th-tile Q	1.6	2.7	11.6	1.7

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	471	36	54	262	25	36
Future Vol, veh/h	471	36	54	262	25	36
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	506	39	58	282	27	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	551	0	936	538
Stage 1	-	-	-	-	532	-
Stage 2	-	-	-	-	404	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1019	-	294	543
Stage 1	-	-	-	-	589	-
Stage 2	-	-	-	-	674	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1014	-	271	538
Mov Cap-2 Maneuver	-	-	-	-	271	-
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	625	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	16.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	383	-	-	1014	-
HCM Lane V/C Ratio	0.171	-	-	0.057	-
HCM Control Delay (s)	16.3	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	487	20	20	306	10	10
Future Vol, veh/h	487	20	20	306	10	10
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	513	21	21	322	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	539	0	897	533
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	369	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1029	-	310	547
Stage 1	-	-	-	-	592	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1025	-	300	542
Mov Cap-2 Maneuver	-	-	-	-	300	-
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	679	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	14.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	386	-	-	1025	-
HCM Lane V/C Ratio	0.055	-	-	0.021	-
HCM Control Delay (s)	14.9	-	-	8.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	102.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	105	402	10	30	261	200	10	230	80	310	130	105
Future Vol, veh/h	105	402	10	30	261	200	10	230	80	310	130	105
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	107	410	10	31	266	204	10	235	82	316	133	107
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	105.2	171.8	21.6	84.9
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	12%	0%	0%	100%	0%	0%	100%	0%	83%	0%
Vol Thru, %	88%	100%	0%	0%	100%	0%	0%	57%	17%	38%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	43%	0%	62%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	153	80	105	402	10	30	461	375	170
LT Vol	10	0	0	105	0	0	30	0	310	0
Through Vol	77	153	0	0	402	0	0	261	65	65
RT Vol	0	0	80	0	0	10	0	200	0	105
Lane Flow Rate	88	156	82	107	410	10	31	470	383	173
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.267	0.469	0.229	0.315	1.149	0.027	0.091	1.295	1.097	0.457
Departure Headway (Hd)	12.178	12.117	11.372	11.569	11.042	10.306	11.303	10.465	11.302	10.416
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	297	299	318	313	332	349	319	353	325	349
Service Time	9.878	9.817	9.072	9.269	8.742	8.006	9.003	8.165	9.002	8.116
HCM Lane V/C Ratio	0.296	0.522	0.258	0.342	1.235	0.029	0.097	1.331	1.178	0.496
HCM Control Delay	19.3	25.1	17.4	19.5	129.9	13.3	15.1	182	113.6	21.6
HCM Lane LOS	C	D	C	C	F	B	C	F	F	C
HCM 95th-tile Q	1.1	2.4	0.9	1.3	15.3	0.1	0.3	20.7	13.5	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	284	130	91	361	240	200	485	104	320	738	690
Future Volume (veh/h)	320	284	130	91	361	240	200	485	104	320	738	690
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	348	309	0	99	392	0	217	527	0	348	872	424
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	452	1035	463	129	828	1011	314	1105	495	457	1304	540
Arrive On Green	0.13	0.29	0.00	0.07	0.23	0.00	0.09	0.31	0.00	0.13	0.35	0.35
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1541
Grp Volume(v), veh/h	348	309	0	99	392	0	217	527	0	348	872	424
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1541
Q Serve(g_s), s	8.1	5.6	0.0	4.5	7.9	0.0	5.1	9.9	0.0	7.8	16.4	20.4
Cycle Q Clear(g_c), s	8.1	5.6	0.0	4.5	7.9	0.0	5.1	9.9	0.0	7.8	16.4	20.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	452	1035	463	129	828	1011	314	1105	495	457	1304	540
V/C Ratio(X)	0.77	0.30	0.00	0.77	0.47	0.00	0.69	0.48	0.00	0.76	0.67	0.79
Avail Cap(c_a), veh/h	750	1542	690	387	1542	1573	792	1328	594	816	1398	578
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.7	22.7	0.0	37.6	27.3	0.0	36.4	23.0	0.0	34.8	22.8	24.1
Incr Delay (d2), s/veh	2.8	0.2	0.0	9.3	0.4	0.0	2.7	0.3	0.0	2.6	1.1	6.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	2.8	0.0	2.6	3.9	0.0	2.5	4.9	0.0	4.0	8.6	9.6
LnGrp Delay(d),s/veh	37.5	22.8	0.0	46.9	27.7	0.0	39.2	23.3	0.0	37.4	23.9	30.7
LnGrp LOS	D	C		D	C		D	C		D	C	C
Approach Vol, veh/h		657			491			744			1644	
Approach Delay, s/veh		30.6			31.6			27.9			28.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.6	29.8	10.0	28.2	11.5	32.9	14.8	23.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	18.0	36.0	19.0	31.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	9.8	11.9	6.5	7.6	7.1	22.4	10.1	9.9
Green Ext Time (p_c), s	0.8	10.7	0.2	4.9	0.5	6.1	0.8	4.8

Intersection Summary	
HCM 2010 Ctrl Delay	29.2
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	148	282	44	124	457	190	11	330	101	300	420	262
Future Volume (veh/h)	148	282	44	124	457	190	11	330	101	300	420	262
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	172	328	38	144	531	173	13	384	93	349	488	235
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	210	1039	119	180	809	262	27	754	181	422	865	414
Arrive On Green	0.12	0.33	0.33	0.10	0.31	0.31	0.02	0.27	0.27	0.12	0.37	0.37
Sat Flow, veh/h	1774	3191	367	1774	2619	849	1774	2825	676	3442	2314	1108
Grp Volume(v), veh/h	172	181	185	144	358	346	13	239	238	349	373	350
Grp Sat Flow(s),veh/h/ln	1774	1770	1788	1774	1770	1699	1774	1770	1732	1721	1770	1652
Q Serve(g_s), s	8.3	6.7	6.8	6.9	15.3	15.4	0.6	10.0	10.2	8.6	14.6	14.7
Cycle Q Clear(g_c), s	8.3	6.7	6.8	6.9	15.3	15.4	0.6	10.0	10.2	8.6	14.6	14.7
Prop In Lane	1.00		0.20	1.00		0.50	1.00		0.39	1.00		0.67
Lane Grp Cap(c), veh/h	210	576	582	180	546	525	27	472	462	422	662	618
V/C Ratio(X)	0.82	0.31	0.32	0.80	0.66	0.66	0.47	0.51	0.52	0.83	0.56	0.57
Avail Cap(c_a), veh/h	326	1238	1251	326	1238	1189	224	731	715	434	731	682
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.5	22.1	22.1	38.3	26.1	26.2	42.6	27.1	27.2	37.3	21.6	21.7
Incr Delay (d2), s/veh	9.1	0.3	0.3	8.0	1.3	1.4	12.1	0.8	0.9	12.2	0.8	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	3.3	3.4	3.8	7.7	7.4	0.4	5.0	5.0	4.8	7.2	6.9
LnGrp Delay(d),s/veh	46.7	22.4	22.4	46.3	27.4	27.6	54.6	27.9	28.0	49.6	22.4	22.6
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		538			848			490			1072	
Approach Delay, s/veh		30.2			30.7			28.7			31.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	27.3	12.8	32.4	5.4	36.6	14.3	30.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	61.0	11.0	36.0	16.0	61.0
Max Q Clear Time (g_c+I1), s	10.6	12.2	8.9	8.8	2.6	16.7	10.3	17.4
Green Ext Time (p_c), s	0.1	8.9	0.2	9.1	0.0	8.1	0.2	8.9

Intersection Summary	
HCM 2010 Ctrl Delay	30.5
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	80	20	50	250	130	20	236	30	80	215	40
Future Vol, veh/h	80	80	20	50	250	130	20	236	30	80	215	40
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	101	25	63	316	165	25	299	38	101	272	51
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.4	21.1	18.7	21.4
HCM LOS	C	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	14%	0%	100%	0%	0%	100%	0%	0%	43%	0%
Vol Thru, %	86%	80%	0%	100%	57%	0%	100%	39%	57%	73%
Vol Right, %	0%	20%	0%	0%	43%	0%	0%	61%	0%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	148	80	53	47	50	167	213	188	148
LT Vol	20	0	80	0	0	50	0	0	80	0
Through Vol	118	118	0	53	27	0	167	83	108	108
RT Vol	0	30	0	0	20	0	0	130	0	40
Lane Flow Rate	175	187	101	68	59	63	211	270	237	187
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.437	0.458	0.285	0.18	0.152	0.162	0.509	0.618	0.591	0.444
Departure Headway (Hd)	9.012	8.794	10.117	9.596	9.283	9.202	8.684	8.242	8.969	8.559
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	400	410	355	374	386	390	416	437	403	420
Service Time	6.77	6.552	7.882	7.36	7.047	6.956	6.438	5.996	6.724	6.314
HCM Lane V/C Ratio	0.438	0.456	0.285	0.182	0.153	0.162	0.507	0.618	0.588	0.445
HCM Control Delay	18.6	18.8	16.9	14.5	13.7	13.7	20.2	23.5	24	18
HCM Lane LOS	C	C	C	B	B	B	C	C	C	C
HCM 95th-tile Q	2.2	2.3	1.2	0.6	0.5	0.6	2.8	4.1	3.7	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	110	30	40	270	150	170	609	40	110	729	160
Future Volume (veh/h)	60	110	30	40	270	150	170	609	40	110	729	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	69	126	5	46	310	0	195	700	0	126	838	83
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	438	370	71	419	356	280	815	693	159	830	701
Arrive On Green	0.05	0.24	0.24	0.04	0.22	0.00	0.08	0.44	0.00	0.09	0.45	0.45
Sat Flow, veh/h	1774	1863	1573	1774	1863	1583	3442	1863	1583	1774	1863	1574
Grp Volume(v), veh/h	69	126	5	46	310	0	195	700	0	126	838	83
Grp Sat Flow(s),veh/h/ln	1774	1863	1573	1774	1863	1583	1721	1863	1583	1774	1863	1574
Q Serve(g_s), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	27.4	0.0	5.6	36.0	2.5
Cycle Q Clear(g_c), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	27.4	0.0	5.6	36.0	2.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	438	370	71	419	356	280	815	693	159	830	701
V/C Ratio(X)	0.78	0.29	0.01	0.65	0.74	0.00	0.70	0.86	0.00	0.79	1.01	0.12
Avail Cap(c_a), veh/h	176	922	779	176	922	784	426	830	706	220	830	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	25.3	23.7	38.2	29.1	0.0	36.1	20.5	0.0	36.0	22.4	13.1
Incr Delay (d2), s/veh	13.5	0.4	0.0	9.7	2.6	0.0	3.1	8.9	0.0	12.7	33.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.4	0.1	1.2	6.8	0.0	2.2	16.0	0.0	3.3	26.0	1.1
LnGrp Delay(d),s/veh	51.4	25.7	23.7	47.9	31.7	0.0	39.3	29.4	0.0	48.8	56.0	13.2
LnGrp LOS	D	C	C	D	C		D	C		D	F	B
Approach Vol, veh/h		200			356			895			1047	
Approach Delay, s/veh		34.5			33.8			31.5			51.7	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	39.3	7.2	23.0	10.6	40.0	8.0	22.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	40.0	10.0	36.0	8.0	40.0
Max Q Clear Time (g_c+I1), s	7.6	29.4	4.1	6.5	6.5	38.0	5.1	14.5
Green Ext Time (p_c), s	0.1	4.8	0.0	3.0	0.2	0.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	40.6
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	97	40	572	201	381	20	470	250	637	990	180
Future Volume (veh/h)	50	97	40	572	201	381	20	470	250	637	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	100	0	590	207	0	21	485	0	657	1021	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	67	439	137	713	1300	405	37	901	0	774	2267	0
Arrive On Green	0.04	0.09	0.00	0.22	0.28	0.00	0.02	0.26	0.00	0.24	0.48	0.00
Sat Flow, veh/h	1645	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	100	0	590	207	0	21	485	0	657	1021	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	2.8	1.7	0.0	15.7	3.0	0.0	1.1	10.7	0.0	17.4	12.8	0.0
Cycle Q Clear(g_c), s	2.8	1.7	0.0	15.7	3.0	0.0	1.1	10.7	0.0	17.4	12.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	67	439	137	713	1300	405	37	901	0	774	2267	0
V/C Ratio(X)	0.78	0.23	0.00	0.83	0.16	0.00	0.57	0.54	0.00	0.85	0.45	0.00
Avail Cap(c_a), veh/h	574	1911	595	1293	1911	595	564	1594	0	1113	2267	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.2	37.3	0.0	32.9	24.4	0.0	43.0	28.2	0.0	32.1	15.3	0.0
Incr Delay (d2), s/veh	17.3	0.3	0.0	2.5	0.1	0.0	13.2	0.5	0.0	4.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.8	0.0	7.1	1.3	0.0	0.6	3.5	0.0	8.1	5.5	0.0
LnGrp Delay(d),s/veh	59.5	37.6	0.0	35.4	24.4	0.0	56.2	28.7	0.0	36.5	15.4	0.0
LnGrp LOS	E	D		D	C		E	C		D	B	
Approach Vol, veh/h		152			797			506			1678	
Approach Delay, s/veh		45.1			32.6			29.9			23.7	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.6	27.2	23.8	12.3	6.0	46.7	7.6	28.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	21.6	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	19.4	12.7	17.7	3.7	3.1	14.8	4.8	5.0
Green Ext Time (p_c), s	2.1	10.1	2.2	2.3	0.0	13.3	0.1	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	28.0
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	373	105	440	30	393	292	79	50	179	160
Future Volume (veh/h)	180	260	373	105	440	30	393	292	79	50	179	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	141	114	478	24	427	317	63	54	195	26
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	313	981	445	149	1401	70	310	950	186	86	620	81
Arrive On Green	0.09	0.29	0.29	0.08	0.28	0.28	0.17	0.32	0.32	0.05	0.20	0.20
Sat Flow, veh/h	3442	3390	1536	1774	4952	246	1774	2933	574	1774	3131	411
Grp Volume(v), veh/h	196	283	141	114	326	176	427	189	191	54	109	112
Grp Sat Flow(s),veh/h/ln	1721	1695	1536	1774	1695	1808	1774	1770	1738	1774	1770	1771
Q Serve(g_s), s	3.5	4.1	4.5	4.0	4.8	4.9	11.0	5.1	5.3	1.9	3.3	3.4
Cycle Q Clear(g_c), s	3.5	4.1	4.5	4.0	4.8	4.9	11.0	5.1	5.3	1.9	3.3	3.4
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.33	1.00		0.23
Lane Grp Cap(c), veh/h	313	981	445	149	959	511	310	573	563	86	350	351
V/C Ratio(X)	0.63	0.29	0.32	0.76	0.34	0.34	1.38	0.33	0.34	0.63	0.31	0.32
Avail Cap(c_a), veh/h	874	1936	877	450	1936	1033	310	1011	993	310	1011	1012
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.6	17.4	17.5	28.2	17.9	18.0	26.0	16.1	16.2	29.4	21.6	21.6
Incr Delay (d2), s/veh	2.1	0.2	0.4	7.8	0.2	0.4	189.7	0.3	0.4	7.3	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	1.9	2.0	2.3	2.3	2.5	21.6	2.5	2.5	1.1	1.7	1.7
LnGrp Delay(d),s/veh	29.7	17.5	17.9	36.1	18.1	18.4	215.7	16.5	16.5	36.7	22.1	22.2
LnGrp LOS	C	B	B	D	B	B	F	B	B	D	C	C
Approach Vol, veh/h		620			616			807			275	
Approach Delay, s/veh		21.5			21.5			121.9			25.0	
Approach LOS		C			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	24.4	9.3	22.2	15.0	16.5	9.7	21.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	36.0	11.0	36.0	16.0	36.0
Max Q Clear Time (g_c+I1), s	3.9	7.3	6.0	6.5	13.0	5.4	5.5	6.9
Green Ext Time (p_c), s	0.0	3.8	0.2	7.2	0.0	3.9	0.5	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	56.9
HCM 2010 LOS	E

Intersection	
Int Delay, s/veh	9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	33	346	561	213	211	34
Future Vol, veh/h	33	346	561	213	211	34
Conflicting Peds, #/hr	10	0	0	2	2	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	417	676	257	254	41

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	686	0	-	0	934	358
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	248	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	553	-	-	-	335	545
Stage 1	-	-	-	-	374	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	548	-	-	-	305	536
Mov Cap-2 Maneuver	-	-	-	-	305	-
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	650	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	49.7
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	548	-	-	-	305	536
HCM Lane V/C Ratio	0.073	-	-	-	0.833	0.076
HCM Control Delay (s)	12.1	-	-	-	55.7	12.3
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	7.1	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	164	579	201	84	686	300	174	305	123	270	455	94
Future Volume (veh/h)	164	579	201	84	686	300	174	305	123	270	455	94
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	200	706	107	102	837	0	212	372	0	329	555	110
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	120	447	199	109	941	460	180	566	481	280	544	108
Arrive On Green	0.16	0.16	0.16	0.29	0.29	0.00	0.10	0.30	0.00	0.16	0.36	0.36
Sat Flow, veh/h	758	2836	1263	375	3238	1583	1774	1863	1583	1774	1510	299
Grp Volume(v), veh/h	481	425	107	501	438	0	212	372	0	329	0	665
Grp Sat Flow(s),veh/h/ln	1825	1770	1263	1844	1770	1583	1774	1863	1583	1774	0	1809
Q Serve(g_s), s	28.0	28.0	13.8	47.0	41.4	0.0	18.0	30.8	0.0	28.0	0.0	64.0
Cycle Q Clear(g_c), s	28.0	28.0	13.8	47.0	41.4	0.0	18.0	30.8	0.0	28.0	0.0	64.0
Prop In Lane	0.42		1.00	0.20		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	288	279	199	536	514	460	180	566	481	280	0	652
V/C Ratio(X)	1.67	1.52	0.54	0.94	0.85	0.00	1.18	0.66	0.00	1.18	0.00	1.02
Avail Cap(c_a), veh/h	288	279	199	561	538	481	180	566	481	280	0	652
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	74.8	74.8	68.8	61.4	59.4	0.0	79.8	53.7	0.0	74.8	0.0	56.8
Incr Delay (d2), s/veh	317.6	252.5	2.8	22.8	12.0	0.0	123.5	5.9	0.0	110.2	0.0	40.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	39.4	33.2	5.0	27.3	22.0	0.0	15.0	16.8	0.0	22.2	0.0	39.2
LnGrp Delay(d),s/veh	392.4	327.3	71.7	84.2	71.4	0.0	203.3	59.6	0.0	185.0	0.0	97.2
LnGrp LOS	F	F	E	F	E		F	E		F		F
Approach Vol, veh/h		1013			939			584			994	
Approach Delay, s/veh		331.2			78.3			111.8			126.3	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.0	58.0		32.0	22.0	68.0		55.6
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	28.0	54.0		28.0	18.0	54.0		54.0
Max Q Clear Time (g_c+I1), s	30.0	32.8		30.0	20.0	66.0		49.0
Green Ext Time (p_c), s	0.0	7.4		0.0	0.0	0.0		2.5

Intersection Summary	
HCM 2010 Ctrl Delay	169.9
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	47.9
Intersection LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	554	263	2	314	164
Future Vol, veh/h	11	554	263	2	314	164
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	652	309	2	369	193
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	78.3	20.6	27.2
HCM LOS	F	C	D

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	2%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	98%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	265	565	314	164
LT Vol	0	11	314	0
Through Vol	263	0	0	164
RT Vol	2	554	0	0
Lane Flow Rate	312	665	369	193
Geometry Grp	5	2	7	7
Degree of Util (X)	0.601	1.065	0.782	0.382
Departure Headway (Hd)	7.271	5.77	7.952	7.438
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	499	625	458	486
Service Time	5.271	3.837	5.652	5.138
HCM Lane V/C Ratio	0.625	1.064	0.806	0.397
HCM Control Delay	20.6	78.3	33.7	14.7
HCM Lane LOS	C	F	D	B
HCM 95th-tile Q	3.9	18.4	6.9	1.8

Intersection	
Int Delay, s/veh	6.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	258	59	46	447	108	112
Future Vol, veh/h	258	59	46	447	108	112
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	287	66	51	497	120	124

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	359	0	932	333
Stage 1	-	-	-	-	326	-
Stage 2	-	-	-	-	606	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1200	-	296	709
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	545	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1193	-	275	701
Mov Cap-2 Maneuver	-	-	-	-	275	-
Stage 1	-	-	-	-	727	-
Stage 2	-	-	-	-	510	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	27.4
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	398	-	-	1193	-
HCM Lane V/C Ratio	0.614	-	-	0.043	-
HCM Control Delay (s)	27.4	-	-	8.2	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	4	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	403	10	10	453	20	20
Future Vol, veh/h	403	10	10	453	20	20
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	458	11	11	515	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	476	0	1016	478
Stage 1	-	-	-	-	471	-
Stage 2	-	-	-	-	545	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1086	-	264	587
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	581	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1080	-	257	580
Mov Cap-2 Maneuver	-	-	-	-	257	-
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	570	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	16.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	356	-	-	1080	-
HCM Lane V/C Ratio	0.128	-	-	0.011	-
HCM Control Delay (s)	16.6	-	-	8.4	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Intersection Delay, s/veh	112.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	182	191	10	10	313	220	30	150	20	270	200	160
Future Vol, veh/h	182	191	10	10	313	220	30	150	20	270	200	160
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	200	210	11	11	344	242	33	165	22	297	220	176
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	27.3	255.4	19.1	70.7
HCM LOS	D	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	38%	0%	0%	100%	0%	0%	100%	0%	73%	0%
Vol Thru, %	62%	100%	0%	0%	100%	0%	0%	59%	27%	38%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	41%	0%	62%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	100	20	182	191	10	10	533	370	260
LT Vol	30	0	0	182	0	0	10	0	270	0
Through Vol	50	100	0	0	191	0	0	313	100	100
RT Vol	0	0	20	0	0	10	0	220	0	160
Lane Flow Rate	88	110	22	200	210	11	11	586	407	286
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.261	0.32	0.06	0.568	0.568	0.028	0.03	1.493	1.06	0.682
Departure Headway (Hd)	12.113	11.914	11.172	11.482	10.956	10.22	10.322	9.509	10.52	9.692
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	299	303	323	316	332	352	349	387	350	377
Service Time	9.813	9.614	8.872	9.182	8.656	7.92	8.022	7.209	8.22	7.392
HCM Lane V/C Ratio	0.294	0.363	0.068	0.633	0.633	0.031	0.032	1.514	1.163	0.759
HCM Control Delay	19	20.1	14.6	28.3	27.1	13.2	13.3	259.9	98.8	30.8
HCM Lane LOS	C	C	B	D	D	B	B	F	F	D
HCM 95th-tile Q	1	1.3	0.2	3.3	3.3	0.1	0.1	30.3	13	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	700	563	260	94	404	350	150	585	123	280	649	430
Future Volume (veh/h)	700	563	260	94	404	350	150	585	123	280	649	430
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	737	593	0	99	425	0	158	616	0	295	683	233
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	858	1404	628	126	775	908	227	995	445	380	1200	491
Arrive On Green	0.25	0.40	0.00	0.07	0.22	0.00	0.07	0.28	0.00	0.11	0.32	0.32
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1524
Grp Volume(v), veh/h	737	593	0	99	425	0	158	616	0	295	683	233
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1524
Q Serve(g_s), s	22.8	13.5	0.0	6.1	11.9	0.0	5.0	16.8	0.0	9.0	16.9	13.6
Cycle Q Clear(g_c), s	22.8	13.5	0.0	6.1	11.9	0.0	5.0	16.8	0.0	9.0	16.9	13.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	858	1404	628	126	775	908	227	995	445	380	1200	491
V/C Ratio(X)	0.86	0.42	0.00	0.78	0.55	0.00	0.69	0.62	0.00	0.78	0.57	0.47
Avail Cap(c_a), veh/h	3187	3660	1637	463	1305	1326	712	1941	868	925	2244	918
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.9	24.3	0.0	50.8	38.6	0.0	50.8	34.8	0.0	48.4	31.3	30.2
Incr Delay (d2), s/veh	2.7	0.2	0.0	10.0	0.6	0.0	3.8	0.6	0.0	3.4	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.2	6.6	0.0	3.4	5.9	0.0	2.5	8.3	0.0	4.6	8.8	5.8
LnGrp Delay(d),s/veh	42.6	24.5	0.0	60.8	39.2	0.0	54.6	35.4	0.0	51.8	31.7	30.9
LnGrp LOS	D	C		E	D		D	D		D	C	C
Approach Vol, veh/h		1330			524			774			1211	
Approach Delay, s/veh		34.5			43.3			39.4			36.5	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.9	35.3	11.9	48.1	11.3	39.8	31.7	28.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	61.0	29.0	115.0	23.0	67.0	103.0	41.0
Max Q Clear Time (g_c+I1), s	11.0	18.8	8.1	15.5	7.0	18.9	24.8	13.9
Green Ext Time (p_c), s	0.9	12.4	0.2	8.5	0.4	12.7	3.0	7.5

Intersection Summary	
HCM 2010 Ctrl Delay	37.3
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	302	553	42	113	422	310	54	480	97	340	280	181
Future Volume (veh/h)	302	553	42	113	422	310	54	480	97	340	280	181
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	325	595	41	122	454	236	58	516	91	366	301	107
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	361	1261	87	152	574	296	75	783	137	451	899	312
Arrive On Green	0.20	0.38	0.38	0.09	0.26	0.26	0.04	0.26	0.26	0.13	0.35	0.35
Sat Flow, veh/h	1774	3353	231	1774	2227	1147	1774	2996	526	3442	2564	891
Grp Volume(v), veh/h	325	314	322	122	360	330	58	304	303	366	206	202
Grp Sat Flow(s),veh/h/ln	1774	1770	1814	1774	1770	1604	1774	1770	1752	1721	1770	1686
Q Serve(g_s), s	19.6	14.7	14.8	7.4	20.8	21.1	3.6	16.8	17.0	11.3	9.4	9.7
Cycle Q Clear(g_c), s	19.6	14.7	14.8	7.4	20.8	21.1	3.6	16.8	17.0	11.3	9.4	9.7
Prop In Lane	1.00		0.13	1.00		0.71	1.00		0.30	1.00		0.53
Lane Grp Cap(c), veh/h	361	665	682	152	456	414	75	463	458	451	620	591
V/C Ratio(X)	0.90	0.47	0.47	0.80	0.79	0.80	0.78	0.66	0.66	0.81	0.33	0.34
Avail Cap(c_a), veh/h	517	677	694	323	484	439	129	597	591	784	871	830
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.6	26.0	26.0	49.3	37.9	38.0	52.0	36.1	36.2	46.3	26.2	26.3
Incr Delay (d2), s/veh	14.1	0.5	0.5	9.5	8.1	9.5	15.6	1.7	1.8	3.5	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	7.3	7.5	4.0	11.2	10.4	2.1	8.4	8.4	5.6	4.6	4.6
LnGrp Delay(d),s/veh	56.7	26.5	26.5	58.8	46.1	47.6	67.7	37.8	38.0	49.9	26.5	26.6
LnGrp LOS	E	C	C	E	D	D	E	D	D	D	C	C
Approach Vol, veh/h		961			812			665			774	
Approach Delay, s/veh		36.7			48.6			40.5			37.6	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.4	32.7	13.4	45.3	8.6	42.5	26.3	32.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	37.0	20.0	42.0	8.0	54.0	32.0	30.0
Max Q Clear Time (g_c+I1), s	13.3	19.0	9.4	16.8	5.6	11.7	21.6	23.1
Green Ext Time (p_c), s	1.0	6.4	0.2	10.2	0.0	8.2	0.8	4.4

Intersection Summary	
HCM 2010 Ctrl Delay	40.7
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	17.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	250	20	80	140	60	20	190	70	110	237	30
Future Vol, veh/h	90	250	20	80	140	60	20	190	70	110	237	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	278	22	89	156	67	22	211	78	122	263	33
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	16.2	14.7	16.5	20.6
HCM LOS	C	B	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	17%	0%	100%	0%	0%	100%	0%	0%	48%	0%
Vol Thru, %	83%	58%	0%	100%	81%	0%	100%	44%	52%	80%
Vol Right, %	0%	42%	0%	0%	19%	0%	0%	56%	0%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	115	165	90	167	103	80	93	107	229	149
LT Vol	20	0	90	0	0	80	0	0	110	0
Through Vol	95	95	0	167	83	0	93	47	119	119
RT Vol	0	70	0	0	20	0	0	60	0	30
Lane Flow Rate	128	183	100	185	115	89	104	119	254	165
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.311	0.427	0.254	0.443	0.27	0.232	0.256	0.279	0.606	0.376
Departure Headway (Hd)	8.767	8.377	9.127	8.61	8.47	9.401	8.882	8.474	8.589	8.202
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	410	429	394	419	425	382	404	424	421	439
Service Time	6.518	6.128	6.877	6.36	6.219	7.153	6.634	6.226	6.336	5.949
HCM Lane V/C Ratio	0.312	0.427	0.254	0.442	0.271	0.233	0.257	0.281	0.603	0.376
HCM Control Delay	15.4	17.3	15	18.1	14.3	15	14.7	14.5	23.7	15.8
HCM Lane LOS	C	C	B	C	B	B	B	B	C	C
HCM 95th-tile Q	1.3	2.1	1	2.2	1.1	0.9	1	1.1	3.9	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	280	40	30	180	100	80	627	40	160	613	170
Future Volume (veh/h)	140	280	40	30	180	100	80	627	40	160	613	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	295	8	32	189	0	84	660	0	168	645	86
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	390	325	44	327	278	145	859	730	209	1000	845
Arrive On Green	0.06	0.21	0.21	0.02	0.18	0.00	0.04	0.46	0.00	0.12	0.54	0.54
Sat Flow, veh/h	1774	1863	1553	1774	1863	1583	3442	1863	1583	1774	1863	1575
Grp Volume(v), veh/h	147	295	8	32	189	0	84	660	0	168	645	86
Grp Sat Flow(s),veh/h/ln	1774	1863	1553	1774	1863	1583	1721	1863	1583	1774	1863	1575
Q Serve(g_s), s	5.0	12.7	0.4	1.5	8.0	0.0	2.0	25.3	0.0	7.9	21.0	2.3
Cycle Q Clear(g_c), s	5.0	12.7	0.4	1.5	8.0	0.0	2.0	25.3	0.0	7.9	21.0	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	104	390	325	44	327	278	145	859	730	209	1000	845
V/C Ratio(X)	1.42	0.76	0.02	0.72	0.58	0.00	0.58	0.77	0.00	0.81	0.65	0.10
Avail Cap(c_a), veh/h	104	871	726	124	893	759	523	2047	1740	498	2287	1934
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.3	31.8	26.9	41.4	32.3	0.0	40.2	19.2	0.0	36.8	14.0	9.7
Incr Delay (d2), s/veh	234.9	3.0	0.0	19.9	1.6	0.0	3.6	1.5	0.0	7.1	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	6.9	0.2	1.0	4.2	0.0	1.1	13.2	0.0	4.3	10.9	1.0
LnGrp Delay(d),s/veh	275.2	34.8	26.9	61.3	34.0	0.0	43.8	20.7	0.0	43.9	14.7	9.8
LnGrp LOS	F	C	C	E	C		D	C		D	B	A
Approach Vol, veh/h		450			221			744			899	
Approach Delay, s/veh		113.2			37.9			23.3			19.7	
Approach LOS		F			D			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.1	43.4	6.1	21.9	7.6	49.9	9.0	19.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	24.0	94.0	6.0	40.0	13.0	105.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	10.9	27.3	3.5	14.7	4.0	23.0	7.0	10.0
Green Ext Time (p_c), s	0.3	12.2	0.0	3.2	0.1	12.3	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	40.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	532	40	268	343	473	70	1210	595	482	320	300
Future Volume (veh/h)	220	532	40	268	343	473	70	1210	595	482	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	572	0	288	369	0	75	1301	0	518	344	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	250	1202	358	323	963	300	71	1487	0	546	2306	0
Arrive On Green	0.15	0.25	0.00	0.10	0.20	0.00	0.04	0.41	0.00	0.17	0.54	0.00
Sat Flow, veh/h	1645	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	572	0	288	369	0	75	1301	0	518	344	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	36.4	26.2	0.0	22.7	17.2	0.0	11.0	84.0	0.0	40.9	10.3	0.0
Cycle Q Clear(g_c), s	36.4	26.2	0.0	22.7	17.2	0.0	11.0	84.0	0.0	40.9	10.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	250	1202	358	323	963	300	71	1487	0	546	2306	0
V/C Ratio(X)	0.95	0.48	0.00	0.89	0.38	0.00	1.06	0.87	0.00	0.95	0.15	0.00
Avail Cap(c_a), veh/h	284	1202	358	802	963	300	71	1487	0	576	2306	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	107.0	80.5	0.0	113.1	87.5	0.0	121.9	69.1	0.0	104.5	29.6	0.0
Incr Delay (d2), s/veh	37.4	1.4	0.0	8.4	1.2	0.0	122.9	7.5	0.0	24.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.2	11.5	0.0	10.4	7.6	0.0	7.4	29.1	0.0	19.9	4.1	0.0
LnGrp Delay(d),s/veh	144.4	81.8	0.0	121.5	88.7	0.0	246.1	76.6	0.0	129.2	29.7	0.0
LnGrp LOS	F	F		F	F		F	E		F	C	
Approach Vol, veh/h		809			657			1376			862	
Approach Delay, s/veh		100.2			103.0			85.8			89.5	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	47.6	108.4	29.8	68.9	15.0	141.0	42.7	56.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	46.0	102.0	64.0	32.0	11.0	137.0	44.0	52.0
Max Q Clear Time (g_c+I1), s	42.9	86.0	24.7	28.2	13.0	12.3	38.4	19.2
Green Ext Time (p_c), s	0.7	10.6	1.1	2.2	0.0	23.3	0.3	8.1

Intersection Summary	
HCM 2010 Ctrl Delay	92.9
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	289	140	380	40	304	255	139	90	248	200
Future Volume (veh/h)	310	700	289	140	380	40	304	255	139	90	248	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	246	147	400	34	320	268	95	95	261	102
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	424	1210	398	177	1426	119	357	945	326	88	543	206
Arrive On Green	0.12	0.32	0.32	0.10	0.30	0.30	0.20	0.37	0.37	0.05	0.22	0.22
Sat Flow, veh/h	3442	3755	1236	1774	4775	400	1774	2563	884	1774	2494	947
Grp Volume(v), veh/h	326	664	319	147	282	152	320	183	180	95	183	180
Grp Sat Flow(s),veh/h/ln	1721	1695	1601	1774	1695	1785	1774	1770	1678	1774	1770	1672
Q Serve(g_s), s	9.2	16.6	16.9	8.2	6.4	6.5	17.6	7.3	7.6	5.0	9.1	9.5
Cycle Q Clear(g_c), s	9.2	16.6	16.9	8.2	6.4	6.5	17.6	7.3	7.6	5.0	9.1	9.5
Prop In Lane	1.00		0.77	1.00		0.22	1.00		0.53	1.00		0.57
Lane Grp Cap(c), veh/h	424	1092	516	177	1013	533	357	653	619	88	385	364
V/C Ratio(X)	0.77	0.61	0.62	0.83	0.28	0.28	0.90	0.28	0.29	1.08	0.48	0.50
Avail Cap(c_a), veh/h	1234	1554	734	194	1216	640	459	1022	970	88	723	683
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.6	28.7	28.8	44.3	26.9	27.0	39.1	22.3	22.4	47.7	34.3	34.4
Incr Delay (d2), s/veh	3.0	0.6	1.2	23.4	0.1	0.3	16.9	0.2	0.3	117.6	0.9	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	7.8	7.6	5.2	3.0	3.2	10.3	3.6	3.5	5.3	4.5	4.5
LnGrp Delay(d),s/veh	45.6	29.2	30.0	67.8	27.1	27.3	56.0	22.5	22.7	165.9	35.2	35.5
LnGrp LOS	D	C	C	E	C	C	E	C	C	F	D	D
Approach Vol, veh/h		1309			581			683			458	
Approach Delay, s/veh		33.5			37.4			38.2			62.4	
Approach LOS		C			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	41.0	14.0	36.3	24.2	25.8	16.4	34.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	11.0	46.0	26.0	41.0	36.0	36.0
Max Q Clear Time (g_c+I1), s	7.0	9.6	10.2	18.9	19.6	11.5	11.2	8.5
Green Ext Time (p_c), s	0.0	5.1	0.0	11.9	0.5	4.9	1.2	12.0

Intersection Summary	
HCM 2010 Ctrl Delay	39.7
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	48	871	456	172	233	44
Future Vol, veh/h	48	871	456	172	233	44
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	937	490	185	251	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	491	0	-	0	970	247
Stage 1	-	-	-	-	491	-
Stage 2	-	-	-	-	479	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	684	-	-	-	321	642
Stage 1	-	-	-	-	489	-
Stage 2	-	-	-	-	538	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	683	-	-	-	296	641
Mov Cap-2 Maneuver	-	-	-	-	296	-
Stage 1	-	-	-	-	489	-
Stage 2	-	-	-	-	497	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	51.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	683	-	-	-	296	641
HCM Lane V/C Ratio	0.076	-	-	-	0.846	0.074
HCM Control Delay (s)	10.7	-	-	-	58.9	11.1
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	7.3	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	901	195	96	569	200	133	419	97	200	339	184
Future Volume (veh/h)	158	901	195	96	569	200	133	419	97	200	339	184
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	178	1012	130	108	639	0	149	471	0	225	381	195
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	644	328	104	648	330	72	658	559	244	523	268
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.00	0.04	0.35	0.00	0.14	0.45	0.45
Sat Flow, veh/h	515	3091	1576	498	3109	1583	1774	1863	1583	1774	1162	595
Grp Volume(v), veh/h	635	555	130	398	349	0	149	471	0	225	0	576
Grp Sat Flow(s),veh/h/ln	1837	1770	1576	1838	1770	1583	1774	1863	1583	1774	0	1757
Q Serve(g_s), s	36.0	36.0	12.3	36.0	33.6	0.0	7.0	37.8	0.0	21.6	0.0	46.3
Cycle Q Clear(g_c), s	36.0	36.0	12.3	36.0	33.6	0.0	7.0	37.8	0.0	21.6	0.0	46.3
Prop In Lane	0.28		1.00	0.27		1.00	1.00		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	383	369	328	383	369	330	72	658	559	244	0	791
V/C Ratio(X)	1.66	1.51	0.40	1.04	0.95	0.00	2.07	0.72	0.00	0.92	0.00	0.73
Avail Cap(c_a), veh/h	383	369	328	383	369	330	72	658	559	267	0	791
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.4	68.4	59.0	68.4	67.4	0.0	82.9	48.4	0.0	73.6	0.0	38.8
Incr Delay (d2), s/veh	307.6	241.5	0.8	56.8	33.1	0.0	527.3	6.6	0.0	33.4	0.0	5.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	50.9	42.3	5.4	24.2	19.9	0.0	13.9	20.7	0.0	12.9	0.0	23.7
LnGrp Delay(d),s/veh	376.0	309.9	59.8	125.2	100.5	0.0	610.2	55.0	0.0	107.0	0.0	44.7
LnGrp LOS	F	F	E	F	F		F	D		F		D
Approach Vol, veh/h		1320			747			620			801	
Approach Delay, s/veh		317.1			113.7			188.4			62.2	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.8	65.0		40.0	11.0	81.8		40.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	26.0	61.0		36.0	7.0	61.0		36.0
Max Q Clear Time (g_c+I1), s	23.6	39.8		38.0	9.0	48.3		38.0
Green Ext Time (p_c), s	0.2	7.4		0.0	0.0	5.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	192.1
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	66.3
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	356	204	1	617	223
Future Vol, veh/h	12	356	204	1	617	223
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	379	217	1	656	237
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	18	13.4	100.3
HCM LOS	C	B	F

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	3%	100%	0%
Vol Thru, %	100%	0%	0%	100%
Vol Right, %	0%	97%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	205	368	617	223
LT Vol	0	12	617	0
Through Vol	204	0	0	223
RT Vol	1	356	0	0
Lane Flow Rate	218	391	656	237
Geometry Grp	5	2	7	7
Degree of Util (X)	0.379	0.613	1.207	0.403
Departure Headway (Hd)	6.481	5.977	6.621	6.113
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	558	607	551	591
Service Time	4.481	3.977	4.332	3.824
HCM Lane V/C Ratio	0.391	0.644	1.191	0.401
HCM Control Delay	13.4	18	131.9	12.9
HCM Lane LOS	B	C	F	B
HCM 95th-tile Q	1.8	4.2	24.2	1.9

Intersection	
Int Delay, s/veh	2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	557	72	62	312	46	41
Future Vol, veh/h	557	72	62	312	46	41
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	599	77	67	335	49	44

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	682	0	1119	650
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	475	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	911	-	229	469
Stage 1	-	-	-	-	523	-
Stage 2	-	-	-	-	626	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	906	-	206	464
Mov Cap-2 Maneuver	-	-	-	-	206	-
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	566	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	24.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	279	-	-	906	-
HCM Lane V/C Ratio	0.335	-	-	0.074	-
HCM Control Delay (s)	24.3	-	-	9.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.4	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	544	20	20	404	10	10
Future Vol, veh/h	544	20	20	404	10	10
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	573	21	21	425	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	599	0	1060	593
Stage 1	-	-	-	-	588	-
Stage 2	-	-	-	-	472	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	978	-	248	506
Stage 1	-	-	-	-	555	-
Stage 2	-	-	-	-	628	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	974	-	239	502
Mov Cap-2 Maneuver	-	-	-	-	239	-
Stage 1	-	-	-	-	553	-
Stage 2	-	-	-	-	608	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	16.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	324	-	-	974	-
HCM Lane V/C Ratio	0.065	-	-	0.022	-
HCM Control Delay (s)	16.9	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	117.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	149	416	10	30	283	200	10	230	80	310	130	180
Future Vol, veh/h	149	416	10	30	283	200	10	230	80	310	130	180
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	152	424	10	31	289	204	10	235	82	316	133	184
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	118.3	214.3	22.6	85.8
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	12%	0%	0%	100%	0%	0%	100%	0%	83%	0%
Vol Thru, %	88%	100%	0%	0%	100%	0%	0%	59%	17%	27%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	41%	0%	73%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	153	80	149	416	10	30	483	375	245
LT Vol	10	0	0	149	0	0	30	0	310	0
Through Vol	77	153	0	0	416	0	0	283	65	65
RT Vol	0	0	80	0	0	10	0	200	0	180
Lane Flow Rate	88	156	82	152	424	10	31	493	383	250
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.271	0.477	0.233	0.455	1.213	0.027	0.094	1.402	1.114	0.664
Departure Headway (Hd)	12.734	12.672	11.926	11.967	11.44	10.702	11.677	10.853	11.707	10.733
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	284	286	303	303	323	337	309	340	314	340
Service Time	10.434	10.372	9.626	9.667	9.14	8.402	9.377	8.553	9.407	8.433
HCM Lane V/C Ratio	0.31	0.545	0.271	0.502	1.313	0.03	0.1	1.45	1.22	0.735
HCM Control Delay	20.1	26.4	18.2	24.3	154.5	13.7	15.6	226.6	120.8	32.3
HCM Lane LOS	C	D	C	C	F	B	C	F	F	D
HCM 95th-tile Q	1.1	2.4	0.9	2.3	16.9	0.1	0.3	23.9	13.7	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	284	133	93	361	240	208	546	108	320	756	690
Future Volume (veh/h)	320	284	133	93	361	240	208	546	108	320	756	690
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	348	309	0	101	392	0	226	593	0	348	885	432
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	450	1026	459	131	824	1007	323	1118	500	456	1307	541
Arrive On Green	0.13	0.29	0.00	0.07	0.23	0.00	0.09	0.32	0.00	0.13	0.35	0.35
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1541
Grp Volume(v), veh/h	348	309	0	101	392	0	226	593	0	348	885	432
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1541
Q Serve(g_s), s	8.2	5.7	0.0	4.7	8.0	0.0	5.3	11.5	0.0	7.9	16.9	21.1
Cycle Q Clear(g_c), s	8.2	5.7	0.0	4.7	8.0	0.0	5.3	11.5	0.0	7.9	16.9	21.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	450	1026	459	131	824	1007	323	1118	500	456	1307	541
V/C Ratio(X)	0.77	0.30	0.00	0.77	0.48	0.00	0.70	0.53	0.00	0.76	0.68	0.80
Avail Cap(c_a), veh/h	743	1527	683	383	1527	1561	784	1315	588	808	1384	573
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.1	23.1	0.0	37.9	27.6	0.0	36.7	23.4	0.0	35.1	23.1	24.4
Incr Delay (d2), s/veh	2.9	0.2	0.0	9.2	0.4	0.0	2.8	0.4	0.0	2.7	1.2	7.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	2.8	0.0	2.6	3.9	0.0	2.6	5.7	0.0	4.0	8.8	10.0
LnGrp Delay(d),s/veh	37.9	23.2	0.0	47.1	28.0	0.0	39.4	23.8	0.0	37.8	24.3	31.9
LnGrp LOS	D	C		D	C		D	C		D	C	C
Approach Vol, veh/h		657			493			819			1665	
Approach Delay, s/veh		31.0			31.9			28.1			29.1	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	30.4	10.2	28.2	11.8	33.3	14.9	23.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	18.0	36.0	19.0	31.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	9.9	13.5	6.7	7.7	7.3	23.1	10.2	10.0
Green Ext Time (p_c), s	0.8	10.7	0.2	4.9	0.5	5.9	0.8	4.8

Intersection Summary	
HCM 2010 Ctrl Delay	29.6
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	148	287	45	124	458	190	12	330	101	300	420	262
Future Volume (veh/h)	148	287	45	124	458	190	12	330	101	300	420	262
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	172	334	39	144	533	174	14	384	93	349	488	235
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	210	1042	121	180	811	264	29	753	180	422	862	413
Arrive On Green	0.12	0.33	0.33	0.10	0.31	0.31	0.02	0.27	0.27	0.12	0.37	0.37
Sat Flow, veh/h	1774	3188	369	1774	2618	851	1774	2825	676	3442	2314	1108
Grp Volume(v), veh/h	172	184	189	144	360	347	14	239	238	349	373	350
Grp Sat Flow(s),veh/h/ln	1774	1770	1788	1774	1770	1699	1774	1770	1732	1721	1770	1652
Q Serve(g_s), s	8.3	6.8	7.0	6.9	15.4	15.5	0.7	10.0	10.2	8.7	14.6	14.8
Cycle Q Clear(g_c), s	8.3	6.8	7.0	6.9	15.4	15.5	0.7	10.0	10.2	8.7	14.6	14.8
Prop In Lane	1.00		0.21	1.00		0.50	1.00		0.39	1.00		0.67
Lane Grp Cap(c), veh/h	210	578	584	180	548	526	29	472	461	422	659	615
V/C Ratio(X)	0.82	0.32	0.32	0.80	0.66	0.66	0.48	0.51	0.52	0.83	0.57	0.57
Avail Cap(c_a), veh/h	325	1235	1247	325	1235	1185	223	729	713	433	729	680
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.6	22.1	22.2	38.4	26.1	26.2	42.6	27.2	27.3	37.5	21.8	21.9
Incr Delay (d2), s/veh	9.2	0.3	0.3	8.0	1.3	1.4	11.6	0.8	0.9	12.3	0.8	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	3.4	3.5	3.8	7.7	7.4	0.4	5.0	5.0	4.8	7.3	6.9
LnGrp Delay(d),s/veh	46.9	22.4	22.5	46.4	27.5	27.6	54.3	28.0	28.2	49.8	22.6	22.8
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		545			851			491			1072	
Approach Delay, s/veh		30.2			30.7			28.8			31.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	27.3	12.9	32.6	5.4	36.6	14.3	31.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	61.0	11.0	36.0	16.0	61.0
Max Q Clear Time (g_c+I1), s	10.7	12.2	8.9	9.0	2.7	16.8	10.3	17.5
Green Ext Time (p_c), s	0.1	8.9	0.2	9.2	0.0	8.0	0.2	9.0

Intersection Summary	
HCM 2010 Ctrl Delay	30.6
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	80	20	50	250	130	20	239	30	80	216	40
Future Vol, veh/h	80	80	20	50	250	130	20	239	30	80	216	40
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	101	25	63	316	165	25	303	38	101	273	51
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.4	21.2	18.9	21.5
HCM LOS	C	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	14%	0%	100%	0%	0%	100%	0%	0%	43%	0%
Vol Thru, %	86%	80%	0%	100%	57%	0%	100%	39%	57%	73%
Vol Right, %	0%	20%	0%	0%	43%	0%	0%	61%	0%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	150	80	53	47	50	167	213	188	148
LT Vol	20	0	80	0	0	50	0	0	80	0
Through Vol	120	120	0	53	27	0	167	83	108	108
RT Vol	0	30	0	0	20	0	0	130	0	40
Lane Flow Rate	177	189	101	68	59	63	211	270	238	187
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.443	0.463	0.285	0.18	0.153	0.162	0.51	0.62	0.594	0.446
Departure Headway (Hd)	9.026	8.81	10.146	9.624	9.311	9.227	8.709	8.267	8.988	8.58
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	399	409	354	373	385	389	414	437	402	420
Service Time	6.781	6.565	7.91	7.388	7.075	6.979	6.461	6.019	6.743	6.335
HCM Lane V/C Ratio	0.444	0.462	0.285	0.182	0.153	0.162	0.51	0.618	0.592	0.445
HCM Control Delay	18.8	19	16.9	14.5	13.8	13.8	20.2	23.7	24.1	18.1
HCM Lane LOS	C	C	C	B	B	B	C	C	C	C
HCM 95th-tile Q	2.2	2.4	1.2	0.6	0.5	0.6	2.8	4.1	3.7	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	110	30	40	270	150	170	683	40	110	751	160
Future Volume (veh/h)	60	110	30	40	270	150	170	683	40	110	751	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	69	126	5	46	310	0	195	785	0	126	863	86
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	438	370	71	419	356	279	817	694	159	832	703
Arrive On Green	0.05	0.23	0.23	0.04	0.22	0.00	0.08	0.44	0.00	0.09	0.45	0.45
Sat Flow, veh/h	1774	1863	1573	1774	1863	1583	3442	1863	1583	1774	1863	1574
Grp Volume(v), veh/h	69	126	5	46	310	0	195	785	0	126	863	86
Grp Sat Flow(s),veh/h/ln	1774	1863	1573	1774	1863	1583	1721	1863	1583	1774	1863	1574
Q Serve(g_s), s	3.1	4.5	0.2	2.1	12.6	0.0	4.5	33.2	0.0	5.6	36.3	2.6
Cycle Q Clear(g_c), s	3.1	4.5	0.2	2.1	12.6	0.0	4.5	33.2	0.0	5.6	36.3	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	438	370	71	419	356	279	817	694	159	832	703
V/C Ratio(X)	0.78	0.29	0.01	0.65	0.74	0.00	0.70	0.96	0.00	0.79	1.04	0.12
Avail Cap(c_a), veh/h	175	918	776	175	918	781	424	827	703	219	832	703
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.1	25.5	23.8	38.4	29.2	0.0	36.3	22.1	0.0	36.2	22.4	13.1
Incr Delay (d2), s/veh	13.5	0.4	0.0	9.7	2.6	0.0	3.1	22.1	0.0	12.9	41.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	2.4	0.1	1.2	6.8	0.0	2.3	22.0	0.0	3.3	28.0	1.1
LnGrp Delay(d),s/veh	51.5	25.8	23.8	48.1	31.8	0.0	39.4	44.2	0.0	49.1	63.6	13.2
LnGrp LOS	D	C	C	D	C		D	D		D	F	B
Approach Vol, veh/h		200			356			980			1075	
Approach Delay, s/veh		34.6			33.9			43.3			57.8	
Approach LOS		C			C			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.3	39.6	7.2	23.1	10.6	40.3	8.1	22.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	40.0	10.0	36.0	8.0	40.0
Max Q Clear Time (g_c+I1), s	7.6	35.2	4.1	6.5	6.5	38.3	5.1	14.6
Green Ext Time (p_c), s	0.1	0.4	0.0	3.0	0.2	0.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	47.3
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	100	40	602	211	391	20	470	259	640	990	180
Future Volume (veh/h)	50	100	40	602	211	391	20	470	259	640	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	103	0	621	218	0	21	485	0	660	1021	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	66	445	138	743	1352	421	37	877	0	774	2234	0
Arrive On Green	0.04	0.09	0.00	0.23	0.29	0.00	0.02	0.25	0.00	0.24	0.47	0.00
Sat Flow, veh/h	1645	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	103	0	621	218	0	21	485	0	660	1021	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	2.8	1.8	0.0	16.8	3.1	0.0	1.2	11.0	0.0	17.9	13.2	0.0
Cycle Q Clear(g_c), s	2.8	1.8	0.0	16.8	3.1	0.0	1.2	11.0	0.0	17.9	13.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	66	445	138	743	1352	421	37	877	0	774	2234	0
V/C Ratio(X)	0.78	0.23	0.00	0.84	0.16	0.00	0.57	0.55	0.00	0.85	0.46	0.00
Avail Cap(c_a), veh/h	563	1874	583	1268	1874	583	553	1564	0	1092	2234	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.1	38.0	0.0	33.1	24.2	0.0	43.8	29.3	0.0	32.8	16.0	0.0
Incr Delay (d2), s/veh	18.0	0.3	0.0	2.6	0.1	0.0	13.4	0.5	0.0	4.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.8	0.0	7.7	1.4	0.0	0.7	3.5	0.0	8.4	5.7	0.0
LnGrp Delay(d),s/veh	61.1	38.2	0.0	35.7	24.2	0.0	57.2	29.9	0.0	37.5	16.2	0.0
LnGrp LOS	E	D		D	C		E	C		D	B	
Approach Vol, veh/h		155			839			506			1681	
Approach Delay, s/veh		45.9			32.7			31.0			24.5	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.0	27.0	25.1	12.5	6.1	46.9	7.6	30.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	19.9	13.0	18.8	3.8	3.2	15.2	4.8	5.1
Green Ext Time (p_c), s	2.1	9.6	2.3	2.4	0.0	13.2	0.1	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	28.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	388	105	440	30	443	313	79	50	185	160
Future Volume (veh/h)	180	260	388	105	440	30	443	313	79	50	185	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	147	114	478	24	482	340	65	54	201	27
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	312	979	443	149	1398	70	307	966	182	86	632	84
Arrive On Green	0.09	0.29	0.29	0.08	0.28	0.28	0.17	0.33	0.33	0.05	0.20	0.20
Sat Flow, veh/h	3442	3390	1536	1774	4952	246	1774	2954	557	1774	3127	413
Grp Volume(v), veh/h	196	283	147	114	326	176	482	202	203	54	112	116
Grp Sat Flow(s),veh/h/ln	1721	1695	1536	1774	1695	1808	1774	1770	1742	1774	1770	1771
Q Serve(g_s), s	3.5	4.1	4.8	4.0	4.8	4.9	11.0	5.5	5.6	1.9	3.4	3.5
Cycle Q Clear(g_c), s	3.5	4.1	4.8	4.0	4.8	4.9	11.0	5.5	5.6	1.9	3.4	3.5
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.32	1.00		0.23
Lane Grp Cap(c), veh/h	312	979	443	149	957	510	307	578	569	86	358	358
V/C Ratio(X)	0.63	0.29	0.33	0.76	0.34	0.34	1.57	0.35	0.36	0.63	0.31	0.32
Avail Cap(c_a), veh/h	867	1921	870	447	1921	1025	307	1003	987	307	1003	1004
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	17.5	17.8	28.5	18.1	18.1	26.3	16.2	16.3	29.7	21.6	21.6
Incr Delay (d2), s/veh	2.1	0.2	0.4	7.8	0.2	0.4	271.4	0.4	0.4	7.4	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.9	2.1	2.3	2.3	2.5	28.4	2.7	2.8	1.1	1.7	1.8
LnGrp Delay(d),s/veh	29.9	17.7	18.2	36.3	18.3	18.5	297.6	16.6	16.7	37.0	22.1	22.2
LnGrp LOS	C	B	B	D	B	B	F	B	B	D	C	C
Approach Vol, veh/h		626			616			887			282	
Approach Delay, s/veh		21.6			21.7			169.3			25.0	
Approach LOS		C			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	24.8	9.3	22.3	15.0	16.8	9.8	21.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	36.0	11.0	36.0	16.0	36.0
Max Q Clear Time (g_c+I1), s	3.9	7.6	6.0	6.8	13.0	5.5	5.5	6.9
Green Ext Time (p_c), s	0.0	4.1	0.2	7.3	0.0	4.1	0.5	7.3

Intersection Summary	
HCM 2010 Ctrl Delay	76.4
HCM 2010 LOS	E

Intersection	
Int Delay, s/veh	9.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	33	346	561	216	212	34
Future Vol, veh/h	33	346	561	216	212	34
Conflicting Peds, #/hr	10	0	0	2	2	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	417	676	260	255	41

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	686	0	-	0	934	358
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	248	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	553	-	-	-	335	545
Stage 1	-	-	-	-	374	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	548	-	-	-	305	536
Mov Cap-2 Maneuver	-	-	-	-	305	-
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	650	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	50.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	548	-	-	-	305	536
HCM Lane V/C Ratio	0.073	-	-	-	0.837	0.076
HCM Control Delay (s)	12.1	-	-	-	56.3	12.3
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	7.2	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	164	579	203	93	686	300	179	378	153	270	476	94
Future Volume (veh/h)	164	579	203	93	686	300	179	378	153	270	476	94
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	200	706	109	113	837	0	218	461	0	329	580	110
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	119	446	199	120	936	463	179	565	480	279	547	104
Arrive On Green	0.16	0.16	0.16	0.29	0.29	0.00	0.10	0.30	0.00	0.16	0.36	0.36
Sat Flow, veh/h	758	2836	1263	411	3201	1583	1774	1863	1583	1774	1522	289
Grp Volume(v), veh/h	481	425	109	507	443	0	218	461	0	329	0	690
Grp Sat Flow(s),veh/h/ln	1825	1770	1263	1842	1770	1583	1774	1863	1583	1774	0	1811
Q Serve(g_s), s	28.0	28.0	14.2	47.8	42.1	0.0	18.0	40.8	0.0	28.0	0.0	64.0
Cycle Q Clear(g_c), s	28.0	28.0	14.2	47.8	42.1	0.0	18.0	40.8	0.0	28.0	0.0	64.0
Prop In Lane	0.42		1.00	0.22		1.00	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	287	278	199	539	517	463	179	565	480	279	0	651
V/C Ratio(X)	1.68	1.53	0.55	0.94	0.86	0.00	1.22	0.82	0.00	1.18	0.00	1.06
Avail Cap(c_a), veh/h	287	278	199	559	537	480	179	565	480	279	0	651
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	75.0	75.0	69.2	61.5	59.5	0.0	80.0	57.4	0.0	75.0	0.0	57.0
Incr Delay (d2), s/veh	319.6	254.3	3.2	24.0	12.6	0.0	137.1	12.3	0.0	111.4	0.0	52.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	39.6	33.3	5.1	27.9	22.4	0.0	15.6	22.9	0.0	22.4	0.0	41.5
LnGrp Delay(d),s/veh	394.6	329.3	72.4	85.5	72.1	0.0	217.1	69.7	0.0	186.5	0.0	109.4
LnGrp LOS	F	F	E	F	E		F	E		F		F
Approach Vol, veh/h		1015			950			679			1019	
Approach Delay, s/veh		332.7			79.2			117.1			134.3	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.0	58.0		32.0	22.0	68.0		56.1
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	28.0	54.0		28.0	18.0	54.0		54.0
Max Q Clear Time (g_c+I1), s	30.0	42.8		30.0	20.0	66.0		49.8
Green Ext Time (p_c), s	0.0	5.8		0.0	0.0	0.0		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	171.8
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	72.9
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	611	281	2	331	169
Future Vol, veh/h	11	611	281	2	331	169
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	719	331	2	389	199
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	128.6	23.4	31.6
HCM LOS	F	C	D

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	2%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	98%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	283	622	331	169
LT Vol	0	11	331	0
Through Vol	281	0	0	169
RT Vol	2	611	0	0
Lane Flow Rate	333	732	389	199
Geometry Grp	5	2	7	7
Degree of Util (X)	0.643	1.206	0.824	0.392
Departure Headway (Hd)	7.644	5.935	8.355	7.839
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	476	615	436	461
Service Time	5.644	3.935	6.055	5.539
HCM Lane V/C Ratio	0.7	1.19	0.892	0.432
HCM Control Delay	23.4	128.6	39.8	15.5
HCM Lane LOS	C	F	E	C
HCM 95th-tile Q	4.5	26.1	7.7	1.8

Intersection	
Int Delay, s/veh	6.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	274	59	46	503	108	112
Future Vol, veh/h	274	59	46	503	108	112
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	304	66	51	559	120	124

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	377	0	1012	351
Stage 1	-	-	-	-	344	-
Stage 2	-	-	-	-	668	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1181	-	265	692
Stage 1	-	-	-	-	718	-
Stage 2	-	-	-	-	510	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1174	-	245	684
Mov Cap-2 Maneuver	-	-	-	-	245	-
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	475	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	32.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	364	-	-	1174	-
HCM Lane V/C Ratio	0.672	-	-	0.044	-
HCM Control Delay (s)	32.9	-	-	8.2	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	4.7	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	420	10	10	509	20	20
Future Vol, veh/h	420	10	10	509	20	20
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	477	11	11	578	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	496	0	1098	497
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	608	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1068	-	235	573
Stage 1	-	-	-	-	616	-
Stage 2	-	-	-	-	543	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1062	-	229	566
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	612	-
Stage 2	-	-	-	-	532	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	17.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	326	-	-	1062	-
HCM Lane V/C Ratio	0.139	-	-	0.011	-
HCM Control Delay (s)	17.8	-	-	8.4	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Intersection Delay, s/veh	135.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	282	206	10	12	318	220	30	159	25	270	203	190
Future Vol, veh/h	282	206	10	12	318	220	30	159	25	270	203	190
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	310	226	11	13	349	242	33	175	27	297	223	209
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	50.7	311.8	21.1	89.3
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	36%	0%	0%	100%	0%	0%	100%	0%	73%	0%
Vol Thru, %	64%	100%	0%	0%	100%	0%	0%	59%	27%	35%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	41%	0%	65%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	83	106	25	282	206	10	12	538	372	292
LT Vol	30	0	0	282	0	0	12	0	270	0
Through Vol	53	106	0	0	206	0	0	318	102	102
RT Vol	0	0	25	0	0	10	0	220	0	190
Lane Flow Rate	91	116	27	310	226	11	13	591	408	320
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.285	0.358	0.079	0.901	0.627	0.028	0.039	1.624	1.126	0.812
Departure Headway (Hd)	13.007	12.814	12.066	12.066	11.538	10.799	11.086	10.272	11.355	10.496
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	278	283	299	304	315	334	325	361	323	349
Service Time	10.707	10.514	9.766	9.766	9.238	8.499	8.786	7.972	9.055	8.196
HCM Lane V/C Ratio	0.327	0.41	0.09	1.02	0.717	0.033	0.04	1.637	1.263	0.917
HCM Control Delay	20.8	22.5	15.8	65.9	31.8	13.8	14.2	318.4	123.4	45.9
HCM Lane LOS	C	C	C	F	D	B	B	F	F	E
HCM 95th-tile Q	1.1	1.6	0.3	8.4	4	0.1	0.1	33.7	14.3	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	700	563	268	98	404	350	155	617	125	280	704	430
Future Volume (veh/h)	700	563	268	98	404	350	155	617	125	280	704	430
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	737	593	0	103	425	0	163	649	0	295	741	250
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	853	1374	615	130	758	892	230	1039	465	377	1240	508
Arrive On Green	0.25	0.39	0.00	0.07	0.21	0.00	0.07	0.29	0.00	0.11	0.33	0.33
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1526
Grp Volume(v), veh/h	737	593	0	103	425	0	163	649	0	295	741	250
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1526
Q Serve(g_s), s	23.7	14.2	0.0	6.6	12.4	0.0	5.4	18.3	0.0	9.4	19.2	15.1
Cycle Q Clear(g_c), s	23.7	14.2	0.0	6.6	12.4	0.0	5.4	18.3	0.0	9.4	19.2	15.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	853	1374	615	130	758	892	230	1039	465	377	1240	508
V/C Ratio(X)	0.86	0.43	0.00	0.79	0.56	0.00	0.71	0.62	0.00	0.78	0.60	0.49
Avail Cap(c_a), veh/h	3065	3519	1574	445	1255	1284	684	1867	835	890	2158	884
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.6	26.0	0.0	52.7	40.6	0.0	52.8	35.3	0.0	50.4	32.1	30.8
Incr Delay (d2), s/veh	2.8	0.2	0.0	10.1	0.7	0.0	4.0	0.6	0.0	3.6	0.5	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.6	7.0	0.0	3.6	6.1	0.0	2.7	9.0	0.0	4.8	10.0	6.4
LnGrp Delay(d),s/veh	44.4	26.2	0.0	62.8	41.2	0.0	56.8	36.0	0.0	54.0	32.6	31.5
LnGrp LOS	D	C		E	D		E	D		D	C	C
Approach Vol, veh/h		1330			528			812			1286	
Approach Delay, s/veh		36.3			45.4			40.1			37.3	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.3	38.0	12.5	48.9	11.7	42.5	32.7	28.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	61.0	29.0	115.0	23.0	67.0	103.0	41.0
Max Q Clear Time (g_c+I1), s	11.4	20.3	8.6	16.2	7.4	21.2	25.7	14.4
Green Ext Time (p_c), s	0.9	13.6	0.2	8.5	0.4	14.0	3.0	7.4

Intersection Summary	
HCM 2010 Ctrl Delay	38.6
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	302	556	43	113	427	310	55	480	97	340	280	181
Future Volume (veh/h)	302	556	43	113	427	310	55	480	97	340	280	181
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	325	598	42	122	459	237	59	516	91	366	301	107
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	361	1261	88	152	577	295	76	783	137	451	896	312
Arrive On Green	0.20	0.38	0.38	0.09	0.26	0.26	0.04	0.26	0.26	0.13	0.35	0.35
Sat Flow, veh/h	1774	3348	235	1774	2232	1142	1774	2996	526	3442	2564	891
Grp Volume(v), veh/h	325	316	324	122	363	333	59	304	303	366	206	202
Grp Sat Flow(s),veh/h/ln	1774	1770	1813	1774	1770	1605	1774	1770	1752	1721	1770	1686
Q Serve(g_s), s	19.6	14.9	14.9	7.4	21.0	21.3	3.6	16.8	17.0	11.4	9.4	9.7
Cycle Q Clear(g_c), s	19.6	14.9	14.9	7.4	21.0	21.3	3.6	16.8	17.0	11.4	9.4	9.7
Prop In Lane	1.00		0.13	1.00		0.71	1.00		0.30	1.00		0.53
Lane Grp Cap(c), veh/h	361	666	683	152	457	415	76	462	458	451	619	589
V/C Ratio(X)	0.90	0.47	0.48	0.80	0.79	0.80	0.78	0.66	0.66	0.81	0.33	0.34
Avail Cap(c_a), veh/h	517	676	693	323	483	438	129	596	590	783	870	829
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.7	26.0	26.0	49.3	38.0	38.1	52.1	36.2	36.3	46.4	26.3	26.4
Incr Delay (d2), s/veh	14.2	0.5	0.5	9.5	8.5	9.9	15.4	1.7	1.8	3.5	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.1	7.4	7.6	4.0	11.4	10.6	2.1	8.4	8.4	5.6	4.6	4.6
LnGrp Delay(d),s/veh	56.9	26.5	26.5	58.9	46.5	48.1	67.5	37.9	38.1	50.0	26.6	26.8
LnGrp LOS	E	C	C	E	D	D	E	D	D	D	C	C
Approach Vol, veh/h		965			818			666			774	
Approach Delay, s/veh		36.7			49.0			40.6			37.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.4	32.7	13.4	45.4	8.7	42.4	26.4	32.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	37.0	20.0	42.0	8.0	54.0	32.0	30.0
Max Q Clear Time (g_c+I1), s	13.4	19.0	9.4	16.9	5.6	11.7	21.6	23.3
Green Ext Time (p_c), s	1.0	6.4	0.2	10.2	0.0	8.2	0.8	4.3

Intersection Summary	
HCM 2010 Ctrl Delay	40.9
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	17.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	250	20	80	140	60	20	192	70	110	240	30
Future Vol, veh/h	90	250	20	80	140	60	20	192	70	110	240	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	278	22	89	156	67	22	213	78	122	267	33
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	16.3	14.7	16.6	20.8
HCM LOS	C	B	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	17%	0%	100%	0%	0%	100%	0%	0%	48%	0%
Vol Thru, %	83%	58%	0%	100%	81%	0%	100%	44%	52%	80%
Vol Right, %	0%	42%	0%	0%	19%	0%	0%	56%	0%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	116	166	90	167	103	80	93	107	230	150
LT Vol	20	0	90	0	0	80	0	0	110	0
Through Vol	96	96	0	167	83	0	93	47	120	120
RT Vol	0	70	0	0	20	0	0	60	0	30
Lane Flow Rate	129	184	100	185	115	89	104	119	256	167
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.315	0.43	0.254	0.444	0.271	0.233	0.257	0.28	0.611	0.381
Departure Headway (Hd)	8.788	8.401	9.158	8.641	8.5	9.432	8.913	8.505	8.607	8.223
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	410	428	393	417	423	381	403	423	419	438
Service Time	6.538	6.15	6.906	6.389	6.248	7.181	6.662	6.254	6.352	5.967
HCM Lane V/C Ratio	0.315	0.43	0.254	0.444	0.272	0.234	0.258	0.281	0.611	0.381
HCM Control Delay	15.5	17.4	15	18.1	14.4	15	14.7	14.5	24	16
HCM Lane LOS	C	C	B	C	B	B	B	B	C	C
HCM 95th-tile Q	1.3	2.1	1	2.2	1.1	0.9	1	1.1	3.9	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	280	40	30	180	100	80	666	40	160	679	170
Future Volume (veh/h)	140	280	40	30	180	100	80	666	40	160	679	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	295	8	32	189	0	84	701	0	168	715	95
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	381	318	43	326	277	142	902	767	206	1041	881
Arrive On Green	0.05	0.20	0.20	0.02	0.18	0.00	0.04	0.48	0.00	0.12	0.56	0.56
Sat Flow, veh/h	1774	1863	1552	1774	1863	1583	3442	1863	1583	1774	1863	1576
Grp Volume(v), veh/h	147	295	8	32	189	0	84	701	0	168	715	95
Grp Sat Flow(s),veh/h/ln	1774	1863	1552	1774	1863	1583	1721	1863	1583	1774	1863	1576
Q Serve(g_s), s	5.0	14.0	0.4	1.7	8.7	0.0	2.2	29.1	0.0	8.7	25.7	2.6
Cycle Q Clear(g_c), s	5.0	14.0	0.4	1.7	8.7	0.0	2.2	29.1	0.0	8.7	25.7	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	95	381	318	43	326	277	142	902	767	206	1041	881
V/C Ratio(X)	1.55	0.77	0.03	0.75	0.58	0.00	0.59	0.78	0.00	0.82	0.69	0.11
Avail Cap(c_a), veh/h	95	796	664	114	816	694	478	1871	1591	455	2090	1768
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.3	35.2	29.8	45.4	35.4	0.0	44.1	19.9	0.0	40.4	14.8	9.7
Incr Delay (d2), s/veh	293.0	3.4	0.0	22.4	1.6	0.0	3.9	1.5	0.0	7.7	0.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.1	7.6	0.2	1.1	4.6	0.0	1.1	15.2	0.0	4.7	13.3	1.2
LnGrp Delay(d),s/veh	337.3	38.6	29.8	67.8	37.0	0.0	47.9	21.4	0.0	48.1	15.6	9.7
LnGrp LOS	F	D	C	E	D		D	C		D	B	A
Approach Vol, veh/h		450			221			785			978	
Approach Delay, s/veh		136.0			41.5			24.3			20.6	
Approach LOS		F			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.9	49.3	6.3	23.1	7.9	56.3	9.0	20.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	24.0	94.0	6.0	40.0	13.0	105.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	10.7	31.1	3.7	16.0	4.2	27.7	7.0	10.7
Green Ext Time (p_c), s	0.3	14.2	0.0	3.1	0.1	14.4	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	45.0
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	541	40	284	348	478	70	1210	623	491	320	300
Future Volume (veh/h)	220	541	40	284	348	478	70	1210	623	491	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	582	0	305	374	0	75	1301	0	528	344	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	250	1176	350	341	963	300	71	1477	0	554	2306	0
Arrive On Green	0.15	0.25	0.00	0.11	0.20	0.00	0.04	0.41	0.00	0.17	0.54	0.00
Sat Flow, veh/h	1645	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	582	0	305	374	0	75	1301	0	528	344	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	36.4	26.9	0.0	24.0	17.5	0.0	11.0	84.4	0.0	41.7	10.3	0.0
Cycle Q Clear(g_c), s	36.4	26.9	0.0	24.0	17.5	0.0	11.0	84.4	0.0	41.7	10.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	250	1176	350	341	963	300	71	1477	0	554	2306	0
V/C Ratio(X)	0.95	0.50	0.00	0.89	0.39	0.00	1.06	0.88	0.00	0.95	0.15	0.00
Avail Cap(c_a), veh/h	284	1176	350	802	963	300	71	1477	0	576	2306	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	107.0	81.9	0.0	112.3	87.6	0.0	121.9	69.8	0.0	104.2	29.6	0.0
Incr Delay (d2), s/veh	37.4	1.5	0.0	8.3	1.2	0.0	122.9	7.8	0.0	25.6	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.2	11.9	0.0	11.0	7.7	0.0	7.4	29.3	0.0	20.5	4.1	0.0
LnGrp Delay(d),s/veh	144.4	83.4	0.0	120.6	88.8	0.0	246.1	77.6	0.0	129.8	29.7	0.0
LnGrp LOS	F	F		F	F		F	E		F	C	
Approach Vol, veh/h		819			679			1376			872	
Approach Delay, s/veh		101.0			103.1			86.8			90.3	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	48.3	107.7	31.2	67.5	15.0	141.0	42.7	56.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	46.0	102.0	64.0	32.0	11.0	137.0	44.0	52.0
Max Q Clear Time (g_c+I1), s	43.7	86.4	26.0	28.9	13.0	12.3	38.4	19.5
Green Ext Time (p_c), s	0.5	10.4	1.2	1.8	0.0	23.3	0.3	8.3

Intersection Summary	
HCM 2010 Ctrl Delay	93.7
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	334	140	380	40	331	266	140	90	267	200
Future Volume (veh/h)	310	700	334	140	380	40	331	266	140	90	267	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	286	147	400	34	348	280	100	95	281	110
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	419	1138	436	176	1406	118	380	988	344	83	546	208
Arrive On Green	0.12	0.32	0.32	0.10	0.29	0.29	0.21	0.39	0.39	0.05	0.22	0.22
Sat Flow, veh/h	3442	3588	1374	1774	4775	400	1774	2557	890	1774	2491	950
Grp Volume(v), veh/h	326	696	327	147	282	152	348	191	189	95	197	194
Grp Sat Flow(s),veh/h/ln	1721	1695	1572	1774	1695	1785	1774	1770	1678	1774	1770	1671
Q Serve(g_s), s	9.8	18.8	19.1	8.7	6.8	7.0	20.4	7.9	8.3	5.0	10.4	10.9
Cycle Q Clear(g_c), s	9.8	18.8	19.1	8.7	6.8	7.0	20.4	7.9	8.3	5.0	10.4	10.9
Prop In Lane	1.00		0.87	1.00		0.22	1.00		0.53	1.00		0.57
Lane Grp Cap(c), veh/h	419	1075	498	176	998	526	380	684	648	83	388	366
V/C Ratio(X)	0.78	0.65	0.66	0.84	0.28	0.29	0.92	0.28	0.29	1.14	0.51	0.53
Avail Cap(c_a), veh/h	1165	1466	680	183	1147	604	434	965	915	83	682	644
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.3	31.2	31.3	47.1	28.9	28.9	40.9	22.5	22.6	50.7	36.5	36.7
Incr Delay (d2), s/veh	3.2	0.7	1.5	26.6	0.2	0.3	22.3	0.2	0.2	141.1	1.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	8.9	8.5	5.5	3.2	3.5	12.3	3.9	3.9	5.7	5.2	5.1
LnGrp Delay(d),s/veh	48.5	31.9	32.8	73.6	29.0	29.2	63.2	22.7	22.8	191.8	37.5	37.9
LnGrp LOS	D	C	C	E	C	C	E	C	C	F	D	D
Approach Vol, veh/h		1349			581			728			486	
Approach Delay, s/veh		36.1			40.4			42.1			67.8	
Approach LOS		D			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	45.1	14.5	37.7	26.8	27.3	16.9	35.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	11.0	46.0	26.0	41.0	36.0	36.0
Max Q Clear Time (g_c+I1), s	7.0	10.3	10.7	21.1	22.4	12.9	11.8	9.0
Green Ext Time (p_c), s	0.0	5.5	0.0	11.9	0.4	5.2	1.2	12.3

Intersection Summary	
HCM 2010 Ctrl Delay	43.2
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	8.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	48	871	456	173	236	44
Future Vol, veh/h	48	871	456	173	236	44
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	937	490	186	254	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	491	0	-	0	970	247
Stage 1	-	-	-	-	491	-
Stage 2	-	-	-	-	479	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	684	-	-	-	321	642
Stage 1	-	-	-	-	489	-
Stage 2	-	-	-	-	538	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	683	-	-	-	296	641
Mov Cap-2 Maneuver	-	-	-	-	296	-
Stage 1	-	-	-	-	489	-
Stage 2	-	-	-	-	497	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	52.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	683	-	-	-	296	641
HCM Lane V/C Ratio	0.076	-	-	-	0.857	0.074
HCM Control Delay (s)	10.7	-	-	-	60.7	11.1
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	7.5	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	901	199	124	569	200	135	458	113	200	405	184
Future Volume (veh/h)	158	901	199	124	569	200	135	458	113	200	405	184
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	178	1012	133	139	639	0	152	515	0	225	455	197
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	644	328	128	622	330	72	658	559	244	555	241
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.00	0.04	0.35	0.00	0.14	0.45	0.45
Sat Flow, veh/h	515	3091	1576	615	2987	1583	1774	1863	1583	1774	1234	534
Grp Volume(v), veh/h	635	555	133	414	364	0	152	515	0	225	0	652
Grp Sat Flow(s),veh/h/ln	1837	1770	1576	1832	1770	1583	1774	1863	1583	1774	0	1768
Q Serve(g_s), s	36.0	36.0	12.6	36.0	35.4	0.0	7.0	42.7	0.0	21.6	0.0	55.5
Cycle Q Clear(g_c), s	36.0	36.0	12.6	36.0	35.4	0.0	7.0	42.7	0.0	21.6	0.0	55.5
Prop In Lane	0.28		1.00	0.34		1.00	1.00		1.00	1.00		0.30
Lane Grp Cap(c), veh/h	383	369	328	382	369	330	72	658	559	244	0	796
V/C Ratio(X)	1.66	1.51	0.41	1.09	0.99	0.00	2.11	0.78	0.00	0.92	0.00	0.82
Avail Cap(c_a), veh/h	383	369	328	382	369	330	72	658	559	267	0	796
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.4	68.4	59.1	68.4	68.2	0.0	82.9	50.0	0.0	73.6	0.0	41.4
Incr Delay (d2), s/veh	307.6	241.5	0.8	70.8	43.2	0.0	545.4	9.0	0.0	33.4	0.0	9.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	50.9	42.2	5.6	25.6	21.7	0.0	14.3	23.7	0.0	12.9	0.0	29.0
LnGrp Delay(d),s/veh	376.0	309.9	59.9	139.2	111.4	0.0	628.3	59.0	0.0	107.0	0.0	50.6
LnGrp LOS	F	F	E	F	F		F	E		F		D
Approach Vol, veh/h		1323			778			667			877	
Approach Delay, s/veh		316.5			126.2			188.8			65.0	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.8	65.0		40.0	11.0	81.8		40.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	26.0	61.0		36.0	7.0	61.0		36.0
Max Q Clear Time (g_c+I1), s	23.6	44.7		38.0	9.0	57.5		38.0
Green Ext Time (p_c), s	0.2	7.4		0.0	0.0	2.3		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	192.0
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	90.6
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	387	214	1	668	239
Future Vol, veh/h	12	387	214	1	668	239
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	412	228	1	711	254
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	20.5	14.2	139.5
HCM LOS	C	B	F

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	3%	100%	0%
Vol Thru, %	100%	0%	0%	100%
Vol Right, %	0%	97%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	215	399	668	239
LT Vol	0	12	668	0
Through Vol	214	0	0	239
RT Vol	1	387	0	0
Lane Flow Rate	229	424	711	254
Geometry Grp	5	2	7	7
Degree of Util (X)	0.405	0.668	1.337	0.442
Departure Headway (Hd)	6.69	6.114	6.772	6.263
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	542	594	540	577
Service Time	4.69	4.114	4.484	3.975
HCM Lane V/C Ratio	0.423	0.714	1.317	0.44
HCM Control Delay	14.2	20.5	184.5	13.9
HCM Lane LOS	B	C	F	B
HCM 95th-tile Q	1.9	5	31	2.2

Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	608	72	62	342	46	41
Future Vol, veh/h	608	72	62	342	46	41
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	654	77	67	368	49	44

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	737	0	1205	704
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	507	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	869	-	203	437
Stage 1	-	-	-	-	494	-
Stage 2	-	-	-	-	605	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	865	-	181	433
Mov Cap-2 Maneuver	-	-	-	-	181	-
Stage 1	-	-	-	-	492	-
Stage 2	-	-	-	-	544	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	27.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	249	-	-	865	-
HCM Lane V/C Ratio	0.376	-	-	0.077	-
HCM Control Delay (s)	27.9	-	-	9.5	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	1.7	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	595	20	20	434	10	10
Future Vol, veh/h	595	20	20	434	10	10
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	626	21	21	457	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	652	0	1146	647
Stage 1	-	-	-	-	642	-
Stage 2	-	-	-	-	504	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	935	-	220	471
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	607	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	931	-	212	467
Mov Cap-2 Maneuver	-	-	-	-	212	-
Stage 1	-	-	-	-	522	-
Stage 2	-	-	-	-	586	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	18.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	292	-	-	931	-
HCM Lane V/C Ratio	0.072	-	-	0.023	-
HCM Control Delay (s)	18.3	-	-	9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	136.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	202	424	10	35	297	200	10	235	83	310	138	270
Future Vol, veh/h	202	424	10	35	297	200	10	235	83	310	138	270
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	206	433	10	36	303	204	10	240	85	316	141	276
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	130.9	255.3	24.2	104.2
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	11%	0%	0%	100%	0%	0%	100%	0%	82%	0%
Vol Thru, %	89%	100%	0%	0%	100%	0%	0%	60%	18%	20%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	40%	0%	80%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	88	157	83	202	424	10	35	497	379	339
LT Vol	10	0	0	202	0	0	35	0	310	0
Through Vol	78	157	0	0	424	0	0	297	69	69
RT Vol	0	0	83	0	0	10	0	200	0	270
Lane Flow Rate	90	160	85	206	433	10	36	507	387	346
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.287	0.507	0.252	0.635	1.274	0.028	0.114	1.507	1.15	0.937
Departure Headway (Hd)	13.177	13.117	12.369	12.49	11.962	11.222	12.185	11.369	12.19	11.172
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	275	277	292	291	307	321	296	325	302	329
Service Time	10.877	10.817	10.069	10.19	9.662	8.922	9.885	9.069	9.89	8.872
HCM Lane V/C Ratio	0.327	0.578	0.291	0.708	1.41	0.031	0.122	1.56	1.281	1.052
HCM Control Delay	21.1	28.6	19.2	34.6	179.6	14.2	16.4	272.1	134.9	69.8
HCM Lane LOS	C	D	C	D	F	B	C	F	F	F
HCM 95th-tile Q	1.2	2.7	1	4	18.2	0.1	0.4	26.8	14.4	9.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	287	130	100	376	240	200	459	105	320	764	690
Future Volume (veh/h)	320	287	130	100	376	240	200	459	105	320	764	690
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	348	312	0	109	409	0	217	499	0	348	890	435
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	450	1020	456	141	838	1018	313	1105	494	456	1304	539
Arrive On Green	0.13	0.29	0.00	0.08	0.24	0.00	0.09	0.31	0.00	0.13	0.35	0.35
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1541
Grp Volume(v), veh/h	348	312	0	109	409	0	217	499	0	348	890	435
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1541
Q Serve(g_s), s	8.2	5.7	0.0	5.0	8.3	0.0	5.1	9.4	0.0	7.9	17.0	21.3
Cycle Q Clear(g_c), s	8.2	5.7	0.0	5.0	8.3	0.0	5.1	9.4	0.0	7.9	17.0	21.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	450	1020	456	141	838	1018	313	1105	494	456	1304	539
V/C Ratio(X)	0.77	0.31	0.00	0.77	0.49	0.00	0.69	0.45	0.00	0.76	0.68	0.81
Avail Cap(c_a), veh/h	742	1526	683	383	1526	1560	783	1314	588	808	1383	572
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.1	23.2	0.0	37.7	27.5	0.0	36.8	23.0	0.0	35.1	23.2	24.6
Incr Delay (d2), s/veh	2.9	0.2	0.0	8.7	0.4	0.0	2.8	0.3	0.0	2.7	1.3	8.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	2.8	0.0	2.8	4.1	0.0	2.5	4.6	0.0	4.0	9.0	10.2
LnGrp Delay(d),s/veh	37.9	23.4	0.0	46.4	27.9	0.0	39.6	23.3	0.0	37.8	24.5	32.5
LnGrp LOS	D	C		D	C		D	C		D	C	C
Approach Vol, veh/h		660			518			716			1673	
Approach Delay, s/veh		31.0			31.8			28.2			29.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	30.1	10.6	28.1	11.6	33.2	14.9	23.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	18.0	36.0	19.0	31.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	9.9	11.4	7.0	7.7	7.1	23.3	10.2	10.3
Green Ext Time (p_c), s	0.8	10.9	0.2	5.0	0.5	5.5	0.8	4.9

Intersection Summary	
HCM 2010 Ctrl Delay	29.8
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	124	279	43	120	471	190	13	330	90	300	420	306
Future Volume (veh/h)	124	279	43	120	471	190	13	330	90	300	420	306
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	144	324	38	140	548	177	15	384	84	349	488	262
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	1020	119	176	834	268	31	779	169	424	834	446
Arrive On Green	0.10	0.32	0.32	0.10	0.32	0.32	0.02	0.27	0.27	0.12	0.38	0.38
Sat Flow, veh/h	1774	3186	370	1774	2625	845	1774	2887	625	3442	2221	1186
Grp Volume(v), veh/h	144	179	183	140	369	356	15	234	234	349	388	362
Grp Sat Flow(s),veh/h/ln	1774	1770	1787	1774	1770	1700	1774	1770	1742	1721	1770	1638
Q Serve(g_s), s	6.8	6.5	6.6	6.6	15.3	15.4	0.7	9.5	9.7	8.4	15.0	15.1
Cycle Q Clear(g_c), s	6.8	6.5	6.6	6.6	15.3	15.4	0.7	9.5	9.7	8.4	15.0	15.1
Prop In Lane	1.00		0.21	1.00		0.50	1.00		0.36	1.00		0.72
Lane Grp Cap(c), veh/h	180	567	572	176	562	540	31	477	470	424	665	615
V/C Ratio(X)	0.80	0.32	0.32	0.80	0.66	0.66	0.48	0.49	0.50	0.82	0.58	0.59
Avail Cap(c_a), veh/h	333	1266	1278	333	1266	1216	229	747	735	444	747	691
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.5	21.9	22.0	37.6	25.1	25.1	41.5	26.2	26.3	36.5	21.3	21.3
Incr Delay (d2), s/veh	7.9	0.3	0.3	7.9	1.3	1.4	11.1	0.8	0.8	11.4	0.9	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	3.2	3.3	3.6	7.7	7.4	0.4	4.7	4.7	4.7	7.5	7.0
LnGrp Delay(d),s/veh	45.3	22.2	22.3	45.5	26.4	26.5	52.6	27.0	27.1	47.9	22.2	22.4
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		506			865			483			1099	
Approach Delay, s/veh		28.8			29.5			27.8			30.4	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	27.0	12.5	31.3	5.5	36.0	12.7	31.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	61.0	11.0	36.0	16.0	61.0
Max Q Clear Time (g_c+I1), s	10.4	11.7	8.6	8.6	2.7	17.1	8.8	17.4
Green Ext Time (p_c), s	0.1	9.1	0.2	9.3	0.0	8.1	0.2	9.1

Intersection Summary	
HCM 2010 Ctrl Delay	29.5
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	80	20	50	250	130	20	222	30	80	212	40
Future Vol, veh/h	80	80	20	50	250	130	20	222	30	80	212	40
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	101	25	63	316	165	25	281	38	101	268	51
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.1	20.6	18	20.7
HCM LOS	C	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	15%	0%	100%	0%	0%	100%	0%	0%	43%	0%
Vol Thru, %	85%	79%	0%	100%	57%	0%	100%	39%	57%	73%
Vol Right, %	0%	21%	0%	0%	43%	0%	0%	61%	0%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	131	141	80	53	47	50	167	213	186	146
LT Vol	20	0	80	0	0	50	0	0	80	0
Through Vol	111	111	0	53	27	0	167	83	106	106
RT Vol	0	30	0	0	20	0	0	130	0	40
Lane Flow Rate	166	178	101	68	59	63	211	270	235	185
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.413	0.433	0.281	0.178	0.15	0.16	0.503	0.61	0.58	0.434
Departure Headway (Hd)	8.962	8.733	9.995	9.474	9.162	9.096	8.579	8.137	8.876	8.463
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	401	412	359	379	391	394	420	443	407	425
Service Time	6.714	6.485	7.754	7.233	6.92	6.845	6.327	5.886	6.627	6.214
HCM Lane V/C Ratio	0.414	0.432	0.281	0.179	0.151	0.16	0.502	0.609	0.577	0.435
HCM Control Delay	17.9	18	16.6	14.3	13.5	13.6	19.7	22.9	23.2	17.6
HCM Lane LOS	C	C	C	B	B	B	C	C	C	C
HCM 95th-tile Q	2	2.1	1.1	0.6	0.5	0.6	2.7	4	3.5	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	110	30	40	270	150	170	584	40	110	765	160
Future Volume (veh/h)	60	110	30	40	270	150	170	584	40	110	765	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	69	126	5	46	310	0	195	671	0	126	879	87
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	438	370	71	419	356	280	815	693	159	830	701
Arrive On Green	0.05	0.24	0.24	0.04	0.22	0.00	0.08	0.44	0.00	0.09	0.45	0.45
Sat Flow, veh/h	1774	1863	1573	1774	1863	1583	3442	1863	1583	1774	1863	1574
Grp Volume(v), veh/h	69	126	5	46	310	0	195	671	0	126	879	87
Grp Sat Flow(s),veh/h/ln	1774	1863	1573	1774	1863	1583	1721	1863	1583	1774	1863	1574
Q Serve(g_s), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	25.6	0.0	5.6	36.0	2.6
Cycle Q Clear(g_c), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	25.6	0.0	5.6	36.0	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	438	370	71	419	356	280	815	693	159	830	701
V/C Ratio(X)	0.78	0.29	0.01	0.65	0.74	0.00	0.70	0.82	0.00	0.79	1.06	0.12
Avail Cap(c_a), veh/h	176	922	779	176	922	784	426	830	706	220	830	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	25.3	23.7	38.2	29.1	0.0	36.1	20.0	0.0	36.0	22.4	13.1
Incr Delay (d2), s/veh	13.5	0.4	0.0	9.7	2.6	0.0	3.1	6.7	0.0	12.7	48.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.4	0.1	1.2	6.8	0.0	2.2	14.6	0.0	3.3	29.3	1.1
LnGrp Delay(d),s/veh	51.4	25.7	23.7	47.9	31.7	0.0	39.3	26.6	0.0	48.8	70.4	13.2
LnGrp LOS	D	C	C	D	C		D	C		D	F	B
Approach Vol, veh/h		200			356			866			1092	
Approach Delay, s/veh		34.5			33.8			29.5			63.4	
Approach LOS		C			C			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	39.3	7.2	23.0	10.6	40.0	8.0	22.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	40.0	10.0	36.0	8.0	40.0
Max Q Clear Time (g_c+I1), s	7.6	27.6	4.1	6.5	6.5	38.0	5.1	14.5
Green Ext Time (p_c), s	0.1	5.9	0.0	3.0	0.2	0.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	45.2
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	93	40	534	188	389	20	470	239	686	990	180
Future Volume (veh/h)	50	93	40	534	188	389	20	470	239	686	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	96	0	551	194	0	21	485	0	707	1021	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	67	430	134	673	1232	384	37	884	0	827	2320	0
Arrive On Green	0.04	0.09	0.00	0.21	0.26	0.00	0.02	0.26	0.00	0.26	0.49	0.00
Sat Flow, veh/h	1645	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	96	0	551	194	0	21	485	0	707	1021	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	2.7	1.7	0.0	14.4	2.8	0.0	1.1	10.6	0.0	18.4	12.3	0.0
Cycle Q Clear(g_c), s	2.7	1.7	0.0	14.4	2.8	0.0	1.1	10.6	0.0	18.4	12.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	67	430	134	673	1232	384	37	884	0	827	2320	0
V/C Ratio(X)	0.77	0.22	0.00	0.82	0.16	0.00	0.57	0.55	0.00	0.86	0.44	0.00
Avail Cap(c_a), veh/h	583	1940	604	1313	1940	604	572	1619	0	1131	2320	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.5	36.9	0.0	32.9	24.9	0.0	42.3	28.2	0.0	30.9	14.4	0.0
Incr Delay (d2), s/veh	16.7	0.3	0.0	2.5	0.1	0.0	13.0	0.5	0.0	4.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.7	0.0	6.6	1.2	0.0	0.6	3.4	0.0	8.7	5.3	0.0
LnGrp Delay(d),s/veh	58.2	37.1	0.0	35.4	25.0	0.0	55.4	28.7	0.0	35.8	14.5	0.0
LnGrp LOS	E	D		D	C		E	C		D	B	
Approach Vol, veh/h		148			745			506			1728	
Approach Delay, s/veh		44.6			32.7			29.8			23.2	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.7	26.4	22.5	12.0	6.0	47.0	7.6	26.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	20.4	12.6	16.4	3.7	3.1	14.3	4.7	4.8
Green Ext Time (p_c), s	2.2	9.4	2.1	2.2	0.0	13.4	0.1	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	27.6
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	408	197	440	30	351	248	94	50	236	160
Future Volume (veh/h)	180	260	408	197	440	30	351	248	94	50	236	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	135	214	478	25	382	270	65	54	257	48
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	303	865	376	262	1537	80	281	915	216	83	631	116
Arrive On Green	0.09	0.25	0.25	0.15	0.31	0.31	0.16	0.32	0.32	0.05	0.21	0.21
Sat Flow, veh/h	3442	3434	1495	1774	4941	256	1774	2823	665	1774	2968	544
Grp Volume(v), veh/h	196	279	139	214	327	176	382	167	168	54	151	154
Grp Sat Flow(s),veh/h/ln	1721	1695	1539	1774	1695	1807	1774	1770	1718	1774	1770	1743
Q Serve(g_s), s	3.8	4.7	5.2	8.1	5.1	5.2	11.0	4.9	5.1	2.1	5.1	5.3
Cycle Q Clear(g_c), s	3.8	4.7	5.2	8.1	5.1	5.2	11.0	4.9	5.1	2.1	5.1	5.3
Prop In Lane	1.00		0.97	1.00		0.14	1.00		0.39	1.00		0.31
Lane Grp Cap(c), veh/h	303	853	388	262	1055	562	281	573	557	83	376	370
V/C Ratio(X)	0.65	0.33	0.36	0.82	0.31	0.31	1.36	0.29	0.30	0.65	0.40	0.41
Avail Cap(c_a), veh/h	792	1754	797	408	1754	935	281	916	889	281	916	902
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.7	21.2	21.4	28.7	18.3	18.3	29.3	17.5	17.6	32.6	23.6	23.7
Incr Delay (d2), s/veh	2.3	0.2	0.6	7.2	0.2	0.3	184.1	0.3	0.3	8.4	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	2.2	2.3	4.5	2.4	2.6	19.6	2.4	2.5	1.2	2.6	2.6
LnGrp Delay(d),s/veh	33.0	21.4	22.0	35.9	18.4	18.6	213.4	17.8	17.9	41.0	24.3	24.4
LnGrp LOS	C	C	C	D	B	B	F	B	B	D	C	C
Approach Vol, veh/h		614			717			717			359	
Approach Delay, s/veh		25.2			23.7			122.0			26.9	
Approach LOS		C			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.2	26.5	14.3	21.5	15.0	18.8	10.1	25.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	36.0	11.0	36.0	16.0	36.0
Max Q Clear Time (g_c+I1), s	4.1	7.1	10.1	7.2	13.0	7.3	5.8	7.2
Green Ext Time (p_c), s	0.0	4.1	0.3	7.2	0.0	4.1	0.4	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	53.9
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	10.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	22	372	655	210	210	32
Future Vol, veh/h	22	372	655	210	210	32
Conflicting Peds, #/hr	10	0	0	2	2	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	448	789	253	253	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	799	0	-	0	1033	415
Stage 1	-	-	-	-	799	-
Stage 2	-	-	-	-	234	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	489	-	-	-	299	501
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	719	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	485	-	-	-	278	493
Mov Cap-2 Maneuver	-	-	-	-	278	-
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	673	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	65.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	485	-	-	-	278	493
HCM Lane V/C Ratio	0.055	-	-	-	0.91	0.078
HCM Control Delay (s)	12.9	-	-	-	73.3	12.9
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	8.3	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	168	595	200	110	740	300	170	276	103	270	465	120
Future Volume (veh/h)	168	595	200	110	740	300	170	276	103	270	465	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	205	726	110	134	902	0	207	337	0	329	567	140
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	441	196	134	949	475	177	559	475	276	513	127
Arrive On Green	0.16	0.16	0.16	0.30	0.30	0.00	0.10	0.30	0.00	0.16	0.36	0.36
Sat Flow, veh/h	756	2838	1260	446	3164	1583	1774	1863	1583	1774	1442	356
Grp Volume(v), veh/h	495	436	110	553	483	0	207	337	0	329	0	707
Grp Sat Flow(s),veh/h/ln	1825	1770	1260	1840	1770	1583	1774	1863	1583	1774	0	1798
Q Serve(g_s), s	28.0	28.0	14.5	54.0	47.4	0.0	18.0	27.8	0.0	28.0	0.0	64.0
Cycle Q Clear(g_c), s	28.0	28.0	14.5	54.0	47.4	0.0	18.0	27.8	0.0	28.0	0.0	64.0
Prop In Lane	0.41		1.00	0.24		1.00	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	284	275	196	552	531	475	177	559	475	276	0	639
V/C Ratio(X)	1.74	1.59	0.56	1.00	0.91	0.00	1.17	0.60	0.00	1.19	0.00	1.11
Avail Cap(c_a), veh/h	284	275	196	552	531	475	177	559	475	276	0	639
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	76.0	76.0	70.3	63.0	60.7	0.0	81.0	53.8	0.0	76.0	0.0	58.0
Incr Delay (d2), s/veh	348.3	280.1	3.6	38.5	19.9	0.0	119.6	4.8	0.0	116.5	0.0	68.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	41.6	35.1	5.3	33.4	26.0	0.0	14.7	15.1	0.0	22.7	0.0	43.9
LnGrp Delay(d),s/veh	424.3	356.1	73.9	101.5	80.6	0.0	200.6	58.6	0.0	192.5	0.0	126.1
LnGrp LOS	F	F	E	F	F		F	E		F		F
Approach Vol, veh/h		1041			1036			544			1036	
Approach Delay, s/veh		358.7			91.7			112.6			147.2	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.0	58.0		32.0	22.0	68.0		58.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	28.0	54.0		28.0	18.0	54.0		54.0
Max Q Clear Time (g_c+I1), s	30.0	29.8		30.0	20.0	66.0		56.0
Green Ext Time (p_c), s	0.0	8.0		0.0	0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	186.5
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	35.8
Intersection LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	449	296	3	300	363
Future Vol, veh/h	14	449	296	3	300	363
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	528	348	4	353	427
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	45.2	24	34.6
HCM LOS	E	C	D

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	3%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	97%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	299	463	300	363
LT Vol	0	14	300	0
Through Vol	296	0	0	363
RT Vol	3	449	0	0
Lane Flow Rate	352	545	353	427
Geometry Grp	5	2	7	7
Degree of Util (X)	0.685	0.924	0.751	0.848
Departure Headway (Hd)	7.008	6.105	7.659	7.146
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	517	599	473	508
Service Time	5.054	4.105	5.411	4.898
HCM Lane V/C Ratio	0.681	0.91	0.746	0.841
HCM Control Delay	24	45.2	30.2	38.3
HCM Lane LOS	C	E	D	E
HCM 95th-tile Q	5.2	11.8	6.3	8.7

Intersection	
Int Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	233	70	127	374	79	127
Future Vol, veh/h	233	70	127	374	79	127
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	259	78	141	416	88	141

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	344	0	1010	312
Stage 1	-	-	-	-	305	-
Stage 2	-	-	-	-	705	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1215	-	266	728
Stage 1	-	-	-	-	748	-
Stage 2	-	-	-	-	490	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1208	-	223	720
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	413	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	26.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	388	-	-	1208	-
HCM Lane V/C Ratio	0.59	-	-	0.117	-
HCM Control Delay (s)	26.8	-	-	8.4	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	3.6	-	-	0.4	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	340	10	10	510	20	20
Future Vol, veh/h	340	10	10	510	20	20
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	386	11	11	580	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	405	0	1008	406
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	609	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1154	-	267	645
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	543	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1147	-	260	637
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	532	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	16.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	369	-	-	1147	-
HCM Lane V/C Ratio	0.123	-	-	0.01	-
HCM Control Delay (s)	16.1	-	-	8.2	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Intersection	
Intersection Delay, s/veh	119.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	129	180	10	10	335	220	30	150	20	270	200	195
Future Vol, veh/h	129	180	10	10	335	220	30	150	20	270	200	195
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	142	198	11	11	368	242	33	165	22	297	220	214
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	23.8	273.5	18.8	65.8
HCM LOS	C	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	38%	0%	0%	100%	0%	0%	100%	0%	73%	0%
Vol Thru, %	62%	100%	0%	0%	100%	0%	0%	60%	27%	34%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	40%	0%	66%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	100	20	129	180	10	10	555	370	295
LT Vol	30	0	0	129	0	0	10	0	270	0
Through Vol	50	100	0	0	180	0	0	335	100	100
RT Vol	0	0	20	0	0	10	0	220	0	195
Lane Flow Rate	88	110	22	142	198	11	11	610	407	324
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.256	0.314	0.059	0.404	0.536	0.028	0.03	1.538	1.032	0.749
Departure Headway (Hd)	11.951	11.753	11.012	11.56	11.034	10.297	10.07	9.27	10.348	9.489
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	302	308	327	313	328	350	358	396	354	386
Service Time	9.651	9.453	8.712	9.26	8.734	7.997	7.77	6.97	8.048	7.189
HCM Lane V/C Ratio	0.291	0.357	0.067	0.454	0.604	0.031	0.031	1.54	1.15	0.839
HCM Control Delay	18.7	19.7	14.4	21.9	25.8	13.3	13.1	278.2	89.9	35.6
HCM Lane LOS	C	C	B	C	D	B	B	F	F	E
HCM 95th-tile Q	1	1.3	0.2	1.9	3	0.1	0.1	32.9	12.3	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	700	576	260	97	411	350	150	593	131	280	622	430
Future Volume (veh/h)	700	576	260	97	411	350	150	593	131	280	622	430
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	737	606	0	102	433	0	158	624	0	295	655	222
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	857	1403	628	130	781	913	227	991	443	380	1196	489
Arrive On Green	0.25	0.40	0.00	0.07	0.22	0.00	0.07	0.28	0.00	0.11	0.32	0.32
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1524
Grp Volume(v), veh/h	737	606	0	102	433	0	158	624	0	295	655	222
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1524
Q Serve(g_s), s	22.8	13.9	0.0	6.3	12.1	0.0	5.0	17.2	0.0	9.0	16.2	12.9
Cycle Q Clear(g_c), s	22.8	13.9	0.0	6.3	12.1	0.0	5.0	17.2	0.0	9.0	16.2	12.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	857	1403	628	130	781	913	227	991	443	380	1196	489
V/C Ratio(X)	0.86	0.43	0.00	0.79	0.55	0.00	0.70	0.63	0.00	0.78	0.55	0.45
Avail Cap(c_a), veh/h	3176	3646	1631	461	1300	1322	709	1934	865	922	2236	915
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.1	24.5	0.0	50.9	38.6	0.0	51.0	35.1	0.0	48.5	31.2	30.1
Incr Delay (d2), s/veh	2.7	0.2	0.0	9.9	0.6	0.0	3.8	0.7	0.0	3.5	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.2	6.9	0.0	3.4	6.0	0.0	2.5	8.5	0.0	4.6	8.3	5.5
LnGrp Delay(d),s/veh	42.7	24.7	0.0	60.8	39.2	0.0	54.8	35.8	0.0	52.0	31.6	30.8
LnGrp LOS	D	C		E	D		D	D		D	C	C
Approach Vol, veh/h		1343			535			782			1172	
Approach Delay, s/veh		34.6			43.4			39.6			36.6	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.9	35.3	12.2	48.3	11.4	39.8	31.8	28.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	61.0	29.0	115.0	23.0	67.0	103.0	41.0
Max Q Clear Time (g_c+I1), s	11.0	19.2	8.3	15.9	7.0	18.2	24.8	14.1
Green Ext Time (p_c), s	0.9	12.0	0.2	8.8	0.4	12.4	3.0	7.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	324	565	44	100	424	310	54	480	90	340	280	158
Future Volume (veh/h)	324	565	44	100	424	310	54	480	90	340	280	158
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	348	608	43	108	456	236	58	516	85	366	301	105
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	384	1301	92	136	556	285	75	785	129	451	897	306
Arrive On Green	0.22	0.39	0.39	0.08	0.25	0.25	0.04	0.26	0.26	0.13	0.35	0.35
Sat Flow, veh/h	1774	3346	236	1774	2230	1143	1774	3031	497	3442	2578	880
Grp Volume(v), veh/h	348	321	330	108	361	331	58	300	301	366	204	202
Grp Sat Flow(s),veh/h/ln	1774	1770	1813	1774	1770	1603	1774	1770	1758	1721	1770	1688
Q Serve(g_s), s	21.2	15.0	15.0	6.6	21.3	21.6	3.6	16.7	16.9	11.4	9.4	9.8
Cycle Q Clear(g_c), s	21.2	15.0	15.0	6.6	21.3	21.6	3.6	16.7	16.9	11.4	9.4	9.8
Prop In Lane	1.00		0.13	1.00		0.71	1.00		0.28	1.00		0.52
Lane Grp Cap(c), veh/h	384	688	705	136	441	400	75	458	455	451	615	587
V/C Ratio(X)	0.91	0.47	0.47	0.79	0.82	0.83	0.78	0.66	0.66	0.81	0.33	0.34
Avail Cap(c_a), veh/h	513	688	705	321	480	435	128	592	588	778	864	824
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.3	25.2	25.3	50.2	39.2	39.3	52.5	36.6	36.6	46.7	26.6	26.7
Incr Delay (d2), s/veh	16.3	0.5	0.5	9.9	10.0	11.8	15.6	1.7	1.8	3.6	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	7.4	7.6	3.6	11.7	10.9	2.1	8.4	8.4	5.7	4.7	4.6
LnGrp Delay(d),s/veh	58.6	25.7	25.7	60.1	49.2	51.1	68.1	38.2	38.4	50.3	26.9	27.1
LnGrp LOS	E	C	C	E	D	D	E	D	D	D	C	C
Approach Vol, veh/h		999			800			659			772	
Approach Delay, s/veh		37.2			51.4			40.9			38.0	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.5	32.6	12.5	47.0	8.7	42.5	27.9	31.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	37.0	20.0	42.0	8.0	54.0	32.0	30.0
Max Q Clear Time (g_c+I1), s	13.4	18.9	8.6	17.0	5.6	11.8	23.2	23.6
Green Ext Time (p_c), s	1.0	6.4	0.2	10.3	0.0	8.1	0.8	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	41.7
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	250	20	80	140	60	20	183	70	110	223	30
Future Vol, veh/h	90	250	20	80	140	60	20	183	70	110	223	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	278	22	89	156	67	22	203	78	122	248	33
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.9	14.5	16.1	19.8
HCM LOS	C	B	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	18%	0%	100%	0%	0%	100%	0%	0%	50%	0%
Vol Thru, %	82%	57%	0%	100%	81%	0%	100%	44%	50%	79%
Vol Right, %	0%	43%	0%	0%	19%	0%	0%	56%	0%	21%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	112	162	90	167	103	80	93	107	222	142
LT Vol	20	0	90	0	0	80	0	0	110	0
Through Vol	92	92	0	167	83	0	93	47	112	112
RT Vol	0	70	0	0	20	0	0	60	0	30
Lane Flow Rate	124	179	100	185	115	89	104	119	246	157
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.299	0.413	0.25	0.437	0.267	0.229	0.253	0.275	0.583	0.357
Departure Headway (Hd)	8.686	8.287	9.014	8.497	8.357	9.284	8.766	8.358	8.533	8.174
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	414	434	399	424	431	387	410	430	423	443
Service Time	6.434	6.035	6.762	6.245	6.105	7.032	6.514	6.106	6.276	5.874
HCM Lane V/C Ratio	0.3	0.412	0.251	0.436	0.267	0.23	0.254	0.277	0.582	0.354
HCM Control Delay	15.1	16.8	14.8	17.7	14.1	14.8	14.5	14.3	22.6	15.3
HCM Lane LOS	C	C	B	C	B	B	B	B	C	C
HCM 95th-tile Q	1.2	2	1	2.2	1.1	0.9	1	1.1	3.6	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	280	40	30	180	100	80	643	40	160	589	170
Future Volume (veh/h)	140	280	40	30	180	100	80	643	40	160	589	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	295	8	32	189	0	84	677	0	168	620	88
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	388	323	44	327	278	144	868	738	208	1008	853
Arrive On Green	0.06	0.21	0.21	0.02	0.18	0.00	0.04	0.47	0.00	0.12	0.54	0.54
Sat Flow, veh/h	1774	1863	1553	1774	1863	1583	3442	1863	1583	1774	1863	1575
Grp Volume(v), veh/h	147	295	8	32	189	0	84	677	0	168	620	88
Grp Sat Flow(s),veh/h/ln	1774	1863	1553	1774	1863	1583	1721	1863	1583	1774	1863	1575
Q Serve(g_s), s	5.0	13.0	0.4	1.6	8.1	0.0	2.1	26.6	0.0	8.0	19.9	2.4
Cycle Q Clear(g_c), s	5.0	13.0	0.4	1.6	8.1	0.0	2.1	26.6	0.0	8.0	19.9	2.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	388	323	44	327	278	144	868	738	208	1008	853
V/C Ratio(X)	1.44	0.76	0.02	0.73	0.58	0.00	0.58	0.78	0.00	0.81	0.61	0.10
Avail Cap(c_a), veh/h	102	856	713	122	877	745	514	2011	1709	489	2246	1899
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.0	32.4	27.4	42.2	32.9	0.0	41.0	19.5	0.0	37.5	13.7	9.7
Incr Delay (d2), s/veh	246.1	3.1	0.0	20.4	1.6	0.0	3.7	1.6	0.0	7.2	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	7.0	0.2	1.0	4.3	0.0	1.1	13.9	0.0	4.3	10.3	1.0
LnGrp Delay(d),s/veh	287.1	35.5	27.5	62.6	34.5	0.0	44.6	21.1	0.0	44.7	14.3	9.8
LnGrp LOS	F	D	C	E	C		D	C		D	B	A
Approach Vol, veh/h		450			221			761			876	
Approach Delay, s/veh		117.6			38.6			23.7			19.7	
Approach LOS		F			D			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.2	44.6	6.2	22.1	7.7	51.1	9.0	19.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	24.0	94.0	6.0	40.0	13.0	105.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	10.0	28.6	3.6	15.0	4.1	21.9	7.0	10.1
Green Ext Time (p_c), s	0.3	12.0	0.0	3.2	0.1	12.2	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	41.9
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	518	40	245	336	521	70	1210	554	505	320	300
Future Volume (veh/h)	220	518	40	245	336	521	70	1210	554	505	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	557	0	263	361	0	75	1301	0	543	344	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	250	1240	369	297	963	300	71	1464	0	567	2306	0
Arrive On Green	0.15	0.26	0.00	0.09	0.20	0.00	0.04	0.40	0.00	0.18	0.54	0.00
Sat Flow, veh/h	1645	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	557	0	263	361	0	75	1301	0	543	344	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	36.4	25.1	0.0	20.7	16.8	0.0	11.0	85.0	0.0	42.9	10.3	0.0
Cycle Q Clear(g_c), s	36.4	25.1	0.0	20.7	16.8	0.0	11.0	85.0	0.0	42.9	10.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	250	1240	369	297	963	300	71	1464	0	567	2306	0
V/C Ratio(X)	0.95	0.45	0.00	0.88	0.37	0.00	1.06	0.89	0.00	0.96	0.15	0.00
Avail Cap(c_a), veh/h	284	1240	369	802	963	300	71	1464	0	576	2306	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	107.0	78.5	0.0	114.1	87.3	0.0	121.9	70.6	0.0	103.8	29.6	0.0
Incr Delay (d2), s/veh	37.4	1.2	0.0	8.6	1.1	0.0	122.9	8.4	0.0	27.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.2	11.1	0.0	9.5	7.4	0.0	7.4	29.6	0.0	21.1	4.1	0.0
LnGrp Delay(d),s/veh	144.4	79.6	0.0	122.7	88.5	0.0	246.1	79.1	0.0	130.9	29.7	0.0
LnGrp LOS	F	E		F	F		F	E		F	C	
Approach Vol, veh/h		794			624			1376			887	
Approach Delay, s/veh		99.0			102.9			88.2			91.7	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	49.2	106.8	27.7	71.0	15.0	141.0	42.7	56.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	46.0	102.0	64.0	32.0	11.0	137.0	44.0	52.0
Max Q Clear Time (g_c+I1), s	44.9	87.0	22.7	27.1	13.0	12.3	38.4	18.8
Green Ext Time (p_c), s	0.3	10.1	1.0	2.6	0.0	23.3	0.3	7.9

Intersection Summary	
HCM 2010 Ctrl Delay	93.8
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	257	178	380	40	322	283	225	90	209	200
Future Volume (veh/h)	310	700	257	178	380	40	322	283	225	90	209	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	218	187	400	34	339	298	136	95	220	79
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	424	1226	358	193	1441	121	375	868	385	88	526	183
Arrive On Green	0.12	0.32	0.32	0.11	0.30	0.30	0.21	0.37	0.37	0.05	0.21	0.21
Sat Flow, veh/h	3442	3881	1132	1774	4775	400	1774	2364	1050	1774	2562	890
Grp Volume(v), veh/h	326	643	312	187	282	152	339	221	213	95	150	149
Grp Sat Flow(s),veh/h/ln	1721	1695	1623	1774	1695	1785	1774	1770	1644	1774	1770	1682
Q Serve(g_s), s	9.3	16.2	16.5	10.6	6.4	6.6	18.8	9.1	9.5	5.0	7.4	7.8
Cycle Q Clear(g_c), s	9.3	16.2	16.5	10.6	6.4	6.6	18.8	9.1	9.5	5.0	7.4	7.8
Prop In Lane	1.00		0.70	1.00		0.22	1.00		0.64	1.00		0.53
Lane Grp Cap(c), veh/h	424	1071	513	193	1023	539	375	650	603	88	364	346
V/C Ratio(X)	0.77	0.60	0.61	0.97	0.28	0.28	0.90	0.34	0.35	1.08	0.41	0.43
Avail Cap(c_a), veh/h	1227	1544	739	193	1208	636	457	1016	944	88	718	683
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.9	29.2	29.3	44.8	26.9	26.9	38.9	23.1	23.2	48.0	34.8	35.0
Incr Delay (d2), s/veh	3.0	0.5	1.2	55.3	0.1	0.3	18.9	0.3	0.4	120.0	0.7	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	7.7	7.5	8.2	3.0	3.3	11.2	4.5	4.4	5.4	3.7	3.7
LnGrp Delay(d),s/veh	45.9	29.7	30.4	100.1	27.0	27.2	57.8	23.4	23.6	168.4	35.6	35.8
LnGrp LOS	D	C	C	F	C	C	E	C	C	F	D	D
Approach Vol, veh/h		1281			621			773			394	
Approach Delay, s/veh		34.0			49.1			38.5			67.7	
Approach LOS		C			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	41.1	15.0	35.9	25.3	24.8	16.4	34.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	11.0	46.0	26.0	41.0	36.0	36.0
Max Q Clear Time (g_c+I1), s	7.0	11.5	12.6	18.5	20.8	9.8	11.3	8.6
Green Ext Time (p_c), s	0.0	5.2	0.0	11.7	0.5	5.0	1.2	11.6

Intersection Summary	
HCM 2010 Ctrl Delay	42.5
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	962	505	170	230	33
Future Vol, veh/h	43	962	505	170	230	33
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	46	1034	543	183	247	35

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	544	0	-	0	1051	274
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	507	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	646	-	-	-	293	617
Stage 1	-	-	-	-	455	-
Stage 2	-	-	-	-	520	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	645	-	-	-	272	616
Mov Cap-2 Maneuver	-	-	-	-	272	-
Stage 1	-	-	-	-	455	-
Stage 2	-	-	-	-	483	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	66.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	645	-	-	-	272	616
HCM Lane V/C Ratio	0.072	-	-	-	0.909	0.058
HCM Control Delay (s)	11	-	-	-	74.2	11.2
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	8.2	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	955	190	83	600	200	130	414	113	200	308	191
Future Volume (veh/h)	179	955	190	83	600	200	130	414	113	200	308	191
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	201	1073	133	93	674	0	146	465	0	225	346	200
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	113	638	328	87	665	330	72	658	559	244	499	288
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.00	0.04	0.35	0.00	0.14	0.45	0.45
Sat Flow, veh/h	543	3062	1576	418	3193	1583	1774	1863	1583	1774	1108	641
Grp Volume(v), veh/h	680	594	133	409	358	0	146	465	0	225	0	546
Grp Sat Flow(s),veh/h/ln	1836	1770	1576	1842	1770	1583	1774	1863	1583	1774	0	1749
Q Serve(g_s), s	36.0	36.0	12.6	36.0	34.7	0.0	7.0	37.2	0.0	21.6	0.0	43.1
Cycle Q Clear(g_c), s	36.0	36.0	12.6	36.0	34.7	0.0	7.0	37.2	0.0	21.6	0.0	43.1
Prop In Lane	0.30		1.00	0.23		1.00	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	382	369	328	384	369	330	72	658	559	244	0	787
V/C Ratio(X)	1.78	1.61	0.41	1.07	0.97	0.00	2.03	0.71	0.00	0.92	0.00	0.69
Avail Cap(c_a), veh/h	382	369	328	384	369	330	72	658	559	267	0	787
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.4	68.4	59.1	68.4	67.9	0.0	82.9	48.2	0.0	73.6	0.0	38.0
Incr Delay (d2), s/veh	360.1	287.9	0.8	64.8	38.9	0.0	509.1	6.3	0.0	33.4	0.0	5.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	56.4	47.0	5.6	25.1	21.0	0.0	13.6	20.3	0.0	12.9	0.0	21.9
LnGrp Delay(d),s/veh	428.5	356.2	59.9	133.2	106.7	0.0	592.0	54.5	0.0	107.0	0.0	43.0
LnGrp LOS	F	F	E	F	F		F	D		F		D
Approach Vol, veh/h		1407			767			611			771	
Approach Delay, s/veh		363.1			120.8			182.9			61.6	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.8	65.0		40.0	11.0	81.8		40.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	26.0	61.0		36.0	7.0	61.0		36.0
Max Q Clear Time (g_c+I1), s	23.6	39.2		38.0	9.0	45.1		38.0
Green Ext Time (p_c), s	0.2	7.1		0.0	0.0	6.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	214.5
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	36.7
Intersection LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	307	383	5	507	299
Future Vol, veh/h	14	307	383	5	507	299
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	327	407	5	539	318
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	17.6	23.3	50.8
HCM LOS	C	C	F

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	4%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	96%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	388	321	507	299
LT Vol	0	14	507	0
Through Vol	383	0	0	299
RT Vol	5	307	0	0
Lane Flow Rate	413	341	539	318
Geometry Grp	5	2	7	7
Degree of Util (X)	0.713	0.584	1.021	0.557
Departure Headway (Hd)	6.216	6.158	6.818	6.309
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	578	584	529	569
Service Time	4.28	4.222	4.59	4.08
HCM Lane V/C Ratio	0.715	0.584	1.019	0.559
HCM Control Delay	23.3	17.6	70.8	16.8
HCM Lane LOS	C	C	F	C
HCM 95th-tile Q	5.8	3.7	14.8	3.4

Intersection	
Int Delay, s/veh	4.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	475	47	101	264	47	119
Future Vol, veh/h	475	47	101	264	47	119
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	511	51	109	284	51	128

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	567	0	1049	548
Stage 1	-	-	-	-	542	-
Stage 2	-	-	-	-	507	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1005	-	252	536
Stage 1	-	-	-	-	583	-
Stage 2	-	-	-	-	605	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1000	-	217	531
Mov Cap-2 Maneuver	-	-	-	-	217	-
Stage 1	-	-	-	-	580	-
Stage 2	-	-	-	-	524	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	22.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	377	-	-	1000	-
HCM Lane V/C Ratio	0.473	-	-	0.109	-
HCM Control Delay (s)	22.8	-	-	9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.5	-	-	0.4	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	574	20	20	355	10	10
Future Vol, veh/h	574	20	20	355	10	10
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	604	21	21	374	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	630	0	1041	625
Stage 1	-	-	-	-	620	-
Stage 2	-	-	-	-	421	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	952	-	255	485
Stage 1	-	-	-	-	536	-
Stage 2	-	-	-	-	662	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	948	-	246	481
Mov Cap-2 Maneuver	-	-	-	-	246	-
Stage 1	-	-	-	-	534	-
Stage 2	-	-	-	-	641	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	16.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	326	-	-	948	-
HCM Lane V/C Ratio	0.065	-	-	0.022	-
HCM Control Delay (s)	16.8	-	-	8.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	122.2
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	157	437	10	30	285	200	10	230	80	310	130	131
Future Vol, veh/h	157	437	10	30	285	200	10	230	80	310	130	131
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	160	446	10	31	291	204	10	235	82	316	133	134
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	131	211.6	22.6	88.2
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	12%	0%	0%	100%	0%	0%	100%	0%	83%	0%
Vol Thru, %	88%	100%	0%	0%	100%	0%	0%	59%	17%	33%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	41%	0%	67%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	153	80	157	437	10	30	485	375	196
LT Vol	10	0	0	157	0	0	30	0	310	0
Through Vol	77	153	0	0	437	0	0	285	65	65
RT Vol	0	0	80	0	0	10	0	200	0	131
Lane Flow Rate	88	156	82	160	446	10	31	495	383	200
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.269	0.474	0.232	0.475	1.26	0.027	0.093	1.395	1.114	0.534
Departure Headway (Hd)	12.728	12.667	11.919	11.859	11.331	10.593	11.658	10.835	11.761	10.835
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	284	286	303	306	326	340	309	341	310	336
Service Time	10.428	10.367	9.619	9.559	9.031	8.293	9.358	8.535	9.461	8.535
HCM Lane V/C Ratio	0.31	0.545	0.271	0.523	1.368	0.029	0.1	1.452	1.235	0.595
HCM Control Delay	20	26.3	18.2	24.8	171.8	13.6	15.5	223.7	121.1	25.3
HCM Lane LOS	C	D	C	C	F	B	C	F	F	D
HCM 95th-tile Q	1.1	2.4	0.9	2.4	18.5	0.1	0.3	23.7	13.7	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	290	130	105	378	240	200	481	109	320	773	690
Future Volume (veh/h)	320	290	130	105	378	240	200	481	109	320	773	690
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	348	315	0	114	411	0	217	523	0	348	896	439
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	450	1009	451	147	839	1018	312	1107	495	456	1306	540
Arrive On Green	0.13	0.29	0.00	0.08	0.24	0.00	0.09	0.31	0.00	0.13	0.35	0.35
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1541
Grp Volume(v), veh/h	348	315	0	114	411	0	217	523	0	348	896	439
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1541
Q Serve(g_s), s	8.2	5.8	0.0	5.3	8.4	0.0	5.1	10.0	0.0	7.9	17.2	21.7
Cycle Q Clear(g_c), s	8.2	5.8	0.0	5.3	8.4	0.0	5.1	10.0	0.0	7.9	17.2	21.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	450	1009	451	147	839	1018	312	1107	495	456	1306	540
V/C Ratio(X)	0.77	0.31	0.00	0.78	0.49	0.00	0.69	0.47	0.00	0.76	0.69	0.81
Avail Cap(c_a), veh/h	740	1521	681	381	1521	1556	781	1310	586	805	1379	571
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.2	23.5	0.0	37.6	27.6	0.0	36.9	23.2	0.0	35.3	23.3	24.7
Incr Delay (d2), s/veh	2.9	0.2	0.0	8.5	0.4	0.0	2.8	0.3	0.0	2.7	1.3	8.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	2.9	0.0	2.9	4.2	0.0	2.6	4.9	0.0	4.0	9.1	10.5
LnGrp Delay(d),s/veh	38.1	23.7	0.0	46.1	28.0	0.0	39.7	23.5	0.0	38.0	24.6	33.1
LnGrp LOS	D	C		D	C		D	C		D	C	C
Approach Vol, veh/h		663			525			740			1683	
Approach Delay, s/veh		31.2			32.0			28.3			29.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	30.2	10.9	27.9	11.6	33.3	14.9	23.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	18.0	36.0	19.0	31.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	9.9	12.0	7.3	7.8	7.1	23.7	10.2	10.4
Green Ext Time (p_c), s	0.8	10.9	0.2	5.1	0.5	5.4	0.8	4.9

Intersection Summary	
HCM 2010 Ctrl Delay	30.0
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	284	44	124	475	190	14	330	98	300	420	315
Future Volume (veh/h)	145	284	44	124	475	190	14	330	98	300	420	315
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	169	330	39	144	552	177	16	384	91	349	488	268
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	206	1049	123	179	827	264	33	757	177	420	815	446
Arrive On Green	0.12	0.33	0.33	0.10	0.31	0.31	0.02	0.27	0.27	0.12	0.37	0.37
Sat Flow, veh/h	1774	3183	373	1774	2630	840	1774	2838	665	3442	2201	1203
Grp Volume(v), veh/h	169	182	187	144	371	358	16	238	237	349	392	364
Grp Sat Flow(s),veh/h/ln	1774	1770	1787	1774	1770	1701	1774	1770	1734	1721	1770	1634
Q Serve(g_s), s	8.2	6.8	6.9	7.0	16.1	16.2	0.8	10.1	10.3	8.8	15.9	16.0
Cycle Q Clear(g_c), s	8.2	6.8	6.9	7.0	16.1	16.2	0.8	10.1	10.3	8.8	15.9	16.0
Prop In Lane	1.00		0.21	1.00		0.49	1.00		0.38	1.00		0.74
Lane Grp Cap(c), veh/h	206	583	589	179	556	535	33	472	463	420	656	605
V/C Ratio(X)	0.82	0.31	0.32	0.80	0.67	0.67	0.49	0.50	0.51	0.83	0.60	0.60
Avail Cap(c_a), veh/h	320	1218	1230	320	1218	1171	220	719	705	427	719	664
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.2	22.2	22.2	38.9	26.3	26.4	43.1	27.5	27.6	38.0	22.5	22.6
Incr Delay (d2), s/veh	9.2	0.3	0.3	8.1	1.4	1.5	11.0	0.8	0.9	12.9	1.2	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	3.4	3.5	3.8	8.0	7.8	0.5	5.0	5.1	4.9	7.9	7.4
LnGrp Delay(d),s/veh	47.5	22.5	22.6	47.0	27.7	27.8	54.1	28.3	28.5	50.9	23.7	23.9
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		538			873			491			1105	
Approach Delay, s/veh		30.4			31.0			29.2			32.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	27.6	13.0	33.2	5.6	36.8	14.3	31.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	61.0	11.0	36.0	16.0	61.0
Max Q Clear Time (g_c+I1), s	10.8	12.3	9.0	8.9	2.8	18.0	10.2	18.2
Green Ext Time (p_c), s	0.0	9.1	0.2	9.4	0.0	8.0	0.2	9.2

Intersection Summary	
HCM 2010 Ctrl Delay	31.1
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	80	20	50	250	130	20	233	30	80	218	40
Future Vol, veh/h	80	80	20	50	250	130	20	233	30	80	218	40
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	101	25	63	316	165	25	295	38	101	276	51
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.4	21	18.6	21.5
HCM LOS	C	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	15%	0%	100%	0%	0%	100%	0%	0%	42%	0%
Vol Thru, %	85%	80%	0%	100%	57%	0%	100%	39%	58%	73%
Vol Right, %	0%	20%	0%	0%	43%	0%	0%	61%	0%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	137	147	80	53	47	50	167	213	189	149
LT Vol	20	0	80	0	0	50	0	0	80	0
Through Vol	117	117	0	53	27	0	167	83	109	109
RT Vol	0	30	0	0	20	0	0	130	0	40
Lane Flow Rate	173	185	101	68	59	63	211	270	239	189
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.433	0.453	0.285	0.18	0.152	0.162	0.509	0.618	0.595	0.448
Departure Headway (Hd)	9.023	8.803	10.117	9.595	9.282	9.201	8.683	8.241	8.956	8.551
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	399	410	355	374	386	390	416	437	404	421
Service Time	6.781	6.56	7.879	7.358	7.044	6.954	6.436	5.994	6.71	6.304
HCM Lane V/C Ratio	0.434	0.451	0.285	0.182	0.153	0.162	0.507	0.618	0.592	0.449
HCM Control Delay	18.5	18.7	16.9	14.5	13.7	13.7	20.1	23.5	24.1	18.1
HCM Lane LOS	C	C	C	B	B	B	C	C	C	C
HCM 95th-tile Q	2.1	2.3	1.2	0.6	0.5	0.6	2.8	4.1	3.7	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	110	30	40	270	150	170	609	40	110	777	160
Future Volume (veh/h)	60	110	30	40	270	150	170	609	40	110	777	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	69	126	5	46	310	0	195	700	0	126	893	90
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	438	370	71	419	356	280	815	693	159	830	701
Arrive On Green	0.05	0.24	0.24	0.04	0.22	0.00	0.08	0.44	0.00	0.09	0.45	0.45
Sat Flow, veh/h	1774	1863	1573	1774	1863	1583	3442	1863	1583	1774	1863	1574
Grp Volume(v), veh/h	69	126	5	46	310	0	195	700	0	126	893	90
Grp Sat Flow(s),veh/h/ln	1774	1863	1573	1774	1863	1583	1721	1863	1583	1774	1863	1574
Q Serve(g_s), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	27.4	0.0	5.6	36.0	2.7
Cycle Q Clear(g_c), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	27.4	0.0	5.6	36.0	2.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	438	370	71	419	356	280	815	693	159	830	701
V/C Ratio(X)	0.78	0.29	0.01	0.65	0.74	0.00	0.70	0.86	0.00	0.79	1.08	0.13
Avail Cap(c_a), veh/h	176	922	779	176	922	784	426	830	706	220	830	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	25.3	23.7	38.2	29.1	0.0	36.1	20.5	0.0	36.0	22.4	13.2
Incr Delay (d2), s/veh	13.5	0.4	0.0	9.7	2.6	0.0	3.1	8.9	0.0	12.7	53.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.4	0.1	1.2	6.8	0.0	2.2	16.0	0.0	3.3	30.6	1.2
LnGrp Delay(d),s/veh	51.4	25.7	23.7	47.9	31.7	0.0	39.3	29.4	0.0	48.8	76.1	13.2
LnGrp LOS	D	C	C	D	C		D	C		D	F	B
Approach Vol, veh/h		200			356			895			1109	
Approach Delay, s/veh		34.5			33.8			31.5			67.9	
Approach LOS		C			C			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	39.3	7.2	23.0	10.6	40.0	8.0	22.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	40.0	10.0	36.0	8.0	40.0
Max Q Clear Time (g_c+I1), s	7.6	29.4	4.1	6.5	6.5	38.0	5.1	14.5
Green Ext Time (p_c), s	0.1	5.0	0.0	3.0	0.2	0.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	47.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	96	40	554	195	407	20	470	247	706	990	180
Future Volume (veh/h)	50	96	40	554	195	407	20	470	247	706	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	99	0	571	201	0	21	485	0	728	1021	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	67	435	136	693	1267	394	37	851	0	844	2301	0
Arrive On Green	0.04	0.09	0.00	0.22	0.27	0.00	0.02	0.25	0.00	0.26	0.49	0.00
Sat Flow, veh/h	1645	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	99	0	571	201	0	21	485	0	728	1021	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	2.8	1.7	0.0	15.2	2.9	0.0	1.1	10.9	0.0	19.3	12.6	0.0
Cycle Q Clear(g_c), s	2.8	1.7	0.0	15.2	2.9	0.0	1.1	10.9	0.0	19.3	12.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	67	435	136	693	1267	394	37	851	0	844	2301	0
V/C Ratio(X)	0.78	0.23	0.00	0.82	0.16	0.00	0.57	0.57	0.00	0.86	0.44	0.00
Avail Cap(c_a), veh/h	574	1909	595	1292	1909	595	563	1593	0	1113	2301	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.2	37.4	0.0	33.2	24.8	0.0	43.0	29.4	0.0	31.2	14.9	0.0
Incr Delay (d2), s/veh	17.3	0.3	0.0	2.6	0.1	0.0	13.2	0.6	0.0	5.6	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.8	0.0	6.9	1.3	0.0	0.6	3.5	0.0	9.2	5.4	0.0
LnGrp Delay(d),s/veh	59.5	37.7	0.0	35.7	24.9	0.0	56.2	30.0	0.0	36.8	15.0	0.0
LnGrp LOS	E	D		D	C		E	C		D	B	
Approach Vol, veh/h		151			772			506			1749	
Approach Delay, s/veh		45.2			32.9			31.1			24.1	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.5	25.9	23.3	12.2	6.0	47.4	7.6	27.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	21.3	12.9	17.2	3.7	3.1	14.6	4.8	4.9
Green Ext Time (p_c), s	2.2	8.6	2.1	2.3	0.0	13.3	0.1	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	28.3
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	439	202	440	30	396	286	103	50	255	160
Future Volume (veh/h)	180	260	439	202	440	30	396	286	103	50	255	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	145	220	478	25	430	311	78	54	277	69
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	300	849	383	266	1548	80	270	930	229	81	634	155
Arrive On Green	0.09	0.25	0.25	0.15	0.31	0.31	0.15	0.33	0.33	0.05	0.23	0.23
Sat Flow, veh/h	3442	3390	1531	1774	4941	256	1774	2795	688	1774	2800	683
Grp Volume(v), veh/h	196	283	145	220	327	176	430	195	194	54	173	173
Grp Sat Flow(s),veh/h/ln	1721	1695	1531	1774	1695	1807	1774	1770	1714	1774	1770	1714
Q Serve(g_s), s	4.0	4.9	5.7	8.7	5.3	5.4	11.0	6.0	6.2	2.2	6.1	6.3
Cycle Q Clear(g_c), s	4.0	4.9	5.7	8.7	5.3	5.4	11.0	6.0	6.2	2.2	6.1	6.3
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.40	1.00		0.40
Lane Grp Cap(c), veh/h	300	849	383	266	1062	566	270	589	570	81	401	388
V/C Ratio(X)	0.65	0.33	0.38	0.83	0.31	0.31	1.59	0.33	0.34	0.67	0.43	0.45
Avail Cap(c_a), veh/h	761	1687	762	392	1687	899	270	881	853	270	881	853
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.0	22.2	22.5	29.8	18.9	18.9	30.7	18.1	18.2	34.0	24.0	24.1
Incr Delay (d2), s/veh	2.4	0.2	0.6	9.0	0.2	0.3	284.3	0.3	0.4	9.0	0.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	2.3	2.4	4.9	2.5	2.7	26.6	3.0	3.0	1.3	3.0	3.1
LnGrp Delay(d),s/veh	34.4	22.4	23.1	38.8	19.0	19.2	314.9	18.4	18.5	43.0	24.7	24.9
LnGrp LOS	C	C	C	D	B	B	F	B	B	D	C	C
Approach Vol, veh/h		624			723			819			400	
Approach Delay, s/veh		26.3			25.1			174.1			27.3	
Approach LOS		C			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.3	28.1	14.9	22.1	15.0	20.4	10.3	26.7
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	36.0	11.0	36.0	16.0	36.0
Max Q Clear Time (g_c+I1), s	4.2	8.2	10.7	7.7	13.0	8.3	6.0	7.4
Green Ext Time (p_c), s	0.0	4.8	0.3	7.2	0.0	4.8	0.4	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	73.3
HCM 2010 LOS	E

Intersection	
Int Delay, s/veh	12.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	373	655	212	211	37
Future Vol, veh/h	31	373	655	212	211	37
Conflicting Peds, #/hr	10	0	0	2	2	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	449	789	255	254	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	799	0	-	0	1055	415
Stage 1	-	-	-	-	799	-
Stage 2	-	-	-	-	256	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	489	-	-	-	291	501
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	700	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	485	-	-	-	264	493
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	641	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	76.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	485	-	-	-	264	493
HCM Lane V/C Ratio	0.077	-	-	-	0.963	0.09
HCM Control Delay (s)	13	-	-	-	87.6	13
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	9.2	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	168	595	207	143	740	300	177	301	139	270	479	118
Future Volume (veh/h)	168	595	207	143	740	300	177	301	139	270	479	118
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	205	726	114	174	902	0	216	367	0	329	584	138
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	441	196	167	914	475	177	559	475	276	518	122
Arrive On Green	0.16	0.16	0.16	0.30	0.30	0.00	0.10	0.30	0.00	0.16	0.36	0.36
Sat Flow, veh/h	756	2838	1260	557	3047	1583	1774	1863	1583	1774	1456	344
Grp Volume(v), veh/h	495	436	114	573	503	0	216	367	0	329	0	722
Grp Sat Flow(s),veh/h/ln	1825	1770	1260	1835	1770	1583	1774	1863	1583	1774	0	1801
Q Serve(g_s), s	28.0	28.0	15.1	54.0	50.0	0.0	18.0	30.9	0.0	28.0	0.0	64.0
Cycle Q Clear(g_c), s	28.0	28.0	15.1	54.0	50.0	0.0	18.0	30.9	0.0	28.0	0.0	64.0
Prop In Lane	0.41		1.00	0.30		1.00	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	284	275	196	550	531	475	177	559	475	276	0	640
V/C Ratio(X)	1.74	1.59	0.58	1.04	0.95	0.00	1.22	0.66	0.00	1.19	0.00	1.13
Avail Cap(c_a), veh/h	284	275	196	550	531	475	177	559	475	276	0	640
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	76.0	76.0	70.6	63.0	61.6	0.0	81.0	54.9	0.0	76.0	0.0	58.0
Incr Delay (d2), s/veh	348.3	280.1	4.3	49.5	26.4	0.0	138.1	5.9	0.0	116.5	0.0	76.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	41.6	35.1	5.5	34.9	28.3	0.0	15.6	16.8	0.0	22.7	0.0	45.4
LnGrp Delay(d),s/veh	424.3	356.1	74.9	112.5	88.0	0.0	219.1	60.9	0.0	192.5	0.0	134.2
LnGrp LOS	F	F	E	F	F		F	E		F		F
Approach Vol, veh/h		1045			1076			583			1051	
Approach Delay, s/veh		357.7			101.1			119.5			152.5	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.0	58.0		32.0	22.0	68.0		58.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	28.0	54.0		28.0	18.0	54.0		54.0
Max Q Clear Time (g_c+I1), s	30.0	32.9		30.0	20.0	66.0		56.0
Green Ext Time (p_c), s	0.0	7.9		0.0	0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	189.7
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	58.2
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	535	304	3	346	370
Future Vol, veh/h	14	535	304	3	346	370
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	629	358	4	407	435
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	92	27	45.6
HCM LOS	F	D	E

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	3%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	97%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	307	549	346	370
LT Vol	0	14	346	0
Through Vol	304	0	0	370
RT Vol	3	535	0	0
Lane Flow Rate	361	646	407	435
Geometry Grp	5	2	7	7
Degree of Util (X)	0.712	1.102	0.878	0.879
Departure Headway (Hd)	7.515	6.14	8.192	7.676
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	484	594	444	474
Service Time	5.515	4.17	5.892	5.376
HCM Lane V/C Ratio	0.746	1.088	0.917	0.918
HCM Control Delay	27	92	46.6	44.6
HCM Lane LOS	D	F	E	E
HCM 95th-tile Q	5.6	19.7	9.1	9.4

Intersection	
Int Delay, s/veh	13.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	266	83	137	435	104	136
Future Vol, veh/h	266	83	137	435	104	136
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	296	92	152	483	116	151

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	395	0	1144	356
Stage 1	-	-	-	-	349	-
Stage 2	-	-	-	-	795	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1164	-	221	688
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	445	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1157	-	179	680
Mov Cap-2 Maneuver	-	-	-	-	179	-
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	363	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	61
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	307	-	-	1157	-
HCM Lane V/C Ratio	0.869	-	-	0.132	-
HCM Control Delay (s)	61	-	-	8.6	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	7.8	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	431	10	10	587	20	20
Future Vol, veh/h	431	10	10	587	20	20
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	490	11	11	667	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	508	0	1199	509
Stage 1	-	-	-	-	502	-
Stage 2	-	-	-	-	697	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1057	-	205	564
Stage 1	-	-	-	-	608	-
Stage 2	-	-	-	-	494	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1051	-	199	557
Mov Cap-2 Maneuver	-	-	-	-	199	-
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	483	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	19.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	293	-	-	1051	-
HCM Lane V/C Ratio	0.155	-	-	0.011	-
HCM Control Delay (s)	19.5	-	-	8.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Intersection Delay, s/veh	144
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	197	204	10	10	357	220	30	150	20	270	200	249
Future Vol, veh/h	197	204	10	10	357	220	30	150	20	270	200	249
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	216	224	11	11	392	242	33	165	22	297	220	274
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	31.8	336.6	20.3	85.3
HCM LOS	D	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	38%	0%	0%	100%	0%	0%	100%	0%	73%	0%
Vol Thru, %	62%	100%	0%	0%	100%	0%	0%	62%	27%	29%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	38%	0%	71%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	100	20	197	204	10	10	577	370	349
LT Vol	30	0	0	197	0	0	10	0	270	0
Through Vol	50	100	0	0	204	0	0	357	100	100
RT Vol	0	0	20	0	0	10	0	220	0	249
Lane Flow Rate	88	110	22	216	224	11	11	634	407	384
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.269	0.33	0.062	0.629	0.62	0.028	0.032	1.682	1.077	0.925
Departure Headway (Hd)	12.833	12.633	11.887	12.088	11.559	10.82	10.676	9.885	11.034	10.131
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	282	287	303	301	314	333	337	374	333	361
Service Time	10.533	10.333	9.587	9.788	9.259	8.52	8.376	7.585	8.734	7.831
HCM Lane V/C Ratio	0.312	0.383	0.073	0.718	0.713	0.033	0.033	1.695	1.222	1.064
HCM Control Delay	20.2	21.4	15.4	33.2	31.4	13.8	13.7	342.2	106.2	63.1
HCM Lane LOS	C	C	C	D	D	B	B	F	F	F
HCM 95th-tile Q	1.1	1.4	0.2	4	3.9	0.1	0.1	37.2	13.2	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	700	579	260	102	414	350	150	606	135	280	642	430
Future Volume (veh/h)	700	579	260	102	414	350	150	606	135	280	642	430
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	737	609	0	107	436	0	158	638	0	295	676	229
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	855	1385	620	135	776	908	226	1008	451	378	1214	497
Arrive On Green	0.25	0.39	0.00	0.08	0.22	0.00	0.07	0.28	0.00	0.11	0.33	0.33
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1525
Grp Volume(v), veh/h	737	609	0	107	436	0	158	638	0	295	676	229
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1525
Q Serve(g_s), s	23.3	14.4	0.0	6.7	12.5	0.0	5.1	17.9	0.0	9.2	17.0	13.5
Cycle Q Clear(g_c), s	23.3	14.4	0.0	6.7	12.5	0.0	5.1	17.9	0.0	9.2	17.0	13.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	855	1385	620	135	776	908	226	1008	451	378	1214	497
V/C Ratio(X)	0.86	0.44	0.00	0.79	0.56	0.00	0.70	0.63	0.00	0.78	0.56	0.46
Avail Cap(c_a), veh/h	3121	3583	1603	453	1277	1303	697	1901	850	906	2197	899
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.8	25.4	0.0	51.6	39.5	0.0	52.0	35.4	0.0	49.4	31.5	30.4
Incr Delay (d2), s/veh	2.7	0.2	0.0	9.8	0.6	0.0	3.9	0.7	0.0	3.5	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.4	7.1	0.0	3.7	6.2	0.0	2.6	8.8	0.0	4.7	8.8	5.8
LnGrp Delay(d),s/veh	43.5	25.6	0.0	61.4	40.1	0.0	55.9	36.1	0.0	53.0	31.9	31.0
LnGrp LOS	D	C		E	D		E	D		D	C	C
Approach Vol, veh/h		1346			543			796			1200	
Approach Delay, s/veh		35.4			44.3			40.0			36.9	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.1	36.4	12.7	48.5	11.5	41.0	32.2	28.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	61.0	29.0	115.0	23.0	67.0	103.0	41.0
Max Q Clear Time (g_c+I1), s	11.2	19.9	8.7	16.4	7.1	19.0	25.3	14.5
Green Ext Time (p_c), s	0.9	12.5	0.2	8.8	0.4	12.9	3.0	7.7

Intersection Summary	
HCM 2010 Ctrl Delay	38.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	337	569	45	108	429	310	55	480	96	340	280	178
Future Volume (veh/h)	337	569	45	108	429	310	55	480	96	340	280	178
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	362	612	44	116	461	237	59	516	90	366	301	107
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	396	1292	93	145	547	279	76	776	135	449	888	309
Arrive On Green	0.22	0.39	0.39	0.08	0.24	0.24	0.04	0.26	0.26	0.13	0.35	0.35
Sat Flow, veh/h	1774	3342	240	1774	2235	1139	1774	3002	521	3442	2564	891
Grp Volume(v), veh/h	362	324	332	116	364	334	59	303	303	366	206	202
Grp Sat Flow(s),veh/h/ln	1774	1770	1812	1774	1770	1604	1774	1770	1753	1721	1770	1686
Q Serve(g_s), s	22.3	15.4	15.4	7.2	21.9	22.3	3.7	17.2	17.4	11.6	9.6	10.0
Cycle Q Clear(g_c), s	22.3	15.4	15.4	7.2	21.9	22.3	3.7	17.2	17.4	11.6	9.6	10.0
Prop In Lane	1.00		0.13	1.00		0.71	1.00		0.30	1.00		0.53
Lane Grp Cap(c), veh/h	396	684	701	145	433	393	76	457	453	449	613	584
V/C Ratio(X)	0.91	0.47	0.47	0.80	0.84	0.85	0.78	0.66	0.67	0.81	0.34	0.35
Avail Cap(c_a), veh/h	506	684	701	317	474	429	127	584	579	768	852	812
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	25.8	25.8	50.6	40.3	40.4	53.1	37.2	37.3	47.4	27.1	27.2
Incr Delay (d2), s/veh	18.1	0.5	0.5	9.8	12.0	14.0	15.4	1.9	2.0	3.6	0.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.9	7.6	7.9	3.9	12.2	11.4	2.1	8.7	8.7	5.7	4.7	4.7
LnGrp Delay(d),s/veh	60.5	26.3	26.3	60.4	52.2	54.4	68.5	39.1	39.3	51.1	27.4	27.6
LnGrp LOS	E	C	C	E	D	D	E	D	D	D	C	C
Approach Vol, veh/h		1018			814			665			774	
Approach Delay, s/veh		38.5			54.3			41.8			38.6	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.6	33.0	13.1	47.4	8.8	42.8	29.1	31.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	37.0	20.0	42.0	8.0	54.0	32.0	30.0
Max Q Clear Time (g_c+I1), s	13.6	19.4	9.2	17.4	5.7	12.0	24.3	24.3
Green Ext Time (p_c), s	1.0	6.3	0.2	10.3	0.0	8.2	0.7	2.6

Intersection Summary	
HCM 2010 Ctrl Delay	43.1
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	17.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	250	20	80	140	60	20	190	70	110	234	30
Future Vol, veh/h	90	250	20	80	140	60	20	190	70	110	234	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	278	22	89	156	67	22	211	78	122	260	33
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	16.2	14.7	16.5	20.5
HCM LOS	C	B	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	17%	0%	100%	0%	0%	100%	0%	0%	48%	0%
Vol Thru, %	83%	58%	0%	100%	81%	0%	100%	44%	52%	80%
Vol Right, %	0%	42%	0%	0%	19%	0%	0%	56%	0%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	115	165	90	167	103	80	93	107	227	147
LT Vol	20	0	90	0	0	80	0	0	110	0
Through Vol	95	95	0	167	83	0	93	47	117	117
RT Vol	0	70	0	0	20	0	0	60	0	30
Lane Flow Rate	128	183	100	185	115	89	104	119	252	163
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.311	0.426	0.253	0.442	0.27	0.232	0.255	0.278	0.602	0.372
Departure Headway (Hd)	8.756	8.366	9.114	8.597	8.457	9.386	8.867	8.459	8.588	8.198
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	411	431	394	419	425	383	405	424	421	439
Service Time	6.502	6.112	6.862	6.344	6.204	7.137	6.618	6.21	6.331	5.941
HCM Lane V/C Ratio	0.311	0.425	0.254	0.442	0.271	0.232	0.257	0.281	0.599	0.371
HCM Control Delay	15.4	17.2	14.9	18	14.3	15	14.6	14.5	23.6	15.7
HCM Lane LOS	C	C	B	C	B	B	B	B	C	C
HCM 95th-tile Q	1.3	2.1	1	2.2	1.1	0.9	1	1.1	3.8	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	280	40	30	180	100	80	661	40	160	615	170
Future Volume (veh/h)	140	280	40	30	180	100	80	661	40	160	615	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	295	8	32	189	0	84	696	0	168	647	90
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	98	384	320	43	327	278	143	887	754	207	1027	868
Arrive On Green	0.06	0.21	0.21	0.02	0.18	0.00	0.04	0.48	0.00	0.12	0.55	0.55
Sat Flow, veh/h	1774	1863	1553	1774	1863	1583	3442	1863	1583	1774	1863	1576
Grp Volume(v), veh/h	147	295	8	32	189	0	84	696	0	168	647	90
Grp Sat Flow(s),veh/h/ln	1774	1863	1553	1774	1863	1583	1721	1863	1583	1774	1863	1576
Q Serve(g_s), s	5.0	13.5	0.4	1.6	8.4	0.0	2.2	28.3	0.0	8.4	21.6	2.5
Cycle Q Clear(g_c), s	5.0	13.5	0.4	1.6	8.4	0.0	2.2	28.3	0.0	8.4	21.6	2.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	98	384	320	43	327	278	143	887	754	207	1027	868
V/C Ratio(X)	1.50	0.77	0.02	0.74	0.58	0.00	0.59	0.78	0.00	0.81	0.63	0.10
Avail Cap(c_a), veh/h	98	823	686	118	843	717	494	1933	1643	470	2159	1827
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.8	33.9	28.7	43.9	34.3	0.0	42.6	19.8	0.0	39.0	14.0	9.7
Incr Delay (d2), s/veh	271.2	3.3	0.0	21.5	1.6	0.0	3.8	1.6	0.0	7.5	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.8	7.3	0.2	1.0	4.5	0.0	1.1	14.9	0.0	4.5	11.1	1.1
LnGrp Delay(d),s/veh	314.0	37.2	28.7	65.3	35.9	0.0	46.4	21.4	0.0	46.5	14.6	9.7
LnGrp LOS	F	D	C	E	D		D	C		D	B	A
Approach Vol, veh/h		450			221			780			905	
Approach Delay, s/veh		127.4			40.2			24.1			20.1	
Approach LOS		F			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.6	47.1	6.2	22.7	7.8	53.9	9.0	19.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	24.0	94.0	6.0	40.0	13.0	105.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	10.4	30.3	3.6	15.5	4.2	23.6	7.0	10.4
Green Ext Time (p_c), s	0.3	12.8	0.0	3.2	0.1	13.0	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	43.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	525	40	258	340	543	70	1210	574	528	320	300
Future Volume (veh/h)	220	525	40	258	340	543	70	1210	574	528	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	565	0	277	366	0	75	1301	0	568	344	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	250	1218	363	312	963	300	71	1453	0	576	2306	0
Arrive On Green	0.15	0.26	0.00	0.10	0.20	0.00	0.04	0.40	0.00	0.18	0.54	0.00
Sat Flow, veh/h	1645	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	565	0	277	366	0	75	1301	0	568	344	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	36.4	25.7	0.0	21.8	17.1	0.0	11.0	85.4	0.0	45.2	10.3	0.0
Cycle Q Clear(g_c), s	36.4	25.7	0.0	21.8	17.1	0.0	11.0	85.4	0.0	45.2	10.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	250	1218	363	312	963	300	71	1453	0	576	2306	0
V/C Ratio(X)	0.95	0.46	0.00	0.89	0.38	0.00	1.06	0.90	0.00	0.99	0.15	0.00
Avail Cap(c_a), veh/h	284	1218	363	802	963	300	71	1453	0	576	2306	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	107.0	79.6	0.0	113.5	87.4	0.0	121.9	71.4	0.0	104.0	29.6	0.0
Incr Delay (d2), s/veh	37.4	1.3	0.0	8.5	1.1	0.0	122.9	8.9	0.0	33.7	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.2	11.3	0.0	10.0	7.5	0.0	7.4	29.8	0.0	22.7	4.1	0.0
LnGrp Delay(d),s/veh	144.4	80.8	0.0	122.0	88.6	0.0	246.1	80.3	0.0	137.7	29.7	0.0
LnGrp LOS	F	F		F	F		F	F		F	C	
Approach Vol, veh/h		802			643			1376			912	
Approach Delay, s/veh		99.6			103.0			89.3			97.0	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	50.0	106.0	28.9	69.8	15.0	141.0	42.7	56.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	46.0	102.0	64.0	32.0	11.0	137.0	44.0	52.0
Max Q Clear Time (g_c+I1), s	47.2	87.4	23.8	27.7	13.0	12.3	38.4	19.1
Green Ext Time (p_c), s	0.0	9.9	1.0	2.4	0.0	23.3	0.3	8.0

Intersection Summary	
HCM 2010 Ctrl Delay	95.8
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	308	188	380	40	361	309	231	90	247	200
Future Volume (veh/h)	310	700	308	188	380	40	361	309	231	90	247	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	263	198	400	34	380	325	149	95	260	102
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	416	1135	400	179	1376	115	408	940	421	81	535	204
Arrive On Green	0.12	0.31	0.31	0.10	0.29	0.29	0.23	0.40	0.40	0.05	0.21	0.21
Sat Flow, veh/h	3442	3682	1296	1774	4775	400	1774	2358	1056	1774	2491	949
Grp Volume(v), veh/h	326	678	322	198	282	152	380	242	232	95	182	180
Grp Sat Flow(s),veh/h/ln	1721	1695	1587	1774	1695	1785	1774	1770	1644	1774	1770	1671
Q Serve(g_s), s	10.0	18.9	19.2	11.0	7.1	7.2	22.9	10.4	10.8	5.0	9.9	10.3
Cycle Q Clear(g_c), s	10.0	18.9	19.2	11.0	7.1	7.2	22.9	10.4	10.8	5.0	9.9	10.3
Prop In Lane	1.00		0.82	1.00		0.22	1.00		0.64	1.00		0.57
Lane Grp Cap(c), veh/h	416	1045	489	179	977	514	408	705	655	81	380	359
V/C Ratio(X)	0.78	0.65	0.66	1.11	0.29	0.30	0.93	0.34	0.35	1.17	0.48	0.50
Avail Cap(c_a), veh/h	1135	1428	669	179	1118	588	422	940	873	81	664	627
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.6	32.7	32.8	49.1	30.2	30.2	41.2	22.9	23.0	52.1	37.5	37.7
Incr Delay (d2), s/veh	3.3	0.7	1.5	99.2	0.2	0.3	27.1	0.3	0.3	152.7	0.9	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	8.9	8.6	10.3	3.3	3.6	14.3	5.1	5.0	5.9	4.9	4.9
LnGrp Delay(d),s/veh	49.9	33.3	34.3	148.3	30.3	30.6	68.4	23.2	23.3	204.8	38.5	38.8
LnGrp LOS	D	C	C	F	C	C	E	C	C	F	D	D
Approach Vol, veh/h		1326			632			854			457	
Approach Delay, s/veh		37.6			67.4			43.3			73.2	
Approach LOS		D			E			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	47.5	15.0	37.7	29.1	27.4	17.2	35.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	11.0	46.0	26.0	41.0	36.0	36.0
Max Q Clear Time (g_c+I1), s	7.0	12.8	13.0	21.2	24.9	12.3	12.0	9.2
Green Ext Time (p_c), s	0.0	6.1	0.0	11.6	0.2	5.8	1.2	12.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.8
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	10.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	962	506	171	232	42
Future Vol, veh/h	49	962	506	171	232	42
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	1034	544	184	249	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	545	0	-	0	1065	274
Stage 1	-	-	-	-	545	-
Stage 2	-	-	-	-	520	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	645	-	-	-	288	617
Stage 1	-	-	-	-	454	-
Stage 2	-	-	-	-	512	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	644	-	-	-	264	616
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	454	-
Stage 2	-	-	-	-	469	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	72.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	644	-	-	-	264	616
HCM Lane V/C Ratio	0.082	-	-	-	0.945	0.073
HCM Control Delay (s)	11.1	-	-	-	83.4	11.3
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.3	-	-	-	8.8	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	955	199	127	600	200	138	434	152	200	334	191
Future Volume (veh/h)	178	955	199	127	600	200	138	434	152	200	334	191
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	200	1073	140	143	674	0	155	488	0	225	375	202
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	113	639	328	126	625	330	72	658	559	244	513	276
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.00	0.04	0.35	0.00	0.14	0.45	0.45
Sat Flow, veh/h	541	3065	1576	603	3000	1583	1774	1863	1583	1774	1140	614
Grp Volume(v), veh/h	679	594	140	435	382	0	155	488	0	225	0	577
Grp Sat Flow(s),veh/h/ln	1836	1770	1576	1833	1770	1583	1774	1863	1583	1774	0	1754
Q Serve(g_s), s	36.0	36.0	13.3	36.0	36.0	0.0	7.0	39.7	0.0	21.6	0.0	46.6
Cycle Q Clear(g_c), s	36.0	36.0	13.3	36.0	36.0	0.0	7.0	39.7	0.0	21.6	0.0	46.6
Prop In Lane	0.29		1.00	0.33		1.00	1.00		1.00	1.00		0.35
Lane Grp Cap(c), veh/h	382	369	328	382	369	330	72	658	559	244	0	790
V/C Ratio(X)	1.78	1.61	0.43	1.14	1.04	0.00	2.16	0.74	0.00	0.92	0.00	0.73
Avail Cap(c_a), veh/h	382	369	328	382	369	330	72	658	559	267	0	790
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.4	68.4	59.4	68.4	68.4	0.0	82.9	49.0	0.0	73.6	0.0	38.9
Incr Delay (d2), s/veh	359.5	287.2	0.9	89.6	56.6	0.0	563.6	7.4	0.0	33.4	0.0	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	56.4	46.9	5.9	27.6	23.3	0.0	14.7	21.8	0.0	12.9	0.0	23.9
LnGrp Delay(d),s/veh	427.9	355.6	60.3	158.0	125.0	0.0	646.5	56.4	0.0	107.0	0.0	44.8
LnGrp LOS	F	F	E	F	F		F	E		F		D
Approach Vol, veh/h		1413			817			643			802	
Approach Delay, s/veh		361.1			142.5			198.7			62.3	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.8	65.0		40.0	11.0	81.8		40.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	26.0	61.0		36.0	7.0	61.0		36.0
Max Q Clear Time (g_c+I1), s	23.6	41.7		38.0	9.0	48.6		38.0
Green Ext Time (p_c), s	0.2	7.2		0.0	0.0	5.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	218.9
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	70.5
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	372	392	5	597	309
Future Vol, veh/h	14	372	392	5	597	309
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	396	417	5	635	329
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	23	27.2	109.8
HCM LOS	C	D	F

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	4%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	96%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	397	386	597	309
LT Vol	0	14	597	0
Through Vol	392	0	0	309
RT Vol	5	372	0	0
Lane Flow Rate	422	411	635	329
Geometry Grp	5	2	7	7
Degree of Util (X)	0.753	0.7	1.264	0.608
Departure Headway (Hd)	6.67	6.403	7.166	6.655
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	545	567	508	542
Service Time	4.67	4.403	4.924	4.413
HCM Lane V/C Ratio	0.774	0.725	1.25	0.607
HCM Control Delay	27.2	23	156.7	19.3
HCM Lane LOS	D	C	F	C
HCM 95th-tile Q	6.6	5.5	25.7	4

Intersection	
Int Delay, s/veh	7.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	539	73	113	311	66	131
Future Vol, veh/h	539	73	113	311	66	131
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	580	78	122	334	71	141

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	664	0	1208	631
Stage 1	-	-	-	-	625	-
Stage 2	-	-	-	-	583	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	925	-	202	481
Stage 1	-	-	-	-	534	-
Stage 2	-	-	-	-	558	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	920	-	167	476
Mov Cap-2 Maneuver	-	-	-	-	167	-
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	465	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	43.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	294	-	-	920	-
HCM Lane V/C Ratio	0.721	-	-	0.132	-
HCM Control Delay (s)	43.4	-	-	9.5	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	5.2	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	666	20	20	464	10	10
Future Vol, veh/h	666	20	20	464	10	10
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	701	21	21	488	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	727	0	1253	722
Stage 1	-	-	-	-	717	-
Stage 2	-	-	-	-	536	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	876	-	190	427
Stage 1	-	-	-	-	484	-
Stage 2	-	-	-	-	587	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	872	-	182	423
Mov Cap-2 Maneuver	-	-	-	-	182	-
Stage 1	-	-	-	-	482	-
Stage 2	-	-	-	-	565	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	20.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	254	-	-	872	-
HCM Lane V/C Ratio	0.083	-	-	0.024	-
HCM Control Delay (s)	20.5	-	-	9.2	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	146.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	223	462	10	30	314	200	10	230	80	310	130	210
Future Vol, veh/h	223	462	10	30	314	200	10	230	80	310	130	210
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	228	471	10	31	320	204	10	235	82	316	133	214
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	154.7	270.5	23.8	93.6
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	12%	0%	0%	100%	0%	0%	100%	0%	83%	0%
Vol Thru, %	88%	100%	0%	0%	100%	0%	0%	61%	17%	24%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	39%	0%	76%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	87	153	80	223	462	10	30	514	375	275
LT Vol	10	0	0	223	0	0	30	0	310	0
Through Vol	77	153	0	0	462	0	0	314	65	65
RT Vol	0	0	80	0	0	10	0	200	0	210
Lane Flow Rate	88	156	82	228	471	10	31	524	383	281
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.277	0.487	0.239	0.689	1.362	0.028	0.096	1.539	1.137	0.761
Departure Headway (Hd)	13.264	13.202	12.453	12.362	11.833	11.092	12.119	11.314	12.31	11.311
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	272	275	291	294	311	325	298	325	298	323
Service Time	10.964	10.902	10.153	10.062	9.533	8.792	9.819	9.014	10.01	9.011
HCM Lane V/C Ratio	0.324	0.567	0.282	0.776	1.514	0.031	0.104	1.612	1.285	0.87
HCM Control Delay	21	27.8	19	38.5	213.8	14.1	16.1	285.4	131	42.5
HCM Lane LOS	C	D	C	E	F	B	C	F	F	E
HCM 95th-tile Q	1.1	2.5	0.9	4.7	21.1	0.1	0.3	28	13.9	5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	290	132	108	378	240	205	517	113	320	785	690
Future Volume (veh/h)	320	290	132	108	378	240	205	517	113	320	785	690
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	348	315	0	117	411	0	223	562	0	348	905	444
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	449	999	447	150	836	1016	318	1115	499	455	1306	540
Arrive On Green	0.13	0.28	0.00	0.08	0.24	0.00	0.09	0.31	0.00	0.13	0.35	0.35
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1541
Grp Volume(v), veh/h	348	315	0	117	411	0	223	562	0	348	905	444
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1541
Q Serve(g_s), s	8.2	5.9	0.0	5.4	8.5	0.0	5.3	10.9	0.0	8.0	17.5	22.1
Cycle Q Clear(g_c), s	8.2	5.9	0.0	5.4	8.5	0.0	5.3	10.9	0.0	8.0	17.5	22.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	449	999	447	150	836	1016	318	1115	499	455	1306	540
V/C Ratio(X)	0.77	0.32	0.00	0.78	0.49	0.00	0.70	0.50	0.00	0.76	0.69	0.82
Avail Cap(c_a), veh/h	735	1513	677	379	1513	1548	776	1303	583	800	1371	567
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.4	23.8	0.0	37.8	27.8	0.0	37.1	23.5	0.0	35.5	23.5	24.9
Incr Delay (d2), s/veh	2.9	0.2	0.0	8.4	0.4	0.0	2.8	0.4	0.0	2.7	1.4	9.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	2.9	0.0	3.0	4.2	0.0	2.6	5.4	0.0	4.1	9.2	10.7
LnGrp Delay(d),s/veh	38.3	24.0	0.0	46.2	28.2	0.0	39.9	23.9	0.0	38.2	24.9	34.0
LnGrp LOS	D	C		D	C		D	C		D	C	C
Approach Vol, veh/h		663			528			785			1697	
Approach Delay, s/veh		31.5			32.2			28.4			30.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	30.5	11.1	27.8	11.8	33.5	15.0	23.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.0	31.0	18.0	36.0	19.0	31.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	10.0	12.9	7.4	7.9	7.3	24.1	10.2	10.5
Green Ext Time (p_c), s	0.8	10.9	0.2	5.0	0.5	5.2	0.8	4.9

Intersection Summary	
HCM 2010 Ctrl Delay	30.3
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	287	45	124	476	190	14	330	98	300	420	315
Future Volume (veh/h)	145	287	45	124	476	190	14	330	98	300	420	315
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	169	334	39	144	553	177	16	384	91	349	488	268
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	206	1052	122	179	829	264	33	757	177	420	815	445
Arrive On Green	0.12	0.33	0.33	0.10	0.31	0.31	0.02	0.27	0.27	0.12	0.37	0.37
Sat Flow, veh/h	1774	3188	369	1774	2632	839	1774	2838	665	3442	2201	1203
Grp Volume(v), veh/h	169	184	189	144	371	359	16	238	237	349	392	364
Grp Sat Flow(s),veh/h/ln	1774	1770	1788	1774	1770	1701	1774	1770	1734	1721	1770	1634
Q Serve(g_s), s	8.3	6.9	7.0	7.0	16.1	16.2	0.8	10.1	10.3	8.8	15.9	16.0
Cycle Q Clear(g_c), s	8.3	6.9	7.0	7.0	16.1	16.2	0.8	10.1	10.3	8.8	15.9	16.0
Prop In Lane	1.00		0.21	1.00		0.49	1.00		0.38	1.00		0.74
Lane Grp Cap(c), veh/h	206	584	590	179	557	536	33	472	462	420	655	605
V/C Ratio(X)	0.82	0.32	0.32	0.80	0.67	0.67	0.49	0.50	0.51	0.83	0.60	0.60
Avail Cap(c_a), veh/h	320	1217	1229	320	1217	1170	220	718	704	427	718	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.3	22.2	22.3	39.0	26.3	26.4	43.1	27.6	27.6	38.0	22.6	22.6
Incr Delay (d2), s/veh	9.3	0.3	0.3	8.1	1.4	1.5	11.0	0.8	0.9	12.9	1.2	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	3.4	3.5	3.8	8.1	7.8	0.5	5.1	5.1	4.9	7.9	7.4
LnGrp Delay(d),s/veh	47.6	22.5	22.6	47.1	27.7	27.8	54.1	28.4	28.5	51.0	23.8	23.9
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		542			874			491			1105	
Approach Delay, s/veh		30.4			31.0			29.3			32.4	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	27.7	13.0	33.3	5.6	36.8	14.3	31.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	61.0	11.0	36.0	16.0	61.0
Max Q Clear Time (g_c+I1), s	10.3	12.3	9.0	9.0	2.8	18.0	10.3	18.2
Green Ext Time (p_c), s	0.0	9.1	0.2	9.5	0.0	8.0	0.2	9.3

Intersection Summary	
HCM 2010 Ctrl Delay	31.1
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	19.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	80	20	50	250	130	20	235	30	80	219	40
Future Vol, veh/h	80	80	20	50	250	130	20	235	30	80	219	40
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	101	25	63	316	165	25	297	38	101	277	51
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	15.4	21.1	18.8	21.6
HCM LOS	C	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	15%	0%	100%	0%	0%	100%	0%	0%	42%	0%
Vol Thru, %	85%	80%	0%	100%	57%	0%	100%	39%	58%	73%
Vol Right, %	0%	20%	0%	0%	43%	0%	0%	61%	0%	27%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	138	148	80	53	47	50	167	213	190	150
LT Vol	20	0	80	0	0	50	0	0	80	0
Through Vol	118	118	0	53	27	0	167	83	110	110
RT Vol	0	30	0	0	20	0	0	130	0	40
Lane Flow Rate	174	187	101	68	59	63	211	270	240	189
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.437	0.457	0.285	0.18	0.153	0.162	0.51	0.619	0.598	0.45
Departure Headway (Hd)	9.033	8.815	10.136	9.614	9.301	9.218	8.7	8.258	8.968	8.563
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	399	409	354	373	385	389	414	437	403	420
Service Time	6.791	6.572	7.902	7.38	7.067	6.973	6.455	6.013	6.724	6.319
HCM Lane V/C Ratio	0.436	0.457	0.285	0.182	0.153	0.162	0.51	0.618	0.596	0.45
HCM Control Delay	18.7	18.8	16.9	14.5	13.8	13.8	20.2	23.6	24.3	18.2
HCM Lane LOS	C	C	C	B	B	B	C	C	C	C
HCM 95th-tile Q	2.2	2.3	1.2	0.6	0.5	0.6	2.8	4.1	3.8	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	110	30	40	270	150	170	655	40	110	796	160
Future Volume (veh/h)	60	110	30	40	270	150	170	655	40	110	796	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	69	126	5	46	310	0	195	753	0	126	915	92
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	438	370	71	419	356	280	815	693	159	831	702
Arrive On Green	0.05	0.24	0.24	0.04	0.22	0.00	0.08	0.44	0.00	0.09	0.45	0.45
Sat Flow, veh/h	1774	1863	1573	1774	1863	1583	3442	1863	1583	1774	1863	1574
Grp Volume(v), veh/h	69	126	5	46	310	0	195	753	0	126	915	92
Grp Sat Flow(s),veh/h/ln	1774	1863	1573	1774	1863	1583	1721	1863	1583	1774	1863	1574
Q Serve(g_s), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	30.9	0.0	5.6	36.1	2.8
Cycle Q Clear(g_c), s	3.1	4.5	0.2	2.1	12.5	0.0	4.5	30.9	0.0	5.6	36.1	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	438	370	71	419	356	280	815	693	159	831	702
V/C Ratio(X)	0.78	0.29	0.01	0.65	0.74	0.00	0.70	0.92	0.00	0.79	1.10	0.13
Avail Cap(c_a), veh/h	176	921	778	176	921	783	426	829	705	219	831	702
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.0	25.4	23.7	38.3	29.1	0.0	36.2	21.5	0.0	36.1	22.4	13.2
Incr Delay (d2), s/veh	13.5	0.4	0.0	9.7	2.6	0.0	3.1	15.7	0.0	12.8	62.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.4	0.1	1.2	6.8	0.0	2.2	19.2	0.0	3.3	32.7	1.2
LnGrp Delay(d),s/veh	51.4	25.7	23.7	47.9	31.7	0.0	39.3	37.2	0.0	48.8	85.3	13.3
LnGrp LOS	D	C	C	D	C		D	D		D	F	B
Approach Vol, veh/h		200			356			948			1133	
Approach Delay, s/veh		34.5			33.8			37.6			75.4	
Approach LOS		C			C			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	39.4	7.2	23.0	10.6	40.1	8.0	22.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	36.0	8.0	40.0	10.0	36.0	8.0	40.0
Max Q Clear Time (g_c+I1), s	7.6	32.9	4.1	6.5	6.5	38.1	5.1	14.5
Green Ext Time (p_c), s	0.1	2.5	0.0	3.0	0.2	0.0	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	53.1
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	98	40	573	201	418	20	470	253	717	990	180
Future Volume (veh/h)	50	98	40	573	201	418	20	470	253	717	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	101	0	591	207	0	21	485	0	739	1021	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	66	438	137	712	1300	405	37	827	0	852	2281	0
Arrive On Green	0.04	0.09	0.00	0.22	0.28	0.00	0.02	0.24	0.00	0.27	0.48	0.00
Sat Flow, veh/h	1645	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	101	0	591	207	0	21	485	0	739	1021	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	2.8	1.8	0.0	15.9	3.0	0.0	1.2	11.2	0.0	19.9	12.9	0.0
Cycle Q Clear(g_c), s	2.8	1.8	0.0	15.9	3.0	0.0	1.2	11.2	0.0	19.9	12.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	66	438	137	712	1300	405	37	827	0	852	2281	0
V/C Ratio(X)	0.78	0.23	0.00	0.83	0.16	0.00	0.57	0.59	0.00	0.87	0.45	0.00
Avail Cap(c_a), veh/h	566	1883	586	1275	1883	586	556	1571	0	1098	2281	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.9	37.9	0.0	33.4	24.7	0.0	43.6	30.3	0.0	31.5	15.3	0.0
Incr Delay (d2), s/veh	17.8	0.3	0.0	2.6	0.1	0.0	13.3	0.7	0.0	6.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.8	0.0	7.2	1.3	0.0	0.7	3.6	0.0	9.4	5.6	0.0
LnGrp Delay(d),s/veh	60.7	38.2	0.0	36.0	24.8	0.0	56.9	31.0	0.0	37.6	15.5	0.0
LnGrp LOS	E	D		D	C		E	C		D	B	
Approach Vol, veh/h		153			798			506			1760	
Approach Delay, s/veh		45.8			33.1			32.1			24.8	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.1	25.6	24.1	12.4	6.0	47.6	7.6	28.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	21.9	13.2	17.9	3.8	3.2	14.9	4.8	5.0
Green Ext Time (p_c), s	2.2	8.0	2.2	2.3	0.0	13.2	0.1	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	29.0
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	458	205	440	30	432	300	105	50	260	160
Future Volume (veh/h)	180	260	458	205	440	30	432	300	105	50	260	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	155	223	478	25	470	326	81	54	283	76
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	298	857	387	269	1569	81	264	934	228	80	633	166
Arrive On Green	0.09	0.25	0.25	0.15	0.32	0.32	0.15	0.33	0.33	0.05	0.23	0.23
Sat Flow, veh/h	3442	3390	1532	1774	4941	256	1774	2800	684	1774	2752	723
Grp Volume(v), veh/h	196	283	155	223	327	176	470	204	203	54	180	179
Grp Sat Flow(s),veh/h/ln	1721	1695	1532	1774	1695	1807	1774	1770	1715	1774	1770	1705
Q Serve(g_s), s	4.1	5.0	6.2	9.0	5.4	5.4	11.0	6.4	6.6	2.2	6.4	6.7
Cycle Q Clear(g_c), s	4.1	5.0	6.2	9.0	5.4	5.4	11.0	6.4	6.6	2.2	6.4	6.7
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.40	1.00		0.42
Lane Grp Cap(c), veh/h	298	857	387	269	1077	574	264	590	572	80	407	392
V/C Ratio(X)	0.66	0.33	0.40	0.83	0.30	0.31	1.78	0.35	0.35	0.67	0.44	0.46
Avail Cap(c_a), veh/h	746	1654	747	385	1654	881	264	863	837	264	863	832
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.6	22.5	22.9	30.4	19.0	19.0	31.4	18.5	18.6	34.7	24.4	24.5
Incr Delay (d2), s/veh	2.5	0.2	0.7	9.9	0.2	0.3	364.8	0.3	0.4	9.3	0.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	2.4	2.7	5.1	2.5	2.7	32.1	3.2	3.2	1.3	3.2	3.2
LnGrp Delay(d),s/veh	35.1	22.7	23.6	40.3	19.2	19.3	396.2	18.9	19.0	44.0	25.1	25.3
LnGrp LOS	D	C	C	D	B	B	F	B	B	D	C	C
Approach Vol, veh/h		634			726			877			413	
Approach Delay, s/veh		26.8			25.7			221.1			27.7	
Approach LOS		C			C			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.3	28.6	15.2	22.7	15.0	21.0	10.4	27.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	11.0	36.0	16.0	36.0	11.0	36.0	16.0	36.0
Max Q Clear Time (g_c+I1), s	4.2	8.6	11.0	8.2	13.0	8.7	6.1	7.4
Green Ext Time (p_c), s	0.0	5.1	0.3	7.3	0.0	5.1	0.4	7.3

Intersection Summary	
HCM 2010 Ctrl Delay	90.9
HCM 2010 LOS	F

Intersection	
Int Delay, s/veh	13.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	374	658	214	212	37
Future Vol, veh/h	31	374	658	214	212	37
Conflicting Peds, #/hr	10	0	0	2	2	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	451	793	258	255	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	803	0	-	0	1060	416
Stage 1	-	-	-	-	803	-
Stage 2	-	-	-	-	257	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	487	-	-	-	290	500
Stage 1	-	-	-	-	318	-
Stage 2	-	-	-	-	700	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	483	-	-	-	263	492
Mov Cap-2 Maneuver	-	-	-	-	263	-
Stage 1	-	-	-	-	315	-
Stage 2	-	-	-	-	641	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	78.4
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	483	-	-	-	263	492
HCM Lane V/C Ratio	0.077	-	-	-	0.971	0.091
HCM Control Delay (s)	13.1	-	-	-	89.8	13
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.2	-	-	-	9.3	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	169	595	211	161	740	300	181	346	165	270	495	121
Future Volume (veh/h)	169	595	211	161	740	300	181	346	165	270	495	121
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.80	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	206	726	117	196	902	0	221	422	0	329	604	142
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	441	196	184	896	475	177	559	475	276	518	122
Arrive On Green	0.16	0.16	0.16	0.30	0.30	0.00	0.10	0.30	0.00	0.16	0.36	0.36
Sat Flow, veh/h	759	2835	1260	614	2987	1583	1774	1863	1583	1774	1458	343
Grp Volume(v), veh/h	495	437	117	584	514	0	221	422	0	329	0	746
Grp Sat Flow(s),veh/h/ln	1825	1770	1260	1832	1770	1583	1774	1863	1583	1774	0	1801
Q Serve(g_s), s	28.0	28.0	15.6	54.0	51.5	0.0	18.0	36.9	0.0	28.0	0.0	64.0
Cycle Q Clear(g_c), s	28.0	28.0	15.6	54.0	51.5	0.0	18.0	36.9	0.0	28.0	0.0	64.0
Prop In Lane	0.42		1.00	0.34		1.00	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	284	275	196	550	531	475	177	559	475	276	0	640
V/C Ratio(X)	1.74	1.59	0.60	1.06	0.97	0.00	1.25	0.76	0.00	1.19	0.00	1.17
Avail Cap(c_a), veh/h	284	275	196	550	531	475	177	559	475	276	0	640
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	76.0	76.0	70.7	63.0	62.1	0.0	81.0	57.0	0.0	76.0	0.0	58.0
Incr Delay (d2), s/veh	349.2	280.8	4.9	56.3	30.8	0.0	148.8	9.2	0.0	116.5	0.0	90.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	41.6	35.2	5.7	35.9	29.8	0.0	16.2	20.4	0.0	22.7	0.0	47.9
LnGrp Delay(d),s/veh	425.2	356.8	75.6	119.3	92.9	0.0	229.8	66.2	0.0	192.5	0.0	148.5
LnGrp LOS	F	F	E	F	F		F	E		F		F
Approach Vol, veh/h		1049			1098			643			1075	
Approach Delay, s/veh		357.7			107.0			122.4			162.0	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	32.0	58.0		32.0	22.0	68.0		58.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	28.0	54.0		28.0	18.0	54.0		54.0
Max Q Clear Time (g_c+I1), s	30.0	38.9		30.0	20.0	66.0		56.0
Green Ext Time (p_c), s	0.0	7.2		0.0	0.0	0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	192.9
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	73.9
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	572	318	3	364	381
Future Vol, veh/h	14	572	318	3	364	381
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	673	374	4	428	448
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Righ	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	125	30.5	52.4
HCM LOS	F	D	F

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	2%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	98%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	321	586	364	381
LT Vol	0	14	364	0
Through Vol	318	0	0	381
RT Vol	3	572	0	0
Lane Flow Rate	378	689	428	448
Geometry Grp	5	2	7	7
Degree of Util (X)	0.75	1.193	0.922	0.901
Departure Headway (Hd)	7.746	6.228	8.475	7.957
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	472	586	433	457
Service Time	5.746	4.228	6.175	5.657
HCM Lane V/C Ratio	0.801	1.176	0.988	0.98
HCM Control Delay	30.5	125	55.5	49.4
HCM Lane LOS	D	F	F	E
HCM 95th-tile Q	6.3	24.5	10.2	9.9

Intersection	
Int Delay, s/veh	16.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	284	83	135	472	104	135
Future Vol, veh/h	284	83	135	472	104	135
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	316	92	150	524	116	150

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	415	0	1200	376
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	831	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1144	-	204	670
Stage 1	-	-	-	-	699	-
Stage 2	-	-	-	-	428	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1137	-	164	662
Mov Cap-2 Maneuver	-	-	-	-	164	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	346	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	76.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	285	-	-	1137	-
HCM Lane V/C Ratio	0.932	-	-	0.132	-
HCM Control Delay (s)	76.7	-	-	8.6	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	8.8	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	448	10	10	621	20	20
Future Vol, veh/h	448	10	10	621	20	20
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	509	11	11	706	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	527	0	1257	529
Stage 1	-	-	-	-	522	-
Stage 2	-	-	-	-	735	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1040	-	189	550
Stage 1	-	-	-	-	595	-
Stage 2	-	-	-	-	474	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1034	-	184	544
Mov Cap-2 Maneuver	-	-	-	-	184	-
Stage 1	-	-	-	-	592	-
Stage 2	-	-	-	-	463	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	20.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	275	-	-	1034	-
HCM Lane V/C Ratio	0.165	-	-	0.011	-
HCM Control Delay (s)	20.7	-	-	8.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection	
Intersection Delay, s/veh	171.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	265	217	10	13	367	220	30	157	24	270	206	282
Future Vol, veh/h	265	217	10	13	367	220	30	157	24	270	206	282
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	291	238	11	14	403	242	33	173	26	297	226	310
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	49.2	396.4	21.8	114.2
HCM LOS	E	F	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	36%	0%	0%	100%	0%	0%	100%	0%	72%	0%
Vol Thru, %	64%	100%	0%	0%	100%	0%	0%	63%	28%	27%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	37%	0%	73%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	82	105	24	265	217	10	13	587	373	385
LT Vol	30	0	0	265	0	0	13	0	270	0
Through Vol	52	105	0	0	217	0	0	367	103	103
RT Vol	0	0	24	0	0	10	0	220	0	282
Lane Flow Rate	90	115	26	291	238	11	14	645	410	423
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.287	0.359	0.077	0.862	0.673	0.029	0.043	1.822	1.131	1.067
Departure Headway (Hd)	13.477	13.282	12.532	12.631	12.101	11.359	11.248	10.459	11.721	10.801
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	269	273	288	288	300	317	320	355	312	338
Service Time	11.177	10.982	10.232	10.331	9.801	9.059	8.948	8.159	9.421	8.501
HCM Lane V/C Ratio	0.335	0.421	0.09	1.01	0.793	0.035	0.044	1.817	1.314	1.251
HCM Control Delay	21.5	23.2	16.3	60.9	36.5	14.4	14.5	404.9	126.6	102.2
HCM Lane LOS	C	C	C	F	E	B	B	F	F	F
HCM 95th-tile Q	1.2	1.6	0.2	7.5	4.5	0.1	0.1	41.1	14.2	13

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	700	579	267	118	414	350	155	635	151	280	683	430
Future Volume (veh/h)	700	579	267	118	414	350	155	635	151	280	683	430
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	737	609	0	124	436	0	163	668	0	295	719	245
Adj No. of Lanes	2	2	1	1	2	2	2	2	1	2	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	851	1331	595	153	761	894	229	1046	468	375	1247	511
Arrive On Green	0.25	0.38	0.00	0.09	0.22	0.00	0.07	0.30	0.00	0.11	0.33	0.33
Sat Flow, veh/h	3442	3539	1583	1774	3539	2787	3442	3539	1583	3548	3725	1526
Grp Volume(v), veh/h	737	609	0	124	436	0	163	668	0	295	719	245
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1774	1770	1393	1721	1770	1583	1774	1863	1526
Q Serve(g_s), s	24.1	15.2	0.0	8.1	12.9	0.0	5.4	19.2	0.0	9.5	18.7	14.9
Cycle Q Clear(g_c), s	24.1	15.2	0.0	8.1	12.9	0.0	5.4	19.2	0.0	9.5	18.7	14.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	851	1331	595	153	761	894	229	1046	468	375	1247	511
V/C Ratio(X)	0.87	0.46	0.00	0.81	0.57	0.00	0.71	0.64	0.00	0.79	0.58	0.48
Avail Cap(c_a), veh/h	3019	3467	1551	438	1236	1268	674	1839	823	876	2126	871
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.3	27.6	0.0	52.7	41.2	0.0	53.7	35.9	0.0	51.2	32.2	31.0
Incr Delay (d2), s/veh	2.8	0.2	0.0	9.6	0.7	0.0	4.0	0.7	0.0	3.7	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.8	7.5	0.0	4.4	6.4	0.0	2.7	9.5	0.0	4.9	9.7	6.4
LnGrp Delay(d),s/veh	45.1	27.9	0.0	62.3	41.9	0.0	57.7	36.6	0.0	54.9	32.6	31.7
LnGrp LOS	D	C		E	D		E	D		D	C	C
Approach Vol, veh/h		1346			560			831			1259	
Approach Delay, s/veh		37.3			46.4			40.7			37.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.4	38.7	14.2	48.1	11.8	43.3	33.0	29.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	29.0	61.0	29.0	115.0	23.0	67.0	103.0	41.0
Max Q Clear Time (g_c+I1), s	11.5	21.2	10.1	17.2	7.4	20.7	26.1	14.9
Green Ext Time (p_c), s	0.9	13.4	0.3	8.8	0.4	14.0	3.0	7.6

Intersection Summary	
HCM 2010 Ctrl Delay	39.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	337	573	46	108	433	310	57	480	96	340	280	178
Future Volume (veh/h)	337	573	46	108	433	310	57	480	96	340	280	178
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	362	616	45	116	466	238	61	516	90	366	301	107
Adj No. of Lanes	1	2	0	1	2	0	1	2	0	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	396	1291	94	145	549	278	79	776	135	449	884	307
Arrive On Green	0.22	0.39	0.39	0.08	0.25	0.25	0.04	0.26	0.26	0.13	0.34	0.34
Sat Flow, veh/h	1774	3338	243	1774	2240	1134	1774	3002	521	3442	2564	891
Grp Volume(v), veh/h	362	326	335	116	367	337	61	303	303	366	206	202
Grp Sat Flow(s),veh/h/ln	1774	1770	1812	1774	1770	1605	1774	1770	1753	1721	1770	1686
Q Serve(g_s), s	22.3	15.5	15.6	7.2	22.2	22.5	3.8	17.2	17.4	11.6	9.7	10.0
Cycle Q Clear(g_c), s	22.3	15.5	15.6	7.2	22.2	22.5	3.8	17.2	17.4	11.6	9.7	10.0
Prop In Lane	1.00		0.13	1.00		0.71	1.00		0.30	1.00		0.53
Lane Grp Cap(c), veh/h	396	685	701	145	434	393	79	457	453	449	610	581
V/C Ratio(X)	0.91	0.48	0.48	0.80	0.85	0.86	0.78	0.66	0.67	0.81	0.34	0.35
Avail Cap(c_a), veh/h	506	685	701	316	473	429	127	584	578	767	852	812
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	25.8	25.9	50.6	40.3	40.5	53.1	37.2	37.3	47.4	27.3	27.4
Incr Delay (d2), s/veh	18.1	0.5	0.5	9.8	12.6	14.7	15.0	1.9	2.0	3.6	0.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.0	7.7	7.9	3.9	12.3	11.5	2.2	8.7	8.7	5.8	4.8	4.7
LnGrp Delay(d),s/veh	60.6	26.4	26.4	60.4	53.0	55.2	68.1	39.1	39.3	51.1	27.6	27.7
LnGrp LOS	E	C	C	E	D	E	E	D	D	D	C	C
Approach Vol, veh/h		1023			820			667			774	
Approach Delay, s/veh		38.5			54.9			41.8			38.7	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.6	33.0	13.1	47.4	9.0	42.7	29.1	31.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	37.0	20.0	42.0	8.0	54.0	32.0	30.0
Max Q Clear Time (g_c+I1), s	13.6	19.4	9.2	17.6	5.8	12.0	24.3	24.5
Green Ext Time (p_c), s	1.0	6.3	0.2	10.4	0.0	8.2	0.7	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	43.3
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	17.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	250	20	80	140	60	20	194	70	110	238	30
Future Vol, veh/h	90	250	20	80	140	60	20	194	70	110	238	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	100	278	22	89	156	67	22	216	78	122	264	33
Number of Lanes	1	2	0	1	2	0	0	2	0	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Righ	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay	16.3	14.7	16.7	20.7
HCM LOS	C	B	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	17%	0%	100%	0%	0%	100%	0%	0%	48%	0%
Vol Thru, %	83%	58%	0%	100%	81%	0%	100%	44%	52%	80%
Vol Right, %	0%	42%	0%	0%	19%	0%	0%	56%	0%	20%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	117	167	90	167	103	80	93	107	229	149
LT Vol	20	0	90	0	0	80	0	0	110	0
Through Vol	97	97	0	167	83	0	93	47	119	119
RT Vol	0	70	0	0	20	0	0	60	0	30
Lane Flow Rate	130	186	100	185	115	89	104	119	254	166
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.317	0.433	0.254	0.444	0.271	0.233	0.257	0.28	0.609	0.378
Departure Headway (Hd)	8.781	8.396	9.158	8.64	8.5	9.431	8.912	8.504	8.614	8.228
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	410	429	393	417	423	381	403	423	420	437
Service Time	6.531	6.146	6.907	6.389	6.249	7.182	6.663	6.255	6.36	5.973
HCM Lane V/C Ratio	0.317	0.434	0.254	0.444	0.272	0.234	0.258	0.281	0.605	0.38
HCM Control Delay	15.6	17.4	15	18.1	14.4	15	14.7	14.5	23.9	15.9
HCM Lane LOS	C	C	B	C	B	B	B	B	C	C
HCM 95th-tile Q	1.3	2.1	1	2.2	1.1	0.9	1	1.1	3.9	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	280	40	30	180	100	80	711	40	160	678	170
Future Volume (veh/h)	140	280	40	30	180	100	80	711	40	160	678	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	147	295	7	32	189	0	84	748	0	168	714	98
Adj No. of Lanes	1	1	1	1	1	1	2	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	88	374	312	42	326	277	140	936	796	203	1074	908
Arrive On Green	0.05	0.20	0.20	0.02	0.17	0.00	0.04	0.50	0.00	0.11	0.58	0.58
Sat Flow, veh/h	1774	1863	1552	1774	1863	1583	3442	1863	1583	1774	1863	1576
Grp Volume(v), veh/h	147	295	7	32	189	0	84	748	0	168	714	98
Grp Sat Flow(s),veh/h/ln	1774	1863	1552	1774	1863	1583	1721	1863	1583	1774	1863	1576
Q Serve(g_s), s	5.0	15.2	0.4	1.8	9.4	0.0	2.4	33.7	0.0	9.3	26.6	2.8
Cycle Q Clear(g_c), s	5.0	15.2	0.4	1.8	9.4	0.0	2.4	33.7	0.0	9.3	26.6	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	88	374	312	42	326	277	140	936	796	203	1074	908
V/C Ratio(X)	1.67	0.79	0.02	0.77	0.58	0.00	0.60	0.80	0.00	0.83	0.66	0.11
Avail Cap(c_a), veh/h	88	738	615	105	757	643	443	1735	1475	422	1938	1640
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.0	38.3	32.4	49.0	38.2	0.0	47.6	20.9	0.0	43.7	14.7	9.7
Incr Delay (d2), s/veh	346.9	3.7	0.0	25.0	1.6	0.0	4.1	1.6	0.0	8.2	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.9	8.2	0.2	1.2	5.0	0.0	1.2	17.7	0.0	5.0	13.7	1.2
LnGrp Delay(d),s/veh	394.8	42.0	32.4	74.0	39.9	0.0	51.7	22.5	0.0	51.9	15.4	9.7
LnGrp LOS	F	D	C	E	D		D	C		D	B	A
Approach Vol, veh/h		449			221			832			980	
Approach Delay, s/veh		157.4			44.8			25.4			21.1	
Approach LOS		F			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.6	54.7	6.4	24.3	8.1	62.2	9.0	21.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	24.0	94.0	6.0	40.0	13.0	105.0	5.0	41.0
Max Q Clear Time (g_c+I1), s	11.3	35.7	3.8	17.2	4.4	28.6	7.0	11.4
Green Ext Time (p_c), s	0.3	15.0	0.0	3.1	0.1	15.4	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	49.3
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	533	40	271	345	589	70	1210	594	572	320	300
Future Volume (veh/h)	220	533	40	271	345	589	70	1210	594	572	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	573	0	291	371	0	75	1301	0	615	344	0
Adj No. of Lanes	1	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	250	1197	356	326	963	300	71	1453	0	576	2306	0
Arrive On Green	0.15	0.25	0.00	0.10	0.20	0.00	0.04	0.40	0.00	0.18	0.54	0.00
Sat Flow, veh/h	1645	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	573	0	291	371	0	75	1301	0	615	344	0
Grp Sat Flow(s),veh/h/ln	1645	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	36.4	26.3	0.0	22.9	17.3	0.0	11.0	85.4	0.0	46.0	10.3	0.0
Cycle Q Clear(g_c), s	36.4	26.3	0.0	22.9	17.3	0.0	11.0	85.4	0.0	46.0	10.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	250	1197	356	326	963	300	71	1453	0	576	2306	0
V/C Ratio(X)	0.95	0.48	0.00	0.89	0.39	0.00	1.06	0.90	0.00	1.07	0.15	0.00
Avail Cap(c_a), veh/h	284	1197	356	802	963	300	71	1453	0	576	2306	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	107.0	80.7	0.0	112.9	87.5	0.0	121.9	71.4	0.0	104.4	29.6	0.0
Incr Delay (d2), s/veh	37.4	1.4	0.0	8.4	1.2	0.0	122.9	8.9	0.0	56.6	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.2	11.6	0.0	10.5	7.7	0.0	7.4	29.8	0.0	24.8	4.1	0.0
LnGrp Delay(d),s/veh	144.4	82.1	0.0	121.3	88.7	0.0	246.1	80.3	0.0	161.0	29.7	0.0
LnGrp LOS	F	F		F	F		F	F		F	C	
Approach Vol, veh/h		810			662			1376			959	
Approach Delay, s/veh		100.3			103.0			89.3			113.9	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	50.0	106.0	30.0	68.7	15.0	141.0	42.7	56.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	46.0	102.0	64.0	32.0	11.0	137.0	44.0	52.0
Max Q Clear Time (g_c+I1), s	42.0	87.4	24.9	28.3	13.0	12.3	38.4	19.3
Green Ext Time (p_c), s	0.0	9.9	1.1	2.1	0.0	23.3	0.3	8.2

Intersection Summary	
HCM 2010 Ctrl Delay	100.2
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	378	193	380	40	424	325	237	90	267	200
Future Volume (veh/h)	310	700	378	193	380	40	424	325	237	90	267	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	323	203	400	34	446	342	157	95	281	110
Adj No. of Lanes	2	3	0	1	3	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	413	1072	464	173	1378	115	409	954	429	79	546	208
Arrive On Green	0.12	0.31	0.31	0.10	0.29	0.29	0.23	0.41	0.41	0.04	0.22	0.22
Sat Flow, veh/h	3442	3445	1491	1774	4775	400	1774	2355	1058	1774	2491	950
Grp Volume(v), veh/h	326	725	335	203	282	152	446	255	244	95	197	194
Grp Sat Flow(s),veh/h/ln	1721	1695	1546	1774	1695	1785	1774	1770	1644	1774	1770	1671
Q Serve(g_s), s	10.4	21.1	21.5	11.0	7.3	7.5	26.0	11.3	11.7	5.0	11.1	11.5
Cycle Q Clear(g_c), s	10.4	21.1	21.5	11.0	7.3	7.5	26.0	11.3	11.7	5.0	11.1	11.5
Prop In Lane	1.00		0.96	1.00		0.22	1.00		0.64	1.00		0.57
Lane Grp Cap(c), veh/h	413	1054	481	173	978	515	409	717	666	79	388	366
V/C Ratio(X)	0.79	0.69	0.70	1.17	0.29	0.29	1.09	0.36	0.37	1.21	0.51	0.53
Avail Cap(c_a), veh/h	1099	1383	631	173	1082	570	409	910	845	79	643	608
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.2	34.0	34.2	50.9	31.1	31.2	43.4	23.3	23.4	53.9	38.7	38.9
Incr Delay (d2), s/veh	3.4	0.9	2.2	122.7	0.2	0.3	71.1	0.3	0.3	167.7	1.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	10.0	9.5	11.2	3.4	3.7	20.7	5.6	5.3	6.1	5.5	5.4
LnGrp Delay(d),s/veh	51.6	35.0	36.4	173.6	31.3	31.5	114.5	23.6	23.8	221.6	39.7	40.1
LnGrp LOS	D	C	D	F	C	C	F	C	C	F	D	D
Approach Vol, veh/h		1386			637			945			486	
Approach Delay, s/veh		39.3			76.7			66.5			75.4	
Approach LOS		D			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	49.7	15.0	39.1	30.0	28.7	17.5	36.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	11.0	46.0	26.0	41.0	36.0	36.0
Max Q Clear Time (g_c+I1), s	7.3	13.7	13.0	23.5	28.0	13.5	12.4	9.5
Green Ext Time (p_c), s	0.0	6.6	0.0	11.6	0.0	6.1	1.2	12.6

Intersection Summary	
HCM 2010 Ctrl Delay	58.7
HCM 2010 LOS	E

Intersection	
Int Delay, s/veh	11.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	968	511	175	236	42
Future Vol, veh/h	49	968	511	175	236	42
Conflicting Peds, #/hr	1	0	0	1	1	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Stop
Storage Length	105	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	53	1041	549	188	254	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	550	0	-	0	1073	277
Stage 1	-	-	-	-	550	-
Stage 2	-	-	-	-	523	-
Critical Hdwy	5.34	-	-	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	3.12	-	-	-	3.82	3.92
Pot Cap-1 Maneuver	642	-	-	-	285	614
Stage 1	-	-	-	-	451	-
Stage 2	-	-	-	-	511	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	641	-	-	-	261	613
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	451	-
Stage 2	-	-	-	-	468	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	78.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	641	-	-	-	261	613
HCM Lane V/C Ratio	0.082	-	-	-	0.972	0.074
HCM Control Delay (s)	11.1	-	-	-	90.5	11.3
HCM Lane LOS	B	-	-	-	F	B
HCM 95th %tile Q(veh)	0.3	-	-	-	9.3	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	955	215	200	600	200	155	481	223	200	396	192
Future Volume (veh/h)	180	955	215	200	600	200	155	481	223	200	396	192
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	202	1073	150	225	674	0	174	540	0	225	445	205
Adj No. of Lanes	0	2	1	0	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	114	638	328	179	569	330	72	658	559	244	544	250
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.00	0.04	0.35	0.00	0.14	0.45	0.45
Sat Flow, veh/h	545	3060	1576	858	2731	1583	1774	1863	1583	1774	1208	556
Grp Volume(v), veh/h	680	595	150	477	422	0	174	540	0	225	0	650
Grp Sat Flow(s),veh/h/ln	1835	1770	1576	1820	1770	1583	1774	1863	1583	1774	0	1764
Q Serve(g_s), s	36.0	36.0	14.4	36.0	36.0	0.0	7.0	45.6	0.0	21.6	0.0	55.4
Cycle Q Clear(g_c), s	36.0	36.0	14.4	36.0	36.0	0.0	7.0	45.6	0.0	21.6	0.0	55.4
Prop In Lane	0.30		1.00	0.47		1.00	1.00		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	382	369	328	379	369	330	72	658	559	244	0	794
V/C Ratio(X)	1.78	1.61	0.46	1.26	1.14	0.00	2.42	0.82	0.00	0.92	0.00	0.82
Avail Cap(c_a), veh/h	382	369	328	379	369	330	72	658	559	267	0	794
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	68.4	68.4	59.8	68.4	68.4	0.0	82.9	50.9	0.0	73.6	0.0	41.4
Incr Delay (d2), s/veh	360.8	288.3	1.0	135.9	92.3	0.0	679.6	11.1	0.0	33.4	0.0	9.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	56.5	47.0	6.4	32.3	27.0	0.0	17.0	25.6	0.0	12.9	0.0	28.9
LnGrp Delay(d),s/veh	429.2	356.7	60.8	204.3	160.7	0.0	762.5	62.0	0.0	107.0	0.0	50.5
LnGrp LOS	F	F	E	F	F		F	E		F		D
Approach Vol, veh/h		1425			899			714			875	
Approach Delay, s/veh		360.2			183.8			232.7			65.0	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	27.8	65.0		40.0	11.0	81.8		40.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	26.0	61.0		36.0	7.0	61.0		36.0
Max Q Clear Time (g_c+I1), s	23.6	47.6		38.0	9.0	57.4		38.0
Green Ext Time (p_c), s	0.2	6.7		0.0	0.0	2.4		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	230.4
HCM 2010 LOS	F

Intersection	
Intersection Delay, s/veh	106.3
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	426	422	5	660	341
Future Vol, veh/h	14	426	422	5	660	341
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	453	449	5	702	363
Number of Lanes	1	0	1	0	1	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	2	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	2	1	0
HCM Control Delay	31.7	36.8	168.8
HCM LOS	D	E	F

Lane	NBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	0%	3%	100%	0%
Vol Thru, %	99%	0%	0%	100%
Vol Right, %	1%	97%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	427	440	660	341
LT Vol	0	14	660	0
Through Vol	422	0	0	341
RT Vol	5	426	0	0
Lane Flow Rate	454	468	702	363
Geometry Grp	5	2	7	7
Degree of Util (X)	0.841	0.81	1.469	0.707
Departure Headway (Hd)	6.984	6.554	7.531	7.018
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	522	557	484	512
Service Time	4.984	4.554	5.304	4.791
HCM Lane V/C Ratio	0.87	0.84	1.45	0.709
HCM Control Delay	36.8	31.7	243	25.1
HCM Lane LOS	E	D	F	D
HCM 95th-tile Q	8.6	7.9	35.2	5.6

Intersection	
Int Delay, s/veh	9.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	602	73	111	365	66	128
Future Vol, veh/h	602	73	111	365	66	128
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	647	78	119	392	71	138

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	732	0	1330	699
Stage 1	-	-	-	-	693	-
Stage 2	-	-	-	-	637	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	873	-	171	440
Stage 1	-	-	-	-	496	-
Stage 2	-	-	-	-	527	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	869	-	140	436
Mov Cap-2 Maneuver	-	-	-	-	140	-
Stage 1	-	-	-	-	494	-
Stage 2	-	-	-	-	433	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	61.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	254	-	-	869	-
HCM Lane V/C Ratio	0.821	-	-	0.137	-
HCM Control Delay (s)	61.8	-	-	9.8	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	6.5	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	726	20	20	517	10	10
Future Vol, veh/h	726	20	20	517	10	10
Conflicting Peds, #/hr	0	5	5	0	5	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	764	21	21	544	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	790	0	1371	785
Stage 1	-	-	-	-	780	-
Stage 2	-	-	-	-	591	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	830	-	161	393
Stage 1	-	-	-	-	452	-
Stage 2	-	-	-	-	553	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	827	-	154	390
Mov Cap-2 Maneuver	-	-	-	-	154	-
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	531	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	23
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	221	-	-	827	-
HCM Lane V/C Ratio	0.095	-	-	0.025	-
HCM Control Delay (s)	23	-	-	9.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	207.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	337	498	10	42	351	200	10	252	92	310	152	339
Future Vol, veh/h	337	498	10	42	351	200	10	252	92	310	152	339
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	344	508	10	43	358	204	10	257	94	316	155	346
Number of Lanes	1	1	1	1	1	0	0	2	1	0	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	214.5	366	25.9	162.9
HCM LOS	F	F	D	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	11%	0%	0%	100%	0%	0%	100%	0%	80%	0%
Vol Thru, %	89%	100%	0%	0%	100%	0%	0%	64%	20%	18%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	36%	0%	82%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	94	168	92	337	498	10	42	551	386	415
LT Vol	10	0	0	337	0	0	42	0	310	0
Through Vol	84	168	0	0	498	0	0	351	76	76
RT Vol	0	0	92	0	0	10	0	200	0	339
Lane Flow Rate	96	171	94	344	508	10	43	562	394	423
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.313	0.557	0.287	1.08	1.525	0.029	0.145	1.781	1.233	1.212
Departure Headway (Hd)	13.286	13.229	12.482	13.381	12.85	12.106	13.074	12.29	13.277	12.248
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	272	274	290	275	290	298	276	304	276	301
Service Time	10.986	10.929	10.182	11.081	10.55	9.806	10.774	9.99	10.977	9.948
HCM Lane V/C Ratio	0.353	0.624	0.324	1.251	1.752	0.034	0.156	1.849	1.428	1.405
HCM Control Delay	21.9	31.4	20.1	116.7	284.6	15.2	18	392.5	169	157.3
HCM Lane LOS	C	D	C	F	F	C	C	F	F	F
HCM 95th-tile Q	1.3	3.1	1.2	11.9	24.8	0.1	0.5	34.3	15.8	16.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	100	40	602	211	391	20	470	259	640	990	180
Future Volume (veh/h)	50	100	40	602	211	391	20	470	259	640	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	103	0	621	218	0	21	485	0	660	1021	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	129	445	138	743	1352	421	37	877	0	774	2234	0
Arrive On Green	0.04	0.09	0.00	0.23	0.29	0.00	0.02	0.25	0.00	0.24	0.47	0.00
Sat Flow, veh/h	3191	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	103	0	621	218	0	21	485	0	660	1021	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	1.4	1.8	0.0	16.8	3.1	0.0	1.2	11.0	0.0	17.9	13.2	0.0
Cycle Q Clear(g_c), s	1.4	1.8	0.0	16.8	3.1	0.0	1.2	11.0	0.0	17.9	13.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	129	445	138	743	1352	421	37	877	0	774	2234	0
V/C Ratio(X)	0.40	0.23	0.00	0.84	0.16	0.00	0.57	0.55	0.00	0.85	0.46	0.00
Avail Cap(c_a), veh/h	1092	1874	583	1268	1874	583	553	1564	0	1092	2234	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.4	38.0	0.0	33.1	24.2	0.0	43.8	29.3	0.0	32.8	16.0	0.0
Incr Delay (d2), s/veh	2.0	0.3	0.0	2.6	0.1	0.0	13.4	0.5	0.0	4.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.8	0.0	7.7	1.4	0.0	0.7	3.5	0.0	8.4	5.7	0.0
LnGrp Delay(d),s/veh	44.4	38.2	0.0	35.7	24.2	0.0	57.2	29.9	0.0	37.5	16.2	0.0
LnGrp LOS	D	D		D	C		E	C		D	B	
Approach Vol, veh/h		155			839			506			1681	
Approach Delay, s/veh		40.3			32.7			31.0			24.5	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	27.0	25.1	12.5	6.1	46.9	7.6	30.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	19.9	13.0	18.8	3.8	3.2	15.2	3.4	5.1
Green Ext Time (p_c), s	2.1	9.6	2.3	2.4	0.0	13.2	0.1	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	28.5
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	346	561	216	212	34
Future Volume (veh/h)	33	346	561	216	212	34
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	40	417	676	0	255	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	67	2739	1866	0	344	307
Arrive On Green	0.04	0.54	0.37	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	40	417	676	0	255	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.7	1.2	2.9	0.0	4.0	0.0
Cycle Q Clear(g_c), s	0.7	1.2	2.9	0.0	4.0	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	67	2739	1866	0	344	307
V/C Ratio(X)	0.60	0.15	0.36	0.00	0.74	0.00
Avail Cap(c_a), veh/h	297	4424	2893	0	950	848
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.2	3.5	6.9	0.0	11.3	0.0
Incr Delay (d2), s/veh	8.2	0.0	0.1	0.0	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.5	1.3	0.0	2.2	0.0
LnGrp Delay(d),s/veh	22.3	3.5	7.0	0.0	14.5	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		457	676		255	
Approach Delay, s/veh		5.1	7.0		14.5	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		20.1		9.8	5.1	15.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		3.2		6.0	2.7	4.9		
Green Ext Time (p_c), s		8.1		0.5	0.0	5.8		

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	164	579	203	93	686	300	179	378	153	270	476	94
Future Volume (veh/h)	164	579	203	93	686	300	179	378	153	270	476	94
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	200	706	31	113	837	0	218	461	0	329	580	109
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	229	1007	396	139	828	370	215	576	490	353	590	111
Arrive On Green	0.13	0.28	0.28	0.08	0.23	0.00	0.12	0.31	0.00	0.20	0.39	0.39
Sat Flow, veh/h	1774	3539	1390	1774	3539	1583	1774	1863	1583	1774	1525	287
Grp Volume(v), veh/h	200	706	31	113	837	0	218	461	0	329	0	689
Grp Sat Flow(s),veh/h/ln	1774	1770	1390	1774	1770	1583	1774	1863	1583	1774	0	1811
Q Serve(g_s), s	13.7	22.1	2.0	7.8	29.0	0.0	15.0	28.2	0.0	22.6	0.0	46.7
Cycle Q Clear(g_c), s	13.7	22.1	2.0	7.8	29.0	0.0	15.0	28.2	0.0	22.6	0.0	46.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	229	1007	396	139	828	370	215	576	490	353	0	701
V/C Ratio(X)	0.87	0.70	0.08	0.81	1.01	0.00	1.02	0.80	0.00	0.93	0.00	0.98
Avail Cap(c_a), veh/h	315	1007	396	229	828	370	215	576	490	358	0	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	53.0	39.6	32.4	56.3	47.5	0.0	54.5	39.3	0.0	48.8	0.0	37.6
Incr Delay (d2), s/veh	17.8	2.2	0.1	10.9	34.1	0.0	65.6	11.1	0.0	30.6	0.0	30.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	11.1	0.8	4.2	18.1	0.0	11.2	16.3	0.0	14.1	0.0	29.2
LnGrp Delay(d),s/veh	70.8	41.8	32.5	67.2	81.5	0.0	120.2	50.5	0.0	79.5	0.0	67.6
LnGrp LOS	E	D	C	E	F		F	D		E		E
Approach Vol, veh/h		937			950			679			1018	
Approach Delay, s/veh		47.7			79.8			72.8			71.4	
Approach LOS		D			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.7	42.3	13.7	39.3	19.0	52.0	20.0	33.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	38.0	16.0	35.0	15.0	48.0	22.0	29.0
Max Q Clear Time (g_c+I1), s	24.6	30.2	9.8	24.1	17.0	48.7	15.7	31.0
Green Ext Time (p_c), s	0.0	4.5	0.1	7.3	0.0	0.0	0.3	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	67.7
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	206	10	12	318	220	30	159	25	270	203	190
Future Volume (veh/h)	282	206	10	12	318	220	30	159	25	270	203	190
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	310	226	6	13	349	219	33	175	0	297	223	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	343	1001	845	21	381	239	51	289	150	351	350	0
Arrive On Green	0.19	0.54	0.54	0.01	0.36	0.36	0.09	0.09	0.00	0.20	0.20	0.00
Sat Flow, veh/h	1774	1863	1572	1774	1068	670	544	3061	1583	1774	1863	0
Grp Volume(v), veh/h	310	226	6	13	0	568	111	97	0	297	223	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1572	1774	0	1738	1836	1770	1583	1774	1770	0
Q Serve(g_s), s	17.3	6.5	0.2	0.7	0.0	31.7	5.9	5.3	0.0	16.4	11.7	0.0
Cycle Q Clear(g_c), s	17.3	6.5	0.2	0.7	0.0	31.7	5.9	5.3	0.0	16.4	11.7	0.0
Prop In Lane	1.00		1.00	1.00		0.39	0.30		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	343	1001	845	21	0	620	173	167	150	351	350	0
V/C Ratio(X)	0.90	0.23	0.01	0.61	0.00	0.92	0.64	0.58	0.00	0.85	0.64	0.00
Avail Cap(c_a), veh/h	385	1047	883	70	0	668	326	314	281	437	436	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.0	12.3	10.9	49.9	0.0	31.2	44.3	44.0	0.0	39.2	37.3	0.0
Incr Delay (d2), s/veh	22.6	0.1	0.0	24.5	0.0	16.9	3.9	3.1	0.0	11.9	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.7	3.4	0.1	0.5	0.0	18.1	3.2	2.8	0.0	9.2	5.9	0.0
LnGrp Delay(d),s/veh	62.6	12.5	10.9	74.3	0.0	48.1	48.2	47.1	0.0	51.1	39.4	0.0
LnGrp LOS	E	B	B	E		D	D	D		D	D	
Approach Vol, veh/h		542			581			208			520	
Approach Delay, s/veh		41.1			48.6			47.7			46.1	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		13.6	5.2	58.5		24.1	23.6	40.2
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	57.0		25.0	22.0	39.0
Max Q Clear Time (g_c+I1), s		7.9	2.7	8.5		18.4	19.3	33.7
Green Ext Time (p_c), s		0.8	0.0	6.9		1.7	0.3	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	93	40	542	191	371	20	470	240	633	990	180
Future Volume (veh/h)	50	93	40	542	191	371	20	470	240	633	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	54	100	0	583	205	0	22	505	0	681	1065	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	98	1011	301	618	1780	554	33	928	0	719	1976	0
Arrive On Green	0.03	0.21	0.00	0.19	0.38	0.00	0.02	0.26	0.00	0.23	0.46	0.00
Sat Flow, veh/h	3191	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	54	100	0	583	205	0	22	505	0	681	1065	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	2.4	2.5	0.0	26.1	4.1	0.0	1.9	17.4	0.0	30.4	25.8	0.0
Cycle Q Clear(g_c), s	2.4	2.5	0.0	26.1	4.1	0.0	1.9	17.4	0.0	30.4	25.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	98	1011	301	618	1780	554	33	928	0	719	1976	0
V/C Ratio(X)	0.55	0.10	0.00	0.94	0.12	0.00	0.66	0.54	0.00	0.95	0.54	0.00
Avail Cap(c_a), veh/h	243	1011	301	618	1780	554	125	928	0	728	1976	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	69.1	45.6	0.0	57.5	29.3	0.0	70.3	46.5	0.0	55.1	27.9	0.0
Incr Delay (d2), s/veh	4.8	0.2	0.0	23.2	0.1	0.0	19.9	2.3	0.0	21.2	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	1.1	0.0	13.5	1.8	0.0	1.1	6.0	0.0	15.5	10.4	0.0
LnGrp Delay(d),s/veh	73.9	45.8	0.0	80.7	29.4	0.0	90.3	48.8	0.0	76.3	29.0	0.0
LnGrp LOS	E	D		F	C		F	D		E	C	
Approach Vol, veh/h		154			788			527			1746	
Approach Delay, s/veh		55.6			67.4			50.5			47.5	
Approach LOS		E			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.6	41.0	32.0	35.0	6.9	70.7	8.4	58.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	33.0	37.0	28.0	31.0	11.0	59.0	11.0	48.0
Max Q Clear Time (g_c+I1), s	32.4	19.4	28.1	4.5	3.9	27.8	4.4	6.1
Green Ext Time (p_c), s	0.2	10.8	0.0	2.2	0.0	15.2	0.1	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	53.2
HCM 2010 LOS	D

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	345	561	210	210	31
Future Volume (veh/h)	22	345	561	210	210	31
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	24	371	603	0	226	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	43	2702	1827	0	308	275
Arrive On Green	0.02	0.53	0.36	0.00	0.17	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	24	371	603	0	226	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.4	1.0	2.3	0.0	3.3	0.0
Cycle Q Clear(g_c), s	0.4	1.0	2.3	0.0	3.3	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	43	2702	1827	0	308	275
V/C Ratio(X)	0.55	0.14	0.33	0.00	0.73	0.00
Avail Cap(c_a), veh/h	327	4880	3191	0	1048	935
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	13.1	3.2	6.3	0.0	10.6	0.0
Incr Delay (d2), s/veh	10.6	0.0	0.1	0.0	3.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.5	1.1	0.0	1.9	0.0
LnGrp Delay(d),s/veh	23.7	3.2	6.4	0.0	14.0	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		395	603		226	
Approach Delay, s/veh		4.5	6.4		14.0	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		18.4		8.7	4.7	13.7		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		3.0		5.3	2.4	4.3		
Green Ext Time (p_c), s		7.2		0.5	0.0	5.3		

Intersection Summary	
HCM 2010 Ctrl Delay	7.2
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	164	579	200	74	686	300	170	273	93	270	444	94
Future Volume (veh/h)	164	579	200	74	686	300	170	273	93	270	444	94
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	184	651	134	83	771	0	191	307	0	303	499	96
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	220	1064	474	107	839	375	159	535	455	340	591	114
Arrive On Green	0.12	0.30	0.30	0.06	0.24	0.00	0.09	0.29	0.00	0.19	0.39	0.39
Sat Flow, veh/h	1774	3539	1578	1774	3539	1583	1774	1863	1583	1774	1519	292
Grp Volume(v), veh/h	184	651	134	83	771	0	191	307	0	303	0	595
Grp Sat Flow(s),veh/h/ln	1774	1770	1578	1774	1770	1583	1774	1863	1583	1774	0	1811
Q Serve(g_s), s	10.2	15.8	6.5	4.6	21.3	0.0	9.0	14.1	0.0	16.7	0.0	29.9
Cycle Q Clear(g_c), s	10.2	15.8	6.5	4.6	21.3	0.0	9.0	14.1	0.0	16.7	0.0	29.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	220	1064	474	107	839	375	159	535	455	340	0	705
V/C Ratio(X)	0.84	0.61	0.28	0.77	0.92	0.00	1.20	0.57	0.00	0.89	0.00	0.84
Avail Cap(c_a), veh/h	390	1064	474	283	848	379	159	535	455	460	0	705
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.9	30.0	26.8	46.4	37.3	0.0	45.6	30.5	0.0	39.4	0.0	27.8
Incr Delay (d2), s/veh	8.2	1.0	0.3	11.2	14.8	0.0	134.5	4.4	0.0	15.2	0.0	11.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	7.8	2.9	2.6	12.1	0.0	10.3	7.9	0.0	9.6	0.0	17.2
LnGrp Delay(d),s/veh	51.0	31.1	27.1	57.6	52.1	0.0	180.1	34.9	0.0	54.6	0.0	39.6
LnGrp LOS	D	C	C	E	D		F	C		D		D
Approach Vol, veh/h		969			854			498			898	
Approach Delay, s/veh		34.3			52.6			90.6			44.7	
Approach LOS		C			D			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.2	32.8	10.1	34.1	13.0	43.0	16.4	27.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	26.0	22.0	16.0	30.0	9.0	39.0	22.0	24.0
Max Q Clear Time (g_c+I1), s	12.7	16.1	6.6	17.8	11.0	31.9	12.2	23.3
Green Ext Time (p_c), s	0.6	2.9	0.1	7.7	0.0	3.3	0.3	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	50.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	116	171	10	10	306	220	30	150	20	270	200	138
Future Volume (veh/h)	116	171	10	10	306	220	30	150	20	270	200	138
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	118	174	4	10	312	194	31	153	0	276	204	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	153	765	641	18	360	224	58	306	160	363	362	0
Arrive On Green	0.09	0.41	0.41	0.01	0.34	0.34	0.10	0.10	0.00	0.20	0.20	0.00
Sat Flow, veh/h	1774	1863	1560	1774	1074	668	578	3026	1583	1774	1863	0
Grp Volume(v), veh/h	118	174	4	10	0	506	98	86	0	276	204	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1560	1774	0	1742	1834	1770	1583	1774	1770	0
Q Serve(g_s), s	3.8	3.6	0.1	0.3	0.0	16.0	3.0	2.7	0.0	8.6	6.1	0.0
Cycle Q Clear(g_c), s	3.8	3.6	0.1	0.3	0.0	16.0	3.0	2.7	0.0	8.6	6.1	0.0
Prop In Lane	1.00		1.00	1.00		0.38	0.31		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	153	765	641	18	0	584	186	179	160	363	362	0
V/C Ratio(X)	0.77	0.23	0.01	0.55	0.00	0.87	0.53	0.48	0.00	0.76	0.56	0.00
Avail Cap(c_a), veh/h	302	889	745	121	0	654	500	483	432	484	483	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.2	11.2	10.2	28.9	0.0	18.3	25.0	24.9	0.0	22.0	21.0	0.0
Incr Delay (d2), s/veh	8.0	0.1	0.0	23.4	0.0	11.0	2.3	2.0	0.0	4.9	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	1.9	0.0	0.3	0.0	9.4	1.6	1.4	0.0	4.7	3.1	0.0
LnGrp Delay(d),s/veh	34.3	11.4	10.2	52.3	0.0	29.2	27.4	26.9	0.0	26.8	22.3	0.0
LnGrp LOS	C	B	B	D		C	C	C		C	C	
Approach Vol, veh/h		296			516			184			480	
Approach Delay, s/veh		20.5			29.7			27.1			24.9	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		9.9	4.6	28.1		16.0	9.1	23.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	10.0	22.0
Max Q Clear Time (g_c+I1), s		5.0	2.3	5.6		10.6	5.8	18.0
Green Ext Time (p_c), s		0.7	0.0	4.9		1.4	0.1	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	26.0
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	97	40	572	201	381	20	470	250	637	990	180
Future Volume (veh/h)	50	97	40	572	201	381	20	470	250	637	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	100	0	590	207	0	21	485	0	657	1021	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	130	439	137	713	1300	405	37	901	0	774	2267	0
Arrive On Green	0.04	0.09	0.00	0.22	0.28	0.00	0.02	0.26	0.00	0.24	0.48	0.00
Sat Flow, veh/h	3191	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	100	0	590	207	0	21	485	0	657	1021	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	1.4	1.7	0.0	15.7	3.0	0.0	1.1	10.7	0.0	17.4	12.8	0.0
Cycle Q Clear(g_c), s	1.4	1.7	0.0	15.7	3.0	0.0	1.1	10.7	0.0	17.4	12.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	130	439	137	713	1300	405	37	901	0	774	2267	0
V/C Ratio(X)	0.40	0.23	0.00	0.83	0.16	0.00	0.57	0.54	0.00	0.85	0.45	0.00
Avail Cap(c_a), veh/h	1113	1911	595	1293	1911	595	564	1594	0	1113	2267	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.6	37.3	0.0	32.9	24.4	0.0	43.0	28.2	0.0	32.1	15.3	0.0
Incr Delay (d2), s/veh	2.0	0.3	0.0	2.5	0.1	0.0	13.2	0.5	0.0	4.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.8	0.0	7.1	1.3	0.0	0.6	3.5	0.0	8.1	5.5	0.0
LnGrp Delay(d),s/veh	43.5	37.6	0.0	35.4	24.4	0.0	56.2	28.7	0.0	36.5	15.4	0.0
LnGrp LOS	D	D		D	C		E	C		D	B	
Approach Vol, veh/h		152			797			506			1678	
Approach Delay, s/veh		39.6			32.6			29.9			23.7	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.6	27.2	23.8	12.3	6.0	46.7	7.6	28.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	21.6	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	19.4	12.7	17.7	3.7	3.1	14.8	3.4	5.0
Green Ext Time (p_c), s	2.1	10.1	2.2	2.3	0.0	13.3	0.1	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	27.7
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	373	105	440	30	393	292	79	50	179	160
Future Volume (veh/h)	180	260	373	105	440	30	393	292	79	50	179	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	130	114	478	24	427	317	65	54	195	27
Adj No. of Lanes	2	3	0	1	3	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	304	1006	424	147	1407	70	577	931	188	87	625	85
Arrive On Green	0.09	0.29	0.29	0.08	0.28	0.28	0.17	0.32	0.32	0.05	0.20	0.20
Sat Flow, veh/h	3442	3478	1464	1774	4952	246	3442	2916	589	1774	3114	424
Grp Volume(v), veh/h	196	275	138	114	326	176	427	190	192	54	109	113
Grp Sat Flow(s),veh/h/ln	1721	1695	1551	1774	1695	1808	1721	1770	1735	1774	1770	1769
Q Serve(g_s), s	3.4	3.9	4.3	3.9	4.7	4.8	7.3	5.1	5.2	1.8	3.2	3.4
Cycle Q Clear(g_c), s	3.4	3.9	4.3	3.9	4.7	4.8	7.3	5.1	5.2	1.8	3.2	3.4
Prop In Lane	1.00		0.94	1.00		0.14	1.00		0.34	1.00		0.24
Lane Grp Cap(c), veh/h	304	981	449	147	963	514	577	565	554	87	355	355
V/C Ratio(X)	0.64	0.28	0.31	0.77	0.34	0.34	0.74	0.34	0.35	0.62	0.31	0.32
Avail Cap(c_a), veh/h	558	1924	880	288	1924	1026	1004	1291	1266	259	1033	1032
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.2	16.9	17.1	27.7	17.5	17.5	24.4	16.0	16.1	28.8	21.0	21.1
Incr Delay (d2), s/veh	2.3	0.2	0.4	8.3	0.2	0.4	1.9	0.3	0.4	7.1	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	1.8	1.9	2.2	2.2	2.4	3.6	2.5	2.6	1.1	1.6	1.7
LnGrp Delay(d),s/veh	29.5	17.1	17.5	36.0	17.7	17.9	26.3	16.4	16.4	35.9	21.5	21.6
LnGrp LOS	C	B	B	D	B	B	C	B	B	D	C	C
Approach Vol, veh/h		609			616			809			276	
Approach Delay, s/veh		21.2			21.1			21.6			24.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.0	23.7	9.1	21.8	14.3	16.4	9.5	21.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	45.0	10.0	35.0	18.0	36.0	10.0	35.0
Max Q Clear Time (g_c+I1), s	3.8	7.2	5.9	6.3	9.3	5.4	5.4	6.8
Green Ext Time (p_c), s	0.0	4.0	0.1	7.1	1.1	3.9	0.3	7.1

Intersection Summary	
HCM 2010 Ctrl Delay	21.7
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	346	561	213	211	34
Future Volume (veh/h)	33	346	561	213	211	34
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	40	417	676	0	254	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	67	2741	1867	0	342	306
Arrive On Green	0.04	0.54	0.37	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	40	417	676	0	254	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.7	1.2	2.9	0.0	4.0	0.0
Cycle Q Clear(g_c), s	0.7	1.2	2.9	0.0	4.0	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	67	2741	1867	0	342	306
V/C Ratio(X)	0.60	0.15	0.36	0.00	0.74	0.00
Avail Cap(c_a), veh/h	297	4429	2896	0	951	849
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.1	3.5	6.9	0.0	11.3	0.0
Incr Delay (d2), s/veh	8.2	0.0	0.1	0.0	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.5	1.3	0.0	2.2	0.0
LnGrp Delay(d),s/veh	22.3	3.5	7.0	0.0	14.5	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		457	676		254	
Approach Delay, s/veh		5.1	7.0		14.5	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		20.1		9.8	5.1	15.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		3.2		6.0	2.7	4.9		
Green Ext Time (p_c), s		8.1		0.5	0.0	5.8		

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	164	579	201	84	686	300	174	305	123	270	455	94
Future Volume (veh/h)	164	579	201	84	686	300	174	305	123	270	455	94
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	200	706	28	102	837	0	212	372	0	329	555	109
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	232	1054	416	128	848	379	220	531	452	359	550	108
Arrive On Green	0.13	0.30	0.30	0.07	0.24	0.00	0.12	0.29	0.00	0.20	0.36	0.36
Sat Flow, veh/h	1774	3539	1397	1774	3539	1583	1774	1863	1583	1774	1512	297
Grp Volume(v), veh/h	200	706	28	102	837	0	212	372	0	329	0	664
Grp Sat Flow(s),veh/h/ln	1774	1770	1397	1774	1770	1583	1774	1863	1583	1774	0	1809
Q Serve(g_s), s	12.5	19.7	1.6	6.4	26.6	0.0	13.4	20.1	0.0	20.5	0.0	41.0
Cycle Q Clear(g_c), s	12.5	19.7	1.6	6.4	26.6	0.0	13.4	20.1	0.0	20.5	0.0	41.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	232	1054	416	128	848	379	220	531	452	359	0	658
V/C Ratio(X)	0.86	0.67	0.07	0.79	0.99	0.00	0.96	0.70	0.00	0.92	0.00	1.01
Avail Cap(c_a), veh/h	346	1054	416	252	848	379	220	531	452	409	0	658
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	48.0	34.7	28.4	51.5	42.7	0.0	49.1	36.0	0.0	44.0	0.0	35.9
Incr Delay (d2), s/veh	13.5	1.6	0.1	10.5	27.7	0.0	49.8	7.5	0.0	23.3	0.0	37.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	9.9	0.6	3.5	16.2	0.0	9.6	11.4	0.0	12.4	0.0	27.1
LnGrp Delay(d),s/veh	61.5	36.4	28.4	62.0	70.4	0.0	99.0	43.5	0.0	67.4	0.0	73.3
LnGrp LOS	E	D	C	E	E		F	D		E		F
Approach Vol, veh/h		934			939			584			993	
Approach Delay, s/veh		41.5			69.5			63.6			71.3	
Approach LOS		D			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.8	36.2	12.2	37.6	18.0	45.0	18.7	31.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	26.0	29.0	16.0	33.0	14.0	41.0	22.0	27.0
Max Q Clear Time (g_c+I1), s	22.5	22.1	8.4	21.7	15.4	43.0	14.5	28.6
Green Ext Time (p_c), s	0.4	3.7	0.1	7.5	0.0	0.0	0.3	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	61.5
HCM 2010 LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	554	263	2	314	164
Future Volume (vph)	11	554	263	2	314	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.99		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1594		1861		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1594		1861		1770	1863
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	13	652	309	2	369	193
RTOR Reduction (vph)	529	0	1	0	0	0
Lane Group Flow (vph)	136	0	310	0	369	193
Confl. Peds. (#/hr)	1	1		1	1	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	9.0		12.7		14.1	30.8
Effective Green, g (s)	9.0		12.7		14.1	30.8
Actuated g/C Ratio	0.19		0.27		0.29	0.64
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	300		494		522	1200
v/s Ratio Prot	c0.09		c0.17		c0.21	0.10
v/s Ratio Perm						
v/c Ratio	0.45		0.63		0.71	0.16
Uniform Delay, d1	17.2		15.5		15.0	3.4
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.1		2.5		4.3	0.1
Delay (s)	18.3		18.0		19.4	3.4
Level of Service	B		B		B	A
Approach Delay (s)	18.3		18.0			13.9
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	47.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	182	191	10	10	313	220	30	150	20	270	200	160
Future Volume (veh/h)	182	191	10	10	313	220	30	150	20	270	200	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	200	210	6	11	344	219	33	165	0	297	220	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	242	927	782	19	395	251	56	297	155	368	367	0
Arrive On Green	0.14	0.50	0.50	0.01	0.37	0.37	0.10	0.10	0.00	0.21	0.21	0.00
Sat Flow, veh/h	1774	1863	1571	1774	1061	676	571	3032	1583	1774	1863	0
Grp Volume(v), veh/h	200	210	6	11	0	563	106	92	0	297	220	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1571	1774	0	1737	1834	1770	1583	1774	1770	0
Q Serve(g_s), s	9.4	5.5	0.2	0.5	0.0	25.9	4.8	4.3	0.0	13.7	9.7	0.0
Cycle Q Clear(g_c), s	9.4	5.5	0.2	0.5	0.0	25.9	4.8	4.3	0.0	13.7	9.7	0.0
Prop In Lane	1.00		1.00	1.00		0.39	0.31		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	242	927	782	19	0	646	179	173	155	368	367	0
V/C Ratio(X)	0.83	0.23	0.01	0.58	0.00	0.87	0.59	0.53	0.00	0.81	0.60	0.00
Avail Cap(c_a), veh/h	454	1235	1042	83	0	788	384	371	332	516	515	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.1	12.2	10.9	42.3	0.0	25.1	37.1	36.9	0.0	32.4	30.8	0.0
Incr Delay (d2), s/veh	7.0	0.1	0.0	24.6	0.0	9.0	3.1	2.5	0.0	6.4	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	2.8	0.1	0.4	0.0	14.0	2.6	2.2	0.0	7.3	4.9	0.0
LnGrp Delay(d),s/veh	43.1	12.3	10.9	66.9	0.0	34.1	40.2	39.4	0.0	38.8	32.4	0.0
LnGrp LOS	D	B	B	E		C	D	D		D	C	
Approach Vol, veh/h		416			574			198			517	
Approach Delay, s/veh		27.1			34.7			39.8			36.0	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.4	4.9	46.8		21.8	15.7	36.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	57.0		25.0	22.0	39.0
Max Q Clear Time (g_c+I1), s		6.8	2.5	7.5		15.7	11.4	27.9
Green Ext Time (p_c), s		0.8	0.0	6.7		2.1	0.4	4.1

Intersection Summary	
HCM 2010 Ctrl Delay	33.9
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	532	40	268	343	473	70	1210	595	482	320	300
Future Volume (veh/h)	220	532	40	268	343	473	70	1210	595	482	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	572	0	288	369	0	75	1301	0	518	344	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	284	1023	305	334	1096	341	93	1548	0	447	2187	0
Arrive On Green	0.09	0.22	0.00	0.10	0.23	0.00	0.06	0.43	0.00	0.14	0.51	0.00
Sat Flow, veh/h	3191	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	572	0	288	369	0	75	1301	0	518	344	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	10.4	15.5	0.0	12.7	9.3	0.0	6.4	45.8	0.0	20.0	6.1	0.0
Cycle Q Clear(g_c), s	10.4	15.5	0.0	12.7	9.3	0.0	6.4	45.8	0.0	20.0	6.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	284	1023	305	334	1096	341	93	1548	0	447	2187	0
V/C Ratio(X)	0.83	0.56	0.00	0.86	0.34	0.00	0.81	0.84	0.00	1.16	0.16	0.00
Avail Cap(c_a), veh/h	357	1023	305	380	1096	341	150	1548	0	447	2187	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.1	49.9	0.0	63.0	45.7	0.0	66.7	36.6	0.0	61.5	18.6	0.0
Incr Delay (d2), s/veh	12.9	2.2	0.0	16.7	0.8	0.0	15.2	5.7	0.0	94.3	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	6.9	0.0	6.4	4.2	0.0	3.3	16.1	0.0	14.7	2.5	0.0
LnGrp Delay(d),s/veh	77.0	52.1	0.0	79.7	46.5	0.0	81.8	42.3	0.0	155.8	18.8	0.0
LnGrp LOS	E	D		E	D		F	D		F	B	
Approach Vol, veh/h		809			657			1376			862	
Approach Delay, s/veh		59.4			61.0			44.5			101.1	
Approach LOS		E			E			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	65.0	18.9	35.0	12.1	76.9	16.7	37.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	20.0	61.0	17.0	31.0	13.0	68.0	16.0	32.0
Max Q Clear Time (g_c+I1), s	22.0	47.8	14.7	17.5	8.4	8.1	12.4	11.3
Green Ext Time (p_c), s	0.0	9.2	0.2	5.6	0.1	21.0	0.3	7.0

Intersection Summary	
HCM 2010 Ctrl Delay	63.8
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	289	140	380	40	304	255	139	90	248	200
Future Volume (veh/h)	310	700	289	140	380	40	304	255	139	90	248	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	238	147	400	34	320	268	99	95	261	110
Adj No. of Lanes	2	3	0	1	3	0	2	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	415	1293	412	183	1546	129	434	746	268	123	579	237
Arrive On Green	0.12	0.34	0.34	0.10	0.32	0.32	0.13	0.29	0.29	0.07	0.24	0.24
Sat Flow, veh/h	3442	3791	1208	1774	4776	400	3442	2530	908	1774	2436	996
Grp Volume(v), veh/h	326	658	317	147	282	152	320	185	182	95	187	184
Grp Sat Flow(s),veh/h/ln	1721	1695	1609	1774	1695	1786	1721	1770	1669	1774	1770	1663
Q Serve(g_s), s	7.7	13.2	13.5	6.8	5.1	5.2	7.5	6.9	7.2	4.4	7.5	7.9
Cycle Q Clear(g_c), s	7.7	13.2	13.5	6.8	5.1	5.2	7.5	6.9	7.2	4.4	7.5	7.9
Prop In Lane	1.00		0.75	1.00		0.22	1.00		0.54	1.00		0.60
Lane Grp Cap(c), veh/h	415	1157	549	183	1097	578	434	522	492	123	421	395
V/C Ratio(X)	0.79	0.57	0.58	0.80	0.26	0.26	0.74	0.35	0.37	0.77	0.45	0.46
Avail Cap(c_a), veh/h	536	1422	675	276	1422	749	1196	1124	1060	276	785	737
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.6	22.5	22.5	36.6	20.8	20.9	35.1	23.2	23.3	38.2	27.1	27.2
Incr Delay (d2), s/veh	5.8	0.4	1.0	9.7	0.1	0.2	2.5	0.4	0.5	9.9	0.7	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	6.3	6.1	3.8	2.4	2.6	3.7	3.4	3.3	2.5	3.8	3.7
LnGrp Delay(d),s/veh	41.4	22.9	23.5	46.3	20.9	21.1	37.6	23.6	23.8	48.1	27.8	28.1
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		1301			581			687			466	
Approach Delay, s/veh		27.7			27.4			30.1			32.1	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.8	28.6	12.6	32.5	14.5	23.8	14.1	31.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	13.0	53.0	13.0	35.0	29.0	37.0	13.0	35.0
Max Q Clear Time (g_c+I1), s	10.4	9.2	8.8	15.5	9.5	9.9	9.7	7.2
Green Ext Time (p_c), s	0.1	5.2	0.1	10.0	1.1	4.9	0.4	11.9

Intersection Summary	
HCM 2010 Ctrl Delay	28.9
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	48	871	456	172	233	44
Future Volume (veh/h)	48	871	456	172	233	44
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	52	937	490	0	251	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	83	2815	1926	0	337	301
Arrive On Green	0.05	0.55	0.38	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	52	937	490	0	251	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.9	3.1	2.1	0.0	4.2	0.0
Cycle Q Clear(g_c), s	0.9	3.1	2.1	0.0	4.2	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	83	2815	1926	0	337	301
V/C Ratio(X)	0.63	0.33	0.25	0.00	0.74	0.00
Avail Cap(c_a), veh/h	284	4239	2771	0	910	812
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.6	3.8	6.7	0.0	11.9	0.0
Incr Delay (d2), s/veh	7.7	0.1	0.1	0.0	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.4	1.0	0.0	2.3	0.0
LnGrp Delay(d),s/veh	22.3	3.9	6.7	0.0	15.2	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		989	490		251	
Approach Delay, s/veh		4.8	6.7		15.2	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		21.3		9.9	5.5	15.8		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		5.1		6.2	2.9	4.1		
Green Ext Time (p_c), s		10.4		0.5	0.0	7.7		

Intersection Summary	
HCM 2010 Ctrl Delay	6.9
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	901	195	96	569	200	133	419	97	200	339	184
Future Volume (veh/h)	158	901	195	96	569	200	133	419	97	200	339	184
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	178	1012	128	108	639	0	149	471	0	225	381	197
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	213	1043	465	137	890	398	157	603	512	262	443	229
Arrive On Green	0.12	0.29	0.29	0.08	0.25	0.00	0.09	0.32	0.00	0.15	0.38	0.38
Sat Flow, veh/h	1774	3539	1578	1774	3539	1583	1774	1863	1583	1774	1158	599
Grp Volume(v), veh/h	178	1012	128	108	639	0	149	471	0	225	0	578
Grp Sat Flow(s),veh/h/ln	1774	1770	1578	1774	1770	1583	1774	1863	1583	1774	0	1757
Q Serve(g_s), s	10.0	28.8	6.3	6.1	16.8	0.0	8.5	23.3	0.0	12.6	0.0	30.8
Cycle Q Clear(g_c), s	10.0	28.8	6.3	6.1	16.8	0.0	8.5	23.3	0.0	12.6	0.0	30.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	213	1043	465	137	890	398	157	603	512	262	0	673
V/C Ratio(X)	0.83	0.97	0.28	0.79	0.72	0.00	0.95	0.78	0.00	0.86	0.00	0.86
Avail Cap(c_a), veh/h	383	1043	465	279	890	398	157	603	512	453	0	673
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.8	35.5	27.6	46.2	34.8	0.0	46.2	31.2	0.0	42.3	0.0	28.9
Incr Delay (d2), s/veh	8.3	21.0	0.3	9.7	2.8	0.0	57.1	9.7	0.0	8.0	0.0	13.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	17.1	2.8	3.4	8.5	0.0	6.6	13.7	0.0	6.8	0.0	17.4
LnGrp Delay(d),s/veh	52.1	56.5	27.9	55.9	37.6	0.0	103.3	40.9	0.0	50.3	0.0	42.4
LnGrp LOS	D	E	C	E	D		F	D		D		D
Approach Vol, veh/h		1318			747			620			803	
Approach Delay, s/veh		53.1			40.3			55.9			44.6	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.1	36.9	11.8	34.0	13.0	43.0	16.2	29.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	26.0	22.0	16.0	30.0	9.0	39.0	22.0	24.0
Max Q Clear Time (g_c+I1), s	14.6	25.3	8.1	30.8	10.5	32.8	12.0	18.8
Green Ext Time (p_c), s	0.5	0.0	0.1	0.0	0.0	3.4	0.3	4.2

Intersection Summary	
HCM 2010 Ctrl Delay	48.9
HCM 2010 LOS	D

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	356	204	1	617	223
Future Volume (vph)	12	356	204	1	617	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.99		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1593		1861		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1593		1861		1770	1863
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	13	379	217	1	656	237
RTOR Reduction (vph)	327	0	0	0	0	0
Lane Group Flow (vph)	65	0	218	0	656	237
Confl. Peds. (#/hr)		3		3	3	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	8.3		12.7		27.1	43.8
Effective Green, g (s)	8.3		12.7		27.1	43.8
Actuated g/C Ratio	0.14		0.21		0.45	0.73
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	219		393		798	1357
v/s Ratio Prot	c0.04		c0.12		c0.37	0.13
v/s Ratio Perm						
v/c Ratio	0.30		0.55		0.82	0.17
Uniform Delay, d1	23.3		21.2		14.4	2.5
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.8		1.7		6.8	0.1
Delay (s)	24.0		22.9		21.2	2.6
Level of Service	C		C		C	A
Approach Delay (s)	24.0		22.9			16.3
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	416	10	30	283	200	10	230	80	310	130	180
Future Volume (veh/h)	149	416	10	30	283	200	10	230	80	310	130	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	152	424	4	31	289	174	10	235	0	316	133	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	192	735	615	47	340	205	16	405	184	380	379	0
Arrive On Green	0.11	0.39	0.39	0.03	0.31	0.31	0.12	0.12	0.00	0.21	0.21	0.00
Sat Flow, veh/h	1774	1863	1560	1774	1089	656	141	3484	1583	1774	1863	0
Grp Volume(v), veh/h	152	424	4	31	0	463	131	114	0	316	133	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1560	1774	0	1745	1856	1770	1583	1774	1770	0
Q Serve(g_s), s	5.4	11.5	0.1	1.1	0.0	16.0	4.3	3.9	0.0	11.0	4.1	0.0
Cycle Q Clear(g_c), s	5.4	11.5	0.1	1.1	0.0	16.0	4.3	3.9	0.0	11.0	4.1	0.0
Prop In Lane	1.00		1.00	1.00		0.38	0.08		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	192	735	615	47	0	545	216	206	184	380	379	0
V/C Ratio(X)	0.79	0.58	0.01	0.66	0.00	0.85	0.61	0.55	0.00	0.83	0.35	0.00
Avail Cap(c_a), veh/h	276	810	679	110	0	596	461	440	394	441	440	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.0	15.3	11.8	31.0	0.0	20.7	27.0	26.9	0.0	24.2	21.5	0.0
Incr Delay (d2), s/veh	9.5	0.8	0.0	14.7	0.0	10.5	2.8	2.3	0.0	11.3	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	6.1	0.0	0.7	0.0	9.2	2.4	2.0	0.0	6.5	2.1	0.0
LnGrp Delay(d),s/veh	37.5	16.1	11.8	45.8	0.0	31.2	29.8	29.2	0.0	35.4	22.0	0.0
LnGrp LOS	D	B	B	D		C	C	C		D	C	
Approach Vol, veh/h		580			494			245			449	
Approach Delay, s/veh		21.7			32.1			29.5			31.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		11.5	5.7	29.4		17.8	11.0	24.1
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	10.0	22.0
Max Q Clear Time (g_c+I1), s		6.3	3.1	13.5		13.0	7.4	18.0
Green Ext Time (p_c), s		0.9	0.0	5.3		0.8	0.1	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	28.2
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	100	40	602	211	391	20	470	259	640	990	180
Future Volume (veh/h)	50	100	40	602	211	391	20	470	259	640	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	103	0	621	218	0	21	485	0	660	1021	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	129	445	138	743	1352	421	37	877	0	774	2234	0
Arrive On Green	0.04	0.09	0.00	0.23	0.29	0.00	0.02	0.25	0.00	0.24	0.47	0.00
Sat Flow, veh/h	3191	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	103	0	621	218	0	21	485	0	660	1021	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	1.4	1.8	0.0	16.8	3.1	0.0	1.2	11.0	0.0	17.9	13.2	0.0
Cycle Q Clear(g_c), s	1.4	1.8	0.0	16.8	3.1	0.0	1.2	11.0	0.0	17.9	13.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	129	445	138	743	1352	421	37	877	0	774	2234	0
V/C Ratio(X)	0.40	0.23	0.00	0.84	0.16	0.00	0.57	0.55	0.00	0.85	0.46	0.00
Avail Cap(c_a), veh/h	1092	1874	583	1268	1874	583	553	1564	0	1092	2234	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.4	38.0	0.0	33.1	24.2	0.0	43.8	29.3	0.0	32.8	16.0	0.0
Incr Delay (d2), s/veh	2.0	0.3	0.0	2.6	0.1	0.0	13.4	0.5	0.0	4.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.8	0.0	7.7	1.4	0.0	0.7	3.5	0.0	8.4	5.7	0.0
LnGrp Delay(d),s/veh	44.4	38.2	0.0	35.7	24.2	0.0	57.2	29.9	0.0	37.5	16.2	0.0
LnGrp LOS	D	D		D	C		E	C		D	B	
Approach Vol, veh/h		155			839			506			1681	
Approach Delay, s/veh		40.3			32.7			31.0			24.5	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.0	27.0	25.1	12.5	6.1	46.9	7.6	30.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	19.9	13.0	18.8	3.8	3.2	15.2	3.4	5.1
Green Ext Time (p_c), s	2.1	9.6	2.3	2.4	0.0	13.2	0.1	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	28.5
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	388	105	440	30	443	313	79	50	185	160
Future Volume (veh/h)	180	260	388	105	440	30	443	313	79	50	185	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.96	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	147	114	478	24	482	340	65	54	201	27
Adj No. of Lanes	2	3	0	1	3	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	301	964	437	147	1386	69	626	990	187	85	629	83
Arrive On Green	0.09	0.28	0.28	0.08	0.28	0.28	0.18	0.34	0.34	0.05	0.20	0.20
Sat Flow, veh/h	3442	3390	1535	1774	4952	246	3442	2955	557	1774	3127	413
Grp Volume(v), veh/h	196	283	147	114	326	176	482	202	203	54	112	116
Grp Sat Flow(s),veh/h/ln	1721	1695	1535	1774	1695	1808	1721	1770	1742	1774	1770	1771
Q Serve(g_s), s	3.5	4.2	4.9	4.0	4.9	5.0	8.5	5.5	5.6	1.9	3.5	3.6
Cycle Q Clear(g_c), s	3.5	4.2	4.9	4.0	4.9	5.0	8.5	5.5	5.6	1.9	3.5	3.6
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.32	1.00		0.23
Lane Grp Cap(c), veh/h	301	964	437	147	949	506	626	593	584	85	356	356
V/C Ratio(X)	0.65	0.29	0.34	0.77	0.34	0.35	0.77	0.34	0.35	0.63	0.32	0.32
Avail Cap(c_a), veh/h	537	1850	838	277	1850	987	966	1241	1222	249	993	994
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.3	17.9	18.2	28.8	18.4	18.4	25.0	16.0	16.1	30.0	21.9	21.9
Incr Delay (d2), s/veh	2.4	0.2	0.5	8.4	0.2	0.4	2.0	0.3	0.4	7.5	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.0	2.1	2.3	2.3	2.6	4.2	2.7	2.8	1.1	1.7	1.8
LnGrp Delay(d),s/veh	30.7	18.1	18.6	37.2	18.6	18.8	27.0	16.3	16.4	37.4	22.4	22.4
LnGrp LOS	C	B	B	D	B	B	C	B	B	D	C	C
Approach Vol, veh/h		626			616			887			282	
Approach Delay, s/veh		22.2			22.1			22.1			25.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	25.5	9.3	22.2	15.7	16.9	9.6	22.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	45.0	10.0	35.0	18.0	36.0	10.0	35.0
Max Q Clear Time (g_c+I1), s	3.9	7.6	6.0	6.9	10.5	5.6	5.5	7.0
Green Ext Time (p_c), s	0.0	4.2	0.1	7.2	1.1	4.1	0.2	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	22.5
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	33	346	561	216	212	34
Future Volume (veh/h)	33	346	561	216	212	34
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	40	417	676	0	255	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	67	2739	1866	0	344	307
Arrive On Green	0.04	0.54	0.37	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	40	417	676	0	255	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.7	1.2	2.9	0.0	4.0	0.0
Cycle Q Clear(g_c), s	0.7	1.2	2.9	0.0	4.0	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	67	2739	1866	0	344	307
V/C Ratio(X)	0.60	0.15	0.36	0.00	0.74	0.00
Avail Cap(c_a), veh/h	297	4424	2893	0	950	848
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.2	3.5	6.9	0.0	11.3	0.0
Incr Delay (d2), s/veh	8.2	0.0	0.1	0.0	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.5	1.3	0.0	2.2	0.0
LnGrp Delay(d),s/veh	22.3	3.5	7.0	0.0	14.5	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		457	676		255	
Approach Delay, s/veh		5.1	7.0		14.5	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		20.1		9.8	5.1	15.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		3.2		6.0	2.7	4.9		
Green Ext Time (p_c), s		8.1		0.5	0.0	5.8		

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	164	579	203	93	686	300	179	378	153	270	476	94
Future Volume (veh/h)	164	579	203	93	686	300	179	378	153	270	476	94
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	200	706	31	113	837	0	218	461	0	329	580	109
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	229	1007	396	139	828	370	215	576	490	353	590	111
Arrive On Green	0.13	0.28	0.28	0.08	0.23	0.00	0.12	0.31	0.00	0.20	0.39	0.39
Sat Flow, veh/h	1774	3539	1390	1774	3539	1583	1774	1863	1583	1774	1525	287
Grp Volume(v), veh/h	200	706	31	113	837	0	218	461	0	329	0	689
Grp Sat Flow(s),veh/h/ln	1774	1770	1390	1774	1770	1583	1774	1863	1583	1774	0	1811
Q Serve(g_s), s	13.7	22.1	2.0	7.8	29.0	0.0	15.0	28.2	0.0	22.6	0.0	46.7
Cycle Q Clear(g_c), s	13.7	22.1	2.0	7.8	29.0	0.0	15.0	28.2	0.0	22.6	0.0	46.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	229	1007	396	139	828	370	215	576	490	353	0	701
V/C Ratio(X)	0.87	0.70	0.08	0.81	1.01	0.00	1.02	0.80	0.00	0.93	0.00	0.98
Avail Cap(c_a), veh/h	315	1007	396	229	828	370	215	576	490	358	0	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	53.0	39.6	32.4	56.3	47.5	0.0	54.5	39.3	0.0	48.8	0.0	37.6
Incr Delay (d2), s/veh	17.8	2.2	0.1	10.9	34.1	0.0	65.6	11.1	0.0	30.6	0.0	30.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	11.1	0.8	4.2	18.1	0.0	11.2	16.3	0.0	14.1	0.0	29.2
LnGrp Delay(d),s/veh	70.8	41.8	32.5	67.2	81.5	0.0	120.2	50.5	0.0	79.5	0.0	67.6
LnGrp LOS	E	D	C	E	F		F	D		E		E
Approach Vol, veh/h		937			950			679			1018	
Approach Delay, s/veh		47.7			79.8			72.8			71.4	
Approach LOS		D			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.7	42.3	13.7	39.3	19.0	52.0	20.0	33.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	25.0	38.0	16.0	35.0	15.0	48.0	22.0	29.0
Max Q Clear Time (g_c+I1), s	24.6	30.2	9.8	24.1	17.0	48.7	15.7	31.0
Green Ext Time (p_c), s	0.0	4.5	0.1	7.3	0.0	0.0	0.3	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	67.7
HCM 2010 LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	611	281	2	331	169
Future Volume (vph)	11	611	281	2	331	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.99		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1594		1861		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1594		1861		1770	1863
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	13	719	331	2	389	199
RTOR Reduction (vph)	509	0	0	0	0	0
Lane Group Flow (vph)	223	0	333	0	389	199
Confl. Peds. (#/hr)	1	1		1	1	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	11.3		13.4		14.7	32.1
Effective Green, g (s)	11.3		13.4		14.7	32.1
Actuated g/C Ratio	0.22		0.26		0.29	0.62
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	350		485		506	1163
v/s Ratio Prot	c0.14		c0.18		c0.22	0.11
v/s Ratio Perm						
v/c Ratio	0.64		0.69		0.77	0.17
Uniform Delay, d1	18.2		17.1		16.8	4.1
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	3.8		4.0		6.9	0.1
Delay (s)	22.0		21.1		23.7	4.1
Level of Service	C		C		C	A
Approach Delay (s)	22.0		21.1			17.1
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	51.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	282	206	10	12	318	220	30	159	25	270	203	190
Future Volume (veh/h)	282	206	10	12	318	220	30	159	25	270	203	190
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	310	226	6	13	349	219	33	175	0	297	223	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	343	1001	845	21	381	239	51	289	150	351	350	0
Arrive On Green	0.19	0.54	0.54	0.01	0.36	0.36	0.09	0.09	0.00	0.20	0.20	0.00
Sat Flow, veh/h	1774	1863	1572	1774	1068	670	544	3061	1583	1774	1863	0
Grp Volume(v), veh/h	310	226	6	13	0	568	111	97	0	297	223	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1572	1774	0	1738	1836	1770	1583	1774	1770	0
Q Serve(g_s), s	17.3	6.5	0.2	0.7	0.0	31.7	5.9	5.3	0.0	16.4	11.7	0.0
Cycle Q Clear(g_c), s	17.3	6.5	0.2	0.7	0.0	31.7	5.9	5.3	0.0	16.4	11.7	0.0
Prop In Lane	1.00		1.00	1.00		0.39	0.30		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	343	1001	845	21	0	620	173	167	150	351	350	0
V/C Ratio(X)	0.90	0.23	0.01	0.61	0.00	0.92	0.64	0.58	0.00	0.85	0.64	0.00
Avail Cap(c_a), veh/h	385	1047	883	70	0	668	326	314	281	437	436	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.0	12.3	10.9	49.9	0.0	31.2	44.3	44.0	0.0	39.2	37.3	0.0
Incr Delay (d2), s/veh	22.6	0.1	0.0	24.5	0.0	16.9	3.9	3.1	0.0	11.9	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.7	3.4	0.1	0.5	0.0	18.1	3.2	2.8	0.0	9.2	5.9	0.0
LnGrp Delay(d),s/veh	62.6	12.5	10.9	74.3	0.0	48.1	48.2	47.1	0.0	51.1	39.4	0.0
LnGrp LOS	E	B	B	E		D	D	D		D	D	
Approach Vol, veh/h		542			581			208			520	
Approach Delay, s/veh		41.1			48.6			47.7			46.1	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		13.6	5.2	58.5		24.1	23.6	40.2
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	57.0		25.0	22.0	39.0
Max Q Clear Time (g_c+I1), s		7.9	2.7	8.5		18.4	19.3	33.7
Green Ext Time (p_c), s		0.8	0.0	6.9		1.7	0.3	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	541	40	284	348	478	70	1210	623	491	320	300
Future Volume (veh/h)	220	541	40	284	348	478	70	1210	623	491	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	582	0	305	374	0	75	1301	0	528	344	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	245	1120	334	269	1157	360	94	1320	0	611	2136	0
Arrive On Green	0.08	0.24	0.00	0.08	0.25	0.00	0.06	0.36	0.00	0.19	0.50	0.00
Sat Flow, veh/h	3191	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	582	0	305	374	0	75	1301	0	528	344	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	9.7	14.0	0.0	11.0	8.5	0.0	5.9	46.4	0.0	20.9	5.7	0.0
Cycle Q Clear(g_c), s	9.7	14.0	0.0	11.0	8.5	0.0	5.9	46.4	0.0	20.9	5.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	245	1120	334	269	1157	360	94	1320	0	611	2136	0
V/C Ratio(X)	0.97	0.52	0.00	1.13	0.32	0.00	0.80	0.99	0.00	0.86	0.16	0.00
Avail Cap(c_a), veh/h	245	1120	334	269	1157	360	277	1320	0	1247	2136	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.1	43.3	0.0	59.7	40.4	0.0	60.7	41.2	0.0	51.1	17.9	0.0
Incr Delay (d2), s/veh	48.7	1.7	0.0	95.8	0.7	0.0	14.0	21.6	0.0	3.8	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	6.3	0.0	8.4	3.8	0.0	3.0	18.1	0.0	9.6	2.3	0.0
LnGrp Delay(d),s/veh	108.8	45.0	0.0	155.5	41.1	0.0	74.7	62.7	0.0	54.9	18.0	0.0
LnGrp LOS	F	D		F	D		E	E		D	B	
Approach Vol, veh/h		819			679			1376			872	
Approach Delay, s/veh		63.4			92.5			63.4			40.3	
Approach LOS		E			F			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	29.0	51.5	15.0	35.0	11.5	69.0	14.0	36.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	51.0	36.0	11.0	31.0	22.0	65.0	10.0	32.0
Max Q Clear Time (g_c+I1), s	22.9	48.4	13.0	16.0	7.9	7.7	11.7	10.5
Green Ext Time (p_c), s	2.1	0.0	0.0	6.1	0.1	20.8	0.0	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	63.3
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	334	140	380	40	331	266	140	90	267	200
Future Volume (veh/h)	310	700	334	140	380	40	331	266	140	90	267	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	286	147	400	34	348	280	100	95	281	110
Adj No. of Lanes	2	3	0	1	3	0	2	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	426	1228	470	184	1538	129	450	769	268	122	597	227
Arrive On Green	0.12	0.34	0.34	0.10	0.32	0.32	0.13	0.30	0.30	0.07	0.24	0.24
Sat Flow, veh/h	3442	3589	1375	1774	4776	400	3442	2555	889	1774	2492	950
Grp Volume(v), veh/h	326	696	327	147	282	152	348	192	188	95	197	194
Grp Sat Flow(s),veh/h/ln	1721	1695	1574	1774	1695	1785	1721	1770	1674	1774	1770	1672
Q Serve(g_s), s	8.0	14.8	15.0	7.0	5.4	5.5	8.5	7.4	7.7	4.6	8.3	8.7
Cycle Q Clear(g_c), s	8.0	14.8	15.0	7.0	5.4	5.5	8.5	7.4	7.7	4.6	8.3	8.7
Prop In Lane	1.00		0.87	1.00		0.22	1.00		0.53	1.00		0.57
Lane Grp Cap(c), veh/h	426	1160	538	184	1092	575	450	533	504	122	424	400
V/C Ratio(X)	0.77	0.60	0.61	0.80	0.26	0.26	0.77	0.36	0.37	0.78	0.47	0.48
Avail Cap(c_a), veh/h	752	1403	651	387	1403	739	791	936	885	265	793	750
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.9	23.7	23.8	38.1	21.8	21.8	36.6	23.8	23.9	39.8	28.3	28.5
Incr Delay (d2), s/veh	2.9	0.5	1.1	7.7	0.1	0.2	2.9	0.4	0.5	10.0	0.8	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	6.9	6.7	3.8	2.5	2.7	4.2	3.7	3.6	2.6	4.2	4.1
LnGrp Delay(d),s/veh	39.8	24.2	24.9	45.8	21.9	22.1	39.4	24.2	24.4	49.8	29.1	29.4
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		1349			581			728			486	
Approach Delay, s/veh		28.1			28.0			31.5			33.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	30.2	13.0	33.8	15.4	24.8	14.8	32.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	13.0	46.0	19.0	36.0	20.0	39.0	19.0	36.0
Max Q Clear Time (g_c+I1), s	10.0	9.7	9.0	17.0	10.5	10.7	10.0	7.5
Green Ext Time (p_c), s	0.1	5.4	0.3	10.2	0.9	5.2	0.8	12.6

Intersection Summary	
HCM 2010 Ctrl Delay	29.7
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	48	871	456	173	236	44
Future Volume (veh/h)	48	871	456	173	236	44
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	52	937	490	0	254	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	82	2808	1922	0	341	304
Arrive On Green	0.05	0.55	0.38	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	52	937	490	0	254	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.9	3.2	2.1	0.0	4.2	0.0
Cycle Q Clear(g_c), s	0.9	3.2	2.1	0.0	4.2	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	82	2808	1922	0	341	304
V/C Ratio(X)	0.63	0.33	0.26	0.00	0.75	0.00
Avail Cap(c_a), veh/h	284	4226	2763	0	907	810
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.7	3.8	6.7	0.0	11.9	0.0
Incr Delay (d2), s/veh	7.7	0.1	0.1	0.0	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.5	1.0	0.0	2.4	0.0
LnGrp Delay(d),s/veh	22.3	3.9	6.8	0.0	15.2	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		989	490		254	
Approach Delay, s/veh		4.9	6.8		15.2	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		21.3		10.0	5.5	15.8		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		5.2		6.2	2.9	4.1		
Green Ext Time (p_c), s		10.4		0.5	0.0	7.7		

Intersection Summary	
HCM 2010 Ctrl Delay	6.9
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	901	199	124	569	200	135	458	113	200	405	184
Future Volume (veh/h)	158	901	199	124	569	200	135	458	113	200	405	184
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	178	1012	133	139	639	0	152	515	0	225	455	197
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	213	1021	455	170	937	419	154	585	498	261	463	200
Arrive On Green	0.12	0.29	0.29	0.10	0.26	0.00	0.09	0.31	0.00	0.15	0.38	0.38
Sat Flow, veh/h	1774	3539	1578	1774	3539	1583	1774	1863	1583	1774	1234	534
Grp Volume(v), veh/h	178	1012	133	139	639	0	152	515	0	225	0	652
Grp Sat Flow(s),veh/h/ln	1774	1770	1578	1774	1770	1583	1774	1863	1583	1774	0	1768
Q Serve(g_s), s	10.2	29.6	6.8	8.0	16.8	0.0	8.9	27.2	0.0	12.9	0.0	38.0
Cycle Q Clear(g_c), s	10.2	29.6	6.8	8.0	16.8	0.0	8.9	27.2	0.0	12.9	0.0	38.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.30
Lane Grp Cap(c), veh/h	213	1021	455	170	937	419	154	585	498	261	0	663
V/C Ratio(X)	0.84	0.99	0.29	0.82	0.68	0.00	0.99	0.88	0.00	0.86	0.00	0.98
Avail Cap(c_a), veh/h	375	1021	455	273	937	419	154	585	498	444	0	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.8	36.8	28.7	46.1	34.3	0.0	47.4	33.8	0.0	43.3	0.0	32.2
Incr Delay (d2), s/veh	8.5	25.9	0.4	9.7	2.0	0.0	69.4	17.1	0.0	8.5	0.0	31.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	18.1	3.0	4.4	8.5	0.0	7.3	16.8	0.0	6.9	0.0	24.2
LnGrp Delay(d),s/veh	53.2	62.7	29.1	55.8	36.3	0.0	116.8	50.9	0.0	51.8	0.0	63.2
LnGrp LOS	D	E	C	E	D		F	D		D		E
Approach Vol, veh/h		1323			778			667			877	
Approach Delay, s/veh		58.1			39.8			65.9			60.3	
Approach LOS		E			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.3	36.7	14.0	34.0	13.0	43.0	16.5	31.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	26.0	22.0	16.0	30.0	9.0	39.0	22.0	24.0
Max Q Clear Time (g_c+I1), s	14.9	29.2	10.0	31.6	10.9	40.0	12.2	18.8
Green Ext Time (p_c), s	0.5	0.0	0.2	0.0	0.0	0.0	0.3	4.1

Intersection Summary	
HCM 2010 Ctrl Delay	56.1
HCM 2010 LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	387	214	1	668	239
Future Volume (vph)	12	387	214	1	668	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.98		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1592		1861		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1592		1861		1770	1863
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	13	412	228	1	711	254
RTOR Reduction (vph)	357	0	0	0	0	0
Lane Group Flow (vph)	68	0	229	0	711	254
Confl. Peds. (#/hr)		3		3	3	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	8.5		12.9		30.3	47.2
Effective Green, g (s)	8.5		12.9		30.3	47.2
Actuated g/C Ratio	0.13		0.20		0.48	0.74
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	212		376		841	1380
v/s Ratio Prot	c0.04		c0.12		c0.40	0.14
v/s Ratio Perm						
v/c Ratio	0.32		0.61		0.85	0.18
Uniform Delay, d1	25.0		23.1		14.6	2.5
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.9		2.8		7.8	0.1
Delay (s)	25.9		25.9		22.5	2.5
Level of Service	C		C		C	A
Approach Delay (s)	25.9		25.9			17.2
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	63.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	424	10	35	297	200	10	235	83	310	138	270
Future Volume (veh/h)	202	424	10	35	297	200	10	235	83	310	138	270
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	206	433	4	36	303	174	10	240	0	316	141	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	248	770	645	51	336	193	16	401	182	372	371	0
Arrive On Green	0.14	0.41	0.41	0.03	0.30	0.30	0.11	0.11	0.00	0.21	0.21	0.00
Sat Flow, veh/h	1774	1863	1560	1774	1110	638	139	3487	1583	1774	1863	0
Grp Volume(v), veh/h	206	433	4	36	0	477	134	116	0	316	141	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1560	1774	0	1748	1856	1770	1583	1774	1770	0
Q Serve(g_s), s	7.8	12.2	0.1	1.4	0.0	18.0	4.7	4.3	0.0	11.8	4.7	0.0
Cycle Q Clear(g_c), s	7.8	12.2	0.1	1.4	0.0	18.0	4.7	4.3	0.0	11.8	4.7	0.0
Prop In Lane	1.00		1.00	1.00		0.36	0.07		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	248	770	645	51	0	529	213	203	182	372	371	0
V/C Ratio(X)	0.83	0.56	0.01	0.70	0.00	0.90	0.63	0.57	0.00	0.85	0.38	0.00
Avail Cap(c_a), veh/h	258	770	645	103	0	560	432	412	369	413	412	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.8	15.4	11.8	33.1	0.0	23.0	29.0	28.8	0.0	26.1	23.3	0.0
Incr Delay (d2), s/veh	19.5	0.9	0.0	15.9	0.0	17.2	3.0	2.5	0.0	14.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	6.5	0.0	0.9	0.0	11.1	2.6	2.2	0.0	7.2	2.3	0.0
LnGrp Delay(d),s/veh	48.3	16.3	11.9	49.0	0.0	40.2	32.0	31.3	0.0	40.3	23.9	0.0
LnGrp LOS	D	B	B	D		D	C	C		D	C	
Approach Vol, veh/h		643			513			250			457	
Approach Delay, s/veh		26.5			40.8			31.7			35.2	
Approach LOS		C			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		11.9	6.0	32.4		18.4	13.6	24.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	10.0	22.0
Max Q Clear Time (g_c+I1), s		6.7	3.4	14.2		13.8	9.8	20.0
Green Ext Time (p_c), s		0.9	0.0	5.3		0.6	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	33.3
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	93	40	534	188	389	20	470	239	686	990	180
Future Volume (veh/h)	50	93	40	534	188	389	20	470	239	686	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	96	0	551	194	0	21	485	0	707	1021	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	131	430	134	673	1232	384	37	884	0	827	2320	0
Arrive On Green	0.04	0.09	0.00	0.21	0.26	0.00	0.02	0.26	0.00	0.26	0.49	0.00
Sat Flow, veh/h	3191	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	96	0	551	194	0	21	485	0	707	1021	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	1.4	1.7	0.0	14.4	2.8	0.0	1.1	10.6	0.0	18.4	12.3	0.0
Cycle Q Clear(g_c), s	1.4	1.7	0.0	14.4	2.8	0.0	1.1	10.6	0.0	18.4	12.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	131	430	134	673	1232	384	37	884	0	827	2320	0
V/C Ratio(X)	0.40	0.22	0.00	0.82	0.16	0.00	0.57	0.55	0.00	0.86	0.44	0.00
Avail Cap(c_a), veh/h	1131	1940	604	1313	1940	604	572	1619	0	1131	2320	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.9	36.9	0.0	32.9	24.9	0.0	42.3	28.2	0.0	30.9	14.4	0.0
Incr Delay (d2), s/veh	1.9	0.3	0.0	2.5	0.1	0.0	13.0	0.5	0.0	4.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.7	0.0	6.6	1.2	0.0	0.6	3.4	0.0	8.7	5.3	0.0
LnGrp Delay(d),s/veh	42.8	37.1	0.0	35.4	25.0	0.0	55.4	28.7	0.0	35.8	14.5	0.0
LnGrp LOS	D	D		D	C		E	C		D	B	
Approach Vol, veh/h		148			745			506			1728	
Approach Delay, s/veh		39.1			32.7			29.8			23.2	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.7	26.4	22.5	12.0	6.0	47.0	7.6	26.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	20.4	12.6	16.4	3.7	3.1	14.3	3.4	4.8
Green Ext Time (p_c), s	2.2	9.4	2.1	2.2	0.0	13.4	0.1	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	27.3
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	372	655	210	210	32
Future Volume (veh/h)	22	372	655	210	210	32
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	27	448	789	0	253	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	48	2783	1983	0	340	304
Arrive On Green	0.03	0.55	0.39	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	27	448	789	0	253	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.5	1.3	3.4	0.0	4.1	0.0
Cycle Q Clear(g_c), s	0.5	1.3	3.4	0.0	4.1	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	48	2783	1983	0	340	304
V/C Ratio(X)	0.57	0.16	0.40	0.00	0.74	0.00
Avail Cap(c_a), veh/h	289	4313	2820	0	926	826
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.7	3.4	6.8	0.0	11.7	0.0
Incr Delay (d2), s/veh	10.2	0.0	0.1	0.0	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.6	1.6	0.0	2.3	0.0
LnGrp Delay(d),s/veh	25.0	3.5	6.9	0.0	14.9	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		475	789		253	
Approach Delay, s/veh		4.7	6.9		14.9	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		20.8		9.9	4.8	16.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		3.3		6.1	2.5	5.4		
Green Ext Time (p_c), s		9.3		0.5	0.0	6.3		

Intersection Summary	
HCM 2010 Ctrl Delay	7.5
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	168	595	200	110	740	300	170	276	103	270	465	120
Future Volume (veh/h)	168	595	200	110	740	300	170	276	103	270	465	120
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.87	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	205	726	10	134	902	0	207	337	0	329	567	137
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	234	970	379	161	825	369	200	563	478	363	571	138
Arrive On Green	0.13	0.27	0.27	0.09	0.23	0.00	0.11	0.30	0.00	0.20	0.39	0.39
Sat Flow, veh/h	1774	3539	1384	1774	3539	1583	1774	1863	1583	1774	1449	350
Grp Volume(v), veh/h	205	726	10	134	902	0	207	337	0	329	0	704
Grp Sat Flow(s),veh/h/ln	1774	1770	1384	1774	1770	1583	1774	1863	1583	1774	0	1800
Q Serve(g_s), s	14.1	23.3	0.7	9.2	29.0	0.0	14.0	19.2	0.0	22.5	0.0	48.4
Cycle Q Clear(g_c), s	14.1	23.3	0.7	9.2	29.0	0.0	14.0	19.2	0.0	22.5	0.0	48.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	234	970	379	161	825	369	200	563	478	363	0	709
V/C Ratio(X)	0.88	0.75	0.03	0.83	1.09	0.00	1.04	0.60	0.00	0.91	0.00	0.99
Avail Cap(c_a), veh/h	314	970	379	257	825	369	200	563	478	585	0	709
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	53.0	41.2	33.0	55.6	47.7	0.0	55.2	37.0	0.0	48.3	0.0	37.5
Incr Delay (d2), s/veh	18.8	3.3	0.0	11.9	59.8	0.0	73.6	4.7	0.0	11.9	0.0	32.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	11.8	0.3	5.1	21.0	0.0	10.9	10.6	0.0	12.3	0.0	30.4
LnGrp Delay(d),s/veh	71.8	44.5	33.0	67.6	107.5	0.0	128.9	41.6	0.0	60.2	0.0	69.6
LnGrp LOS	E	D	C	E	F		F	D		E		E
Approach Vol, veh/h		941			1036			544			1033	
Approach Delay, s/veh		50.3			102.3			74.8			66.6	
Approach LOS		D			F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.4	41.6	15.3	38.1	18.0	53.0	20.4	33.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	41.0	22.0	18.0	33.0	14.0	49.0	22.0	29.0
Max Q Clear Time (g_c+I1), s	24.5	21.2	11.2	25.3	16.0	50.4	16.1	31.0
Green Ext Time (p_c), s	0.9	0.6	0.2	5.7	0.0	0.0	0.3	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	74.0
HCM 2010 LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	449	296	3	300	363
Future Volume (vph)	14	449	296	3	300	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.99		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1596		1859		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1596		1859		1770	1863
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	16	528	348	4	353	427
RTOR Reduction (vph)	435	0	1	0	0	0
Lane Group Flow (vph)	109	0	351	0	353	427
Confl. Peds. (#/hr)	1	1		1	1	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	8.4		13.5		13.8	31.3
Effective Green, g (s)	8.4		13.5		13.8	31.3
Actuated g/C Ratio	0.18		0.28		0.29	0.66
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	281		526		512	1222
v/s Ratio Prot	c0.07		c0.19		c0.20	0.23
v/s Ratio Perm						
v/c Ratio	0.39		0.67		0.69	0.35
Uniform Delay, d1	17.4		15.1		15.0	3.7
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.9		3.2		3.9	0.2
Delay (s)	18.3		18.3		18.9	3.8
Level of Service	B		B		B	A
Approach Delay (s)	18.3		18.3			10.7
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	180	10	10	335	220	30	150	20	270	200	195
Future Volume (veh/h)	129	180	10	10	335	220	30	150	20	270	200	195
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	142	198	6	11	368	223	33	165	0	297	220	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	901	759	19	426	258	57	300	157	377	376	0
Arrive On Green	0.10	0.48	0.48	0.01	0.39	0.39	0.10	0.10	0.00	0.21	0.21	0.00
Sat Flow, veh/h	1774	1863	1571	1774	1084	657	571	3032	1583	1774	1863	0
Grp Volume(v), veh/h	142	198	6	11	0	591	106	92	0	297	220	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1571	1774	0	1741	1834	1770	1583	1774	1770	0
Q Serve(g_s), s	6.4	5.1	0.2	0.5	0.0	25.7	4.6	4.1	0.0	13.0	9.2	0.0
Cycle Q Clear(g_c), s	6.4	5.1	0.2	0.5	0.0	25.7	4.6	4.1	0.0	13.0	9.2	0.0
Prop In Lane	1.00		1.00	1.00		0.38	0.31		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	180	901	759	19	0	684	182	175	157	377	376	0
V/C Ratio(X)	0.79	0.22	0.01	0.57	0.00	0.86	0.58	0.53	0.00	0.79	0.58	0.00
Avail Cap(c_a), veh/h	409	1266	1067	86	0	866	378	365	327	581	580	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.2	12.3	11.0	40.6	0.0	23.0	35.5	35.3	0.0	30.7	29.2	0.0
Incr Delay (d2), s/veh	7.5	0.1	0.0	24.3	0.0	7.5	3.0	2.4	0.0	4.0	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	2.6	0.1	0.4	0.0	13.7	2.4	2.1	0.0	6.8	4.6	0.0
LnGrp Delay(d),s/veh	43.7	12.4	11.0	64.8	0.0	30.5	38.5	37.7	0.0	34.6	30.6	0.0
LnGrp LOS	D	B	B	E		C	D	D		C	C	
Approach Vol, veh/h		346			602			198			517	
Approach Delay, s/veh		25.2			31.1			38.1			32.9	
Approach LOS		C			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.2	4.9	43.8		21.5	12.4	36.4
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	56.0		27.0	19.0	41.0
Max Q Clear Time (g_c+I1), s		6.6	2.5	7.1		15.0	8.4	27.7
Green Ext Time (p_c), s		0.7	0.0	6.9		2.5	0.3	4.7

Intersection Summary	
HCM 2010 Ctrl Delay	31.3
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	518	40	245	336	521	70	1210	554	505	320	300
Future Volume (veh/h)	220	518	40	245	336	521	70	1210	554	505	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	557	0	263	361	0	75	1301	0	543	344	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	182	1045	311	297	1213	378	93	1366	0	621	2206	0
Arrive On Green	0.06	0.22	0.00	0.09	0.26	0.00	0.06	0.38	0.00	0.19	0.51	0.00
Sat Flow, veh/h	3191	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	557	0	263	361	0	75	1301	0	543	344	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	8.0	14.6	0.0	11.4	8.6	0.0	6.3	48.8	0.0	23.1	5.9	0.0
Cycle Q Clear(g_c), s	8.0	14.6	0.0	11.4	8.6	0.0	6.3	48.8	0.0	23.1	5.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	182	1045	311	297	1213	378	93	1366	0	621	2206	0
V/C Ratio(X)	1.30	0.53	0.00	0.89	0.30	0.00	0.81	0.95	0.00	0.87	0.16	0.00
Avail Cap(c_a), veh/h	182	1045	311	297	1213	378	153	1366	0	1118	2206	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	66.0	48.1	0.0	62.7	41.8	0.0	65.2	42.4	0.0	54.7	17.9	0.0
Incr Delay (d2), s/veh	168.6	1.9	0.0	25.9	0.6	0.0	14.9	15.3	0.0	4.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	6.5	0.0	6.1	3.8	0.0	3.3	18.2	0.0	10.5	2.4	0.0
LnGrp Delay(d),s/veh	234.6	50.0	0.0	88.7	42.4	0.0	80.2	57.7	0.0	58.8	18.1	0.0
LnGrp LOS	F	D		F	D		F	E		E	B	
Approach Vol, veh/h		794			624			1376			887	
Approach Delay, s/veh		105.1			61.9			58.9			43.0	
Approach LOS		F			E			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	31.2	56.7	17.0	35.0	11.9	76.0	12.0	40.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	19.6	36.0	13.0	31.0	13.0	72.0	8.0	36.0
Max Q Clear Time (g_c+I1), s	25.1	50.8	13.4	16.6	8.3	7.9	10.0	10.6
Green Ext Time (p_c), s	2.1	0.0	0.0	5.7	0.1	21.4	0.0	7.3

Intersection Summary	
HCM 2010 Ctrl Delay	65.6
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	962	505	170	230	33
Future Volume (veh/h)	43	962	505	170	230	33
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	46	1034	543	0	247	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	74	2860	2009	0	331	296
Arrive On Green	0.04	0.56	0.40	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	46	1034	543	0	247	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.8	3.6	2.3	0.0	4.2	0.0
Cycle Q Clear(g_c), s	0.8	3.6	2.3	0.0	4.2	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	74	2860	2009	0	331	296
V/C Ratio(X)	0.62	0.36	0.27	0.00	0.75	0.00
Avail Cap(c_a), veh/h	278	4145	2710	0	890	794
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	15.0	3.8	6.5	0.0	12.3	0.0
Incr Delay (d2), s/veh	8.1	0.1	0.1	0.0	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.6	1.1	0.0	2.4	0.0
LnGrp Delay(d),s/veh	23.1	3.9	6.6	0.0	15.6	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		1080	543		247	
Approach Delay, s/veh		4.7	6.6		15.6	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		21.9		10.0	5.3	16.6		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		5.6		6.2	2.8	4.3		
Green Ext Time (p_c), s		11.4		0.5	0.0	8.3		

Intersection Summary	
HCM 2010 Ctrl Delay	6.7
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	955	190	83	600	200	130	414	113	200	308	191
Future Volume (veh/h)	179	955	190	83	600	200	130	414	113	200	308	191
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	201	1073	53	93	674	0	146	465	0	225	346	199
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	233	1113	496	118	883	395	174	619	527	253	419	241
Arrive On Green	0.13	0.31	0.31	0.07	0.25	0.00	0.10	0.33	0.00	0.14	0.38	0.38
Sat Flow, veh/h	1774	3539	1578	1774	3539	1583	1774	1863	1583	1774	1111	639
Grp Volume(v), veh/h	201	1073	53	93	674	0	146	465	0	225	0	545
Grp Sat Flow(s),veh/h/ln	1774	1770	1578	1774	1770	1583	1774	1863	1583	1774	0	1749
Q Serve(g_s), s	12.3	33.2	2.7	5.7	19.6	0.0	9.0	24.7	0.0	13.9	0.0	31.4
Cycle Q Clear(g_c), s	12.3	33.2	2.7	5.7	19.6	0.0	9.0	24.7	0.0	13.9	0.0	31.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	233	1113	496	118	883	395	174	619	527	253	0	659
V/C Ratio(X)	0.86	0.96	0.11	0.79	0.76	0.00	0.84	0.75	0.00	0.89	0.00	0.83
Avail Cap(c_a), veh/h	351	1113	496	255	922	413	191	619	527	255	0	659
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	47.3	37.5	27.0	51.1	38.7	0.0	49.3	33.0	0.0	46.9	0.0	31.4
Incr Delay (d2), s/veh	13.1	18.8	0.1	10.9	3.7	0.0	25.2	8.2	0.0	29.5	0.0	11.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	19.2	1.2	3.2	10.0	0.0	5.6	14.1	0.0	8.9	0.0	17.2
LnGrp Delay(d),s/veh	60.4	56.3	27.1	62.0	42.4	0.0	74.5	41.2	0.0	76.3	0.0	42.7
LnGrp LOS	E	E	C	E	D		E	D		E		D
Approach Vol, veh/h		1327			767			611			770	
Approach Delay, s/veh		55.8			44.7			49.1			52.5	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.9	41.0	11.4	39.0	14.9	45.9	18.6	31.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	37.0	16.0	35.0	12.0	41.0	22.0	29.0
Max Q Clear Time (g_c+I1), s	15.9	26.7	7.7	35.2	11.0	33.4	14.3	21.6
Green Ext Time (p_c), s	0.0	4.8	0.1	0.0	0.0	3.9	0.3	5.8

Intersection Summary	
HCM 2010 Ctrl Delay	51.5
HCM 2010 LOS	D

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	307	383	5	507	299
Future Volume (vph)	14	307	383	5	507	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.99		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1595		1859		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1595		1859		1770	1863
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	327	407	5	539	318
RTOR Reduction (vph)	286	0	1	0	0	0
Lane Group Flow (vph)	56	0	411	0	539	318
Confl. Peds. (#/hr)		3		3	3	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	8.3		20.1		25.4	49.5
Effective Green, g (s)	8.3		20.1		25.4	49.5
Actuated g/C Ratio	0.13		0.31		0.39	0.75
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	201		567		683	1401
v/s Ratio Prot	c0.04		c0.22		c0.30	0.17
v/s Ratio Perm						
v/c Ratio	0.28		0.73		0.79	0.23
Uniform Delay, d1	26.0		20.4		17.8	2.4
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.8		4.6		6.0	0.1
Delay (s)	26.8		25.0		23.9	2.5
Level of Service	C		C		C	A
Approach Delay (s)	26.8		25.0			16.0
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	157	437	10	30	285	200	10	230	80	310	130	131
Future Volume (veh/h)	157	437	10	30	285	200	10	230	80	310	130	131
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	160	446	3	31	291	175	10	235	0	316	133	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	204	793	664	45	367	220	16	392	178	388	387	0
Arrive On Green	0.11	0.43	0.43	0.03	0.34	0.34	0.11	0.11	0.00	0.22	0.22	0.00
Sat Flow, veh/h	1774	1863	1560	1774	1090	655	141	3484	1583	1774	1863	0
Grp Volume(v), veh/h	160	446	3	31	0	466	131	114	0	316	133	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1560	1774	0	1745	1856	1770	1583	1774	1770	0
Q Serve(g_s), s	6.4	13.3	0.1	1.3	0.0	17.8	5.0	4.5	0.0	12.4	4.7	0.0
Cycle Q Clear(g_c), s	6.4	13.3	0.1	1.3	0.0	17.8	5.0	4.5	0.0	12.4	4.7	0.0
Prop In Lane	1.00		1.00	1.00		0.38	0.08		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	204	793	664	45	0	587	209	199	178	388	387	0
V/C Ratio(X)	0.79	0.56	0.00	0.68	0.00	0.79	0.63	0.57	0.00	0.82	0.34	0.00
Avail Cap(c_a), veh/h	507	1191	998	145	0	760	480	457	409	531	530	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	31.6	15.9	12.1	35.5	0.0	22.1	31.2	30.9	0.0	27.3	24.3	0.0
Incr Delay (d2), s/veh	6.5	0.6	0.0	16.7	0.0	4.4	3.1	2.6	0.0	6.9	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	7.0	0.0	0.8	0.0	9.3	2.7	2.3	0.0	6.8	2.3	0.0
LnGrp Delay(d),s/veh	38.2	16.6	12.1	52.2	0.0	26.5	34.3	33.5	0.0	34.2	24.8	0.0
LnGrp LOS	D	B	B	D		C	C	C		C	C	
Approach Vol, veh/h		609			497			245			449	
Approach Delay, s/veh		22.2			28.1			33.9			31.4	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.3	5.9	35.3		20.1	12.4	28.7
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	6.0	47.0		22.0	21.0	32.0
Max Q Clear Time (g_c+I1), s		7.0	3.3	15.3		14.4	8.4	19.8
Green Ext Time (p_c), s		1.1	0.0	7.4		1.6	0.3	5.0

Intersection Summary	
HCM 2010 Ctrl Delay	27.7
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	96	40	554	195	407	20	470	247	706	990	180
Future Volume (veh/h)	50	96	40	554	195	407	20	470	247	706	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	99	0	571	201	0	21	485	0	728	1021	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	130	435	136	693	1267	394	37	851	0	844	2301	0
Arrive On Green	0.04	0.09	0.00	0.22	0.27	0.00	0.02	0.25	0.00	0.26	0.49	0.00
Sat Flow, veh/h	3191	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	99	0	571	201	0	21	485	0	728	1021	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	1.4	1.7	0.0	15.2	2.9	0.0	1.1	10.9	0.0	19.3	12.6	0.0
Cycle Q Clear(g_c), s	1.4	1.7	0.0	15.2	2.9	0.0	1.1	10.9	0.0	19.3	12.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	130	435	136	693	1267	394	37	851	0	844	2301	0
V/C Ratio(X)	0.40	0.23	0.00	0.82	0.16	0.00	0.57	0.57	0.00	0.86	0.44	0.00
Avail Cap(c_a), veh/h	1113	1909	595	1292	1909	595	563	1593	0	1113	2301	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.6	37.4	0.0	33.2	24.8	0.0	43.0	29.4	0.0	31.2	14.9	0.0
Incr Delay (d2), s/veh	2.0	0.3	0.0	2.6	0.1	0.0	13.2	0.6	0.0	5.6	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.8	0.0	6.9	1.3	0.0	0.6	3.5	0.0	9.2	5.4	0.0
LnGrp Delay(d),s/veh	43.6	37.7	0.0	35.7	24.9	0.0	56.2	30.0	0.0	36.8	15.0	0.0
LnGrp LOS	D	D		D	C		E	C		D	B	
Approach Vol, veh/h		151			772			506			1749	
Approach Delay, s/veh		39.7			32.9			31.1			24.1	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.5	25.9	23.3	12.2	6.0	47.4	7.6	27.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	21.3	12.9	17.2	3.7	3.1	14.6	3.4	4.9
Green Ext Time (p_c), s	2.2	8.6	2.1	2.3	0.0	13.3	0.1	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	28.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	439	202	440	30	396	286	103	50	255	160
Future Volume (veh/h)	180	260	439	202	440	30	396	286	103	50	255	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	134	220	478	25	430	311	79	54	277	76
Adj No. of Lanes	2	3	0	1	3	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	292	844	365	263	1524	79	541	948	236	81	626	168
Arrive On Green	0.08	0.25	0.25	0.15	0.31	0.31	0.16	0.34	0.34	0.05	0.23	0.23
Sat Flow, veh/h	3442	3442	1488	1774	4941	256	3442	2787	695	1774	2738	734
Grp Volume(v), veh/h	196	278	139	220	327	176	430	195	195	54	177	176
Grp Sat Flow(s),veh/h/ln	1721	1695	1540	1774	1695	1807	1721	1770	1713	1774	1770	1703
Q Serve(g_s), s	4.0	4.9	5.4	8.7	5.3	5.4	8.7	5.9	6.1	2.2	6.2	6.5
Cycle Q Clear(g_c), s	4.0	4.9	5.4	8.7	5.3	5.4	8.7	5.9	6.1	2.2	6.2	6.5
Prop In Lane	1.00		0.97	1.00		0.14	1.00		0.41	1.00		0.43
Lane Grp Cap(c), veh/h	292	831	377	263	1046	557	541	602	583	81	405	389
V/C Ratio(X)	0.67	0.33	0.37	0.84	0.31	0.32	0.80	0.32	0.33	0.67	0.44	0.45
Avail Cap(c_a), veh/h	522	1637	743	318	1730	922	712	1025	992	220	879	846
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	22.5	22.7	30.0	19.2	19.2	29.4	17.7	17.8	34.0	24.0	24.1
Incr Delay (d2), s/veh	2.7	0.2	0.6	15.0	0.2	0.3	4.7	0.3	0.3	9.0	0.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	2.3	2.4	5.4	2.5	2.7	4.5	2.9	2.9	1.3	3.1	3.1
LnGrp Delay(d),s/veh	34.8	22.7	23.3	45.0	19.3	19.5	34.1	18.1	18.1	43.1	24.7	24.9
LnGrp LOS	C	C	C	D	B	B	C	B	B	D	C	C
Approach Vol, veh/h		613			723			820			407	
Approach Delay, s/veh		26.7			27.2			26.5			27.2	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.3	28.7	14.8	21.8	15.4	20.6	10.2	26.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	42.0	13.0	35.0	15.0	36.0	11.0	37.0
Max Q Clear Time (g_c+I1), s	4.2	8.1	10.7	7.4	10.7	8.5	6.0	7.4
Green Ext Time (p_c), s	0.0	5.1	0.1	7.1	0.7	4.9	0.3	7.2

Intersection Summary	
HCM 2010 Ctrl Delay	26.9
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	373	655	212	211	37
Future Volume (veh/h)	31	373	655	212	211	37
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	37	449	789	0	254	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	62	2798	1964	0	341	304
Arrive On Green	0.04	0.55	0.39	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	37	449	789	0	254	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.6	1.4	3.5	0.0	4.2	0.0
Cycle Q Clear(g_c), s	0.6	1.4	3.5	0.0	4.2	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	62	2798	1964	0	341	304
V/C Ratio(X)	0.59	0.16	0.40	0.00	0.74	0.00
Avail Cap(c_a), veh/h	286	4256	2783	0	914	815
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.8	3.4	6.9	0.0	11.8	0.0
Incr Delay (d2), s/veh	8.7	0.0	0.1	0.0	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.6	1.6	0.0	2.4	0.0
LnGrp Delay(d),s/veh	23.4	3.5	7.1	0.0	15.1	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		486	789		254	
Approach Delay, s/veh		5.0	7.1		15.1	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		21.1		10.0	5.1	16.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		3.4		6.2	2.6	5.5		
Green Ext Time (p_c), s		9.3		0.5	0.0	6.3		

Intersection Summary	
HCM 2010 Ctrl Delay	7.7
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	168	595	207	143	740	300	177	301	139	270	479	118
Future Volume (veh/h)	168	595	207	143	740	300	177	301	139	270	479	118
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.86	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	205	726	18	174	902	0	216	367	0	329	584	135
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	234	890	344	201	825	369	200	563	478	363	577	133
Arrive On Green	0.13	0.25	0.25	0.11	0.23	0.00	0.11	0.30	0.00	0.20	0.39	0.39
Sat Flow, veh/h	1774	3539	1369	1774	3539	1583	1774	1863	1583	1774	1464	338
Grp Volume(v), veh/h	205	726	18	174	902	0	216	367	0	329	0	719
Grp Sat Flow(s),veh/h/ln	1774	1770	1369	1774	1770	1583	1774	1863	1583	1774	0	1802
Q Serve(g_s), s	14.1	24.0	1.2	12.0	29.0	0.0	14.0	21.3	0.0	22.5	0.0	49.0
Cycle Q Clear(g_c), s	14.1	24.0	1.2	12.0	29.0	0.0	14.0	21.3	0.0	22.5	0.0	49.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	234	890	344	201	825	369	200	563	478	363	0	710
V/C Ratio(X)	0.88	0.82	0.05	0.86	1.09	0.00	1.08	0.65	0.00	0.91	0.00	1.01
Avail Cap(c_a), veh/h	314	939	363	257	825	369	200	563	478	585	0	710
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	53.0	43.9	35.3	54.2	47.7	0.0	55.2	37.7	0.0	48.3	0.0	37.7
Incr Delay (d2), s/veh	18.8	5.4	0.1	20.9	59.7	0.0	87.1	5.8	0.0	11.9	0.0	37.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	12.4	0.5	7.1	20.9	0.0	11.7	11.8	0.0	12.3	0.0	31.6
LnGrp Delay(d),s/veh	71.8	49.3	35.4	75.1	107.4	0.0	142.3	43.5	0.0	60.2	0.0	74.7
LnGrp LOS	E	D	D	E	F		F	D		E		F
Approach Vol, veh/h		949			1076			583			1048	
Approach Delay, s/veh		53.9			102.2			80.1			70.2	
Approach LOS		D			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.4	41.6	18.1	35.3	18.0	53.0	20.4	33.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	41.0	22.0	18.0	33.0	14.0	49.0	22.0	29.0
Max Q Clear Time (g_c+I1), s	24.5	23.3	14.0	26.0	16.0	51.0	16.1	31.0
Green Ext Time (p_c), s	0.9	0.0	0.2	5.2	0.0	0.0	0.3	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	77.0
HCM 2010 LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	535	304	3	346	370
Future Volume (vph)	14	535	304	3	346	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.99		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1595		1860		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1595		1860		1770	1863
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	16	629	358	4	407	435
RTOR Reduction (vph)	516	0	1	0	0	0
Lane Group Flow (vph)	129	0	361	0	407	435
Confl. Peds. (#/hr)	1	1		1	1	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	9.0		13.8		15.1	32.9
Effective Green, g (s)	9.0		13.8		15.1	32.9
Actuated g/C Ratio	0.18		0.28		0.30	0.66
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	287		514		535	1228
v/s Ratio Prot	c0.08		c0.19		c0.23	0.23
v/s Ratio Perm						
v/c Ratio	0.45		0.70		0.76	0.35
Uniform Delay, d1	18.2		16.2		15.8	3.8
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.1		4.3		6.3	0.2
Delay (s)	19.4		20.5		22.1	4.0
Level of Service	B		C		C	A
Approach Delay (s)	19.4		20.5			12.7
Approach LOS	B		C			B

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	49.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	266	83	137	435	104	136
Future Vol, veh/h	266	83	137	435	104	136
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	296	92	152	483	116	151

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	395	0	1144	356
Stage 1	-	-	-	-	349	-
Stage 2	-	-	-	-	795	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1164	-	221	688
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	445	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1157	-	190	680
Mov Cap-2 Maneuver	-	-	-	-	302	-
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	384	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	24.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	441	-	-	1157	-
HCM Lane V/C Ratio	0.605	-	-	0.132	-
HCM Control Delay (s)	24.9	-	-	8.6	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	3.9	-	-	0.5	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	197	204	10	10	357	220	30	150	20	270	200	249
Future Volume (veh/h)	197	204	10	10	357	220	30	150	20	270	200	249
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	216	224	6	11	392	223	33	165	0	297	220	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	253	972	820	19	433	247	54	285	149	363	362	0
Arrive On Green	0.14	0.52	0.52	0.01	0.39	0.39	0.09	0.09	0.00	0.20	0.20	0.00
Sat Flow, veh/h	1774	1863	1571	1774	1112	633	571	3032	1583	1774	1863	0
Grp Volume(v), veh/h	216	224	6	11	0	615	106	92	0	297	220	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1571	1774	0	1745	1834	1770	1583	1774	1770	0
Q Serve(g_s), s	11.2	6.2	0.2	0.6	0.0	31.4	5.3	4.7	0.0	15.1	10.7	0.0
Cycle Q Clear(g_c), s	11.2	6.2	0.2	0.6	0.0	31.4	5.3	4.7	0.0	15.1	10.7	0.0
Prop In Lane	1.00		1.00	1.00		0.36	0.31		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	253	972	820	19	0	680	172	166	149	363	362	0
V/C Ratio(X)	0.85	0.23	0.01	0.58	0.00	0.90	0.62	0.55	0.00	0.82	0.61	0.00
Avail Cap(c_a), veh/h	356	1103	931	75	0	757	330	318	285	507	505	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	39.6	12.3	10.9	46.6	0.0	27.2	41.2	41.0	0.0	35.9	34.2	0.0
Incr Delay (d2), s/veh	13.2	0.1	0.0	25.5	0.0	13.5	3.5	2.9	0.0	7.2	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	3.2	0.1	0.4	0.0	17.6	2.8	2.4	0.0	8.2	5.4	0.0
LnGrp Delay(d),s/veh	52.7	12.4	10.9	72.1	0.0	40.7	44.7	43.8	0.0	43.1	35.8	0.0
LnGrp LOS	D	B	B	E		D	D	D		D	D	
Approach Vol, veh/h		446			626			198			517	
Approach Delay, s/veh		31.9			41.2			44.3			40.0	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.9	5.0	53.3		23.3	17.5	40.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	56.0		27.0	19.0	41.0
Max Q Clear Time (g_c+I1), s		7.3	2.6	8.2		17.1	13.2	33.4
Green Ext Time (p_c), s		0.7	0.0	7.5		2.2	0.3	3.4

Intersection Summary	
HCM 2010 Ctrl Delay	38.9
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	525	40	258	340	543	70	1210	574	528	320	300
Future Volume (veh/h)	220	525	40	258	340	543	70	1210	574	528	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	565	0	277	366	0	75	1301	0	568	344	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	182	1045	311	297	1213	378	93	1337	0	647	2206	0
Arrive On Green	0.06	0.22	0.00	0.09	0.26	0.00	0.06	0.37	0.00	0.20	0.51	0.00
Sat Flow, veh/h	3191	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	565	0	277	366	0	75	1301	0	568	344	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	8.0	14.8	0.0	12.1	8.7	0.0	6.3	49.4	0.0	24.2	5.9	0.0
Cycle Q Clear(g_c), s	8.0	14.8	0.0	12.1	8.7	0.0	6.3	49.4	0.0	24.2	5.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	182	1045	311	297	1213	378	93	1337	0	647	2206	0
V/C Ratio(X)	1.30	0.54	0.00	0.93	0.30	0.00	0.81	0.97	0.00	0.88	0.16	0.00
Avail Cap(c_a), veh/h	182	1045	311	297	1213	378	153	1337	0	1118	2206	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	66.0	48.2	0.0	63.0	41.8	0.0	65.2	43.5	0.0	54.1	17.9	0.0
Incr Delay (d2), s/veh	168.6	2.0	0.0	35.3	0.6	0.0	14.9	19.0	0.0	4.3	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	6.6	0.0	6.8	3.9	0.0	3.3	18.9	0.0	11.0	2.4	0.0
LnGrp Delay(d),s/veh	234.6	50.2	0.0	98.3	42.5	0.0	80.2	62.5	0.0	58.4	18.1	0.0
LnGrp LOS	F	D		F	D		F	E		E	B	
Approach Vol, veh/h		802			643			1376			912	
Approach Delay, s/veh		104.7			66.5			63.5			43.2	
Approach LOS		F			E			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	32.4	55.6	17.0	35.0	11.9	76.0	12.0	40.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	49.6	36.0	13.0	31.0	13.0	72.0	8.0	36.0
Max Q Clear Time (g_c+I1), s	26.2	51.4	14.1	16.8	8.3	7.9	10.0	10.7
Green Ext Time (p_c), s	2.2	0.0	0.0	5.7	0.1	21.4	0.0	7.5

Intersection Summary	
HCM 2010 Ctrl Delay	67.9
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	308	188	380	40	361	309	231	90	247	200
Future Volume (veh/h)	310	700	308	188	380	40	361	309	231	90	247	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	249	198	400	34	380	325	151	95	260	110
Adj No. of Lanes	2	3	0	1	3	0	2	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	419	1203	401	237	1592	133	478	711	322	122	568	233
Arrive On Green	0.12	0.32	0.32	0.13	0.33	0.33	0.14	0.30	0.30	0.07	0.23	0.23
Sat Flow, veh/h	3442	3742	1247	1774	4776	400	3442	2343	1063	1774	2433	998
Grp Volume(v), veh/h	326	667	319	198	282	152	380	243	233	95	187	183
Grp Sat Flow(s),veh/h/ln	1721	1695	1599	1774	1695	1786	1721	1770	1637	1774	1770	1662
Q Serve(g_s), s	8.5	15.4	15.7	10.1	5.6	5.7	9.9	10.3	10.7	4.9	8.4	8.8
Cycle Q Clear(g_c), s	8.5	15.4	15.7	10.1	5.6	5.7	9.9	10.3	10.7	4.9	8.4	8.8
Prop In Lane	1.00		0.78	1.00		0.22	1.00		0.65	1.00		0.60
Lane Grp Cap(c), veh/h	419	1090	514	237	1130	595	478	537	496	122	413	388
V/C Ratio(X)	0.78	0.61	0.62	0.84	0.25	0.25	0.80	0.45	0.47	0.78	0.45	0.47
Avail Cap(c_a), veh/h	706	1282	605	402	1355	714	781	860	796	249	707	664
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.4	26.5	26.6	39.1	22.4	22.5	38.6	26.1	26.2	42.4	30.4	30.6
Incr Delay (d2), s/veh	3.1	0.6	1.5	7.6	0.1	0.2	3.1	0.6	0.7	10.2	0.8	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	7.2	7.1	5.4	2.6	2.9	4.9	5.1	4.9	2.7	4.2	4.1
LnGrp Delay(d),s/veh	42.6	27.2	28.1	46.7	22.6	22.7	41.7	26.7	26.9	52.6	31.2	31.5
LnGrp LOS	D	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		1312			632			856			465	
Approach Delay, s/veh		31.2			30.2			33.4			35.7	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	32.1	16.4	33.8	16.8	25.6	15.3	34.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	13.6	45.0	21.0	35.0	21.0	37.0	19.0	37.0
Max Q Clear Time (g_c+I1), s	10.9	12.7	12.1	17.7	11.9	10.8	10.5	7.7
Green Ext Time (p_c), s	0.1	6.0	0.4	9.4	0.9	5.7	0.8	12.3

Intersection Summary	
HCM 2010 Ctrl Delay	32.2
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	962	506	171	232	42
Future Volume (veh/h)	49	962	506	171	232	42
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	53	1034	544	0	249	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	83	2865	1995	0	333	298
Arrive On Green	0.05	0.56	0.39	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	53	1034	544	0	249	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.9	3.6	2.3	0.0	4.3	0.0
Cycle Q Clear(g_c), s	0.9	3.6	2.3	0.0	4.3	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	83	2865	1995	0	333	298
V/C Ratio(X)	0.64	0.36	0.27	0.00	0.75	0.00
Avail Cap(c_a), veh/h	276	4108	2686	0	882	787
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	15.1	3.8	6.7	0.0	12.3	0.0
Incr Delay (d2), s/veh	7.8	0.1	0.1	0.0	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.6	1.1	0.0	2.4	0.0
LnGrp Delay(d),s/veh	22.9	3.9	6.7	0.0	15.7	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		1087	544		249	
Approach Delay, s/veh		4.9	6.7		15.7	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		22.1		10.0	5.5	16.6		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		5.6		6.3	2.9	4.3		
Green Ext Time (p_c), s		11.4		0.5	0.0	8.3		

Intersection Summary	
HCM 2010 Ctrl Delay	6.8
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	955	199	127	600	200	138	434	152	200	334	191
Future Volume (veh/h)	178	955	199	127	600	200	138	434	152	200	334	191
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	200	1073	64	143	674	0	155	488	0	225	375	199
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	231	1076	480	172	957	428	182	599	509	247	410	218
Arrive On Green	0.13	0.30	0.30	0.10	0.27	0.00	0.10	0.32	0.00	0.14	0.36	0.36
Sat Flow, veh/h	1774	3539	1578	1774	3539	1583	1774	1863	1583	1774	1146	608
Grp Volume(v), veh/h	200	1073	64	143	674	0	155	488	0	225	0	574
Grp Sat Flow(s),veh/h/ln	1774	1770	1578	1774	1770	1583	1774	1863	1583	1774	0	1755
Q Serve(g_s), s	12.7	34.9	3.4	9.1	19.8	0.0	9.9	27.7	0.0	14.4	0.0	36.0
Cycle Q Clear(g_c), s	12.7	34.9	3.4	9.1	19.8	0.0	9.9	27.7	0.0	14.4	0.0	36.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.35
Lane Grp Cap(c), veh/h	231	1076	480	172	957	428	182	599	509	247	0	628
V/C Ratio(X)	0.86	1.00	0.13	0.83	0.70	0.00	0.85	0.82	0.00	0.91	0.00	0.91
Avail Cap(c_a), veh/h	339	1076	480	247	957	428	185	599	509	247	0	628
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	49.1	40.0	29.1	51.1	37.9	0.0	50.8	35.9	0.0	48.9	0.0	35.3
Incr Delay (d2), s/veh	14.4	26.8	0.1	14.9	2.4	0.0	29.4	11.6	0.0	34.9	0.0	20.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	21.0	1.5	5.2	10.0	0.0	6.4	16.2	0.0	9.5	0.0	20.9
LnGrp Delay(d),s/veh	63.5	66.8	29.2	66.0	40.2	0.0	80.2	47.6	0.0	83.8	0.0	55.4
LnGrp LOS	E	E	C	E	D		F	D		F		E
Approach Vol, veh/h		1337			817			643			799	
Approach Delay, s/veh		64.5			44.7			55.4			63.4	
Approach LOS		E			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	41.0	15.1	39.0	15.8	45.2	19.0	35.1
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	37.0	16.0	35.0	12.0	41.0	22.0	29.0
Max Q Clear Time (g_c+I1), s	16.4	29.7	11.1	36.9	11.9	38.0	14.7	21.8
Green Ext Time (p_c), s	0.0	3.9	0.1	0.0	0.0	1.9	0.3	5.7

Intersection Summary	
HCM 2010 Ctrl Delay	58.1
HCM 2010 LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	372	392	5	597	309
Future Volume (vph)	14	372	392	5	597	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.98		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1593		1859		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1593		1859		1770	1863
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	396	417	5	635	329
RTOR Reduction (vph)	349	0	1	0	0	0
Lane Group Flow (vph)	62	0	421	0	635	329
Confl. Peds. (#/hr)		3		3	3	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	8.6		21.3		30.6	55.9
Effective Green, g (s)	8.6		21.3		30.6	55.9
Actuated g/C Ratio	0.12		0.29		0.42	0.77
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	188		546		747	1436
v/s Ratio Prot	c0.04		c0.23		c0.36	0.18
v/s Ratio Perm						
v/c Ratio	0.33		0.77		0.85	0.23
Uniform Delay, d1	29.3		23.4		18.9	2.3
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.0		6.7		9.1	0.1
Delay (s)	30.3		30.1		28.0	2.4
Level of Service	C		C		C	A
Approach Delay (s)	30.3		30.1			19.3
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	72.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	539	73	113	311	66	131
Future Vol, veh/h	539	73	113	311	66	131
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	580	78	122	334	71	141

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	664	0	1208	631
Stage 1	-	-	-	-	625	-
Stage 2	-	-	-	-	583	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	925	-	202	481
Stage 1	-	-	-	-	534	-
Stage 2	-	-	-	-	558	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	920	-	173	476
Mov Cap-2 Maneuver	-	-	-	-	309	-
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	482	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	23.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	403	-	-	920	-
HCM Lane V/C Ratio	0.526	-	-	0.132	-
HCM Control Delay (s)	23.4	-	-	9.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	3	-	-	0.5	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	223	462	10	30	314	200	10	230	80	310	130	210
Future Volume (veh/h)	223	462	10	30	314	200	10	230	80	310	130	210
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	228	471	3	31	320	175	10	235	0	316	133	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	272	864	724	44	379	207	15	374	170	375	374	0
Arrive On Green	0.15	0.46	0.46	0.02	0.34	0.34	0.11	0.11	0.00	0.21	0.21	0.00
Sat Flow, veh/h	1774	1863	1561	1774	1132	619	141	3484	1583	1774	1863	0
Grp Volume(v), veh/h	228	471	3	31	0	495	131	114	0	316	133	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1561	1774	0	1751	1856	1770	1583	1774	1770	0
Q Serve(g_s), s	10.4	15.0	0.1	1.4	0.0	21.7	5.6	5.1	0.0	14.2	5.3	0.0
Cycle Q Clear(g_c), s	10.4	15.0	0.1	1.4	0.0	21.7	5.6	5.1	0.0	14.2	5.3	0.0
Prop In Lane	1.00		1.00	1.00		0.35	0.08		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	272	864	724	44	0	587	199	190	170	375	374	0
V/C Ratio(X)	0.84	0.55	0.00	0.71	0.00	0.84	0.66	0.60	0.00	0.84	0.36	0.00
Avail Cap(c_a), veh/h	449	1056	884	128	0	676	425	405	363	471	469	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.1	16.0	11.9	40.1	0.0	25.6	35.5	35.3	0.0	31.4	27.9	0.0
Incr Delay (d2), s/veh	7.1	0.5	0.0	19.0	0.0	8.6	3.7	3.0	0.0	10.9	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	7.8	0.0	0.9	0.0	11.8	3.1	2.7	0.0	8.1	2.6	0.0
LnGrp Delay(d),s/veh	41.2	16.5	11.9	59.2	0.0	34.1	39.2	38.3	0.0	42.2	28.5	0.0
LnGrp LOS	D	B	B	E		C	D	D		D	C	
Approach Vol, veh/h		702			526			245			449	
Approach Delay, s/veh		24.5			35.6			38.8			38.2	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.9	6.0	42.5		21.5	16.7	31.8
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	6.0	47.0		22.0	21.0	32.0
Max Q Clear Time (g_c+I1), s		7.6	3.4	17.0		16.2	12.4	23.7
Green Ext Time (p_c), s		1.0	0.0	7.9		1.3	0.4	4.1

Intersection Summary	
HCM 2010 Ctrl Delay	32.6
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	98	40	573	201	418	20	470	253	717	990	180
Future Volume (veh/h)	50	98	40	573	201	418	20	470	253	717	990	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1727	1727	1727	1727	1696	1439	1900	1727	1727	1900
Adj Flow Rate, veh/h	52	101	0	591	207	0	21	485	0	739	1021	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10	10	10	10	12	32	32	10	10	10
Cap, veh/h	129	438	137	712	1300	405	37	827	0	852	2281	0
Arrive On Green	0.04	0.09	0.00	0.22	0.28	0.00	0.02	0.24	0.00	0.27	0.48	0.00
Sat Flow, veh/h	3191	4715	1468	3191	4715	1468	1616	3742	0	3191	4871	0
Grp Volume(v), veh/h	52	101	0	591	207	0	21	485	0	739	1021	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1468	1596	1572	1468	1616	1152	0	1596	1572	0
Q Serve(g_s), s	1.4	1.8	0.0	15.9	3.0	0.0	1.2	11.2	0.0	19.9	12.9	0.0
Cycle Q Clear(g_c), s	1.4	1.8	0.0	15.9	3.0	0.0	1.2	11.2	0.0	19.9	12.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	129	438	137	712	1300	405	37	827	0	852	2281	0
V/C Ratio(X)	0.40	0.23	0.00	0.83	0.16	0.00	0.57	0.59	0.00	0.87	0.45	0.00
Avail Cap(c_a), veh/h	1098	1883	586	1275	1883	586	556	1571	0	1098	2281	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.2	37.9	0.0	33.4	24.7	0.0	43.6	30.3	0.0	31.5	15.3	0.0
Incr Delay (d2), s/veh	2.0	0.3	0.0	2.6	0.1	0.0	13.3	0.7	0.0	6.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.8	0.0	7.2	1.3	0.0	0.7	3.6	0.0	9.4	5.6	0.0
LnGrp Delay(d),s/veh	44.2	38.2	0.0	36.0	24.8	0.0	56.9	31.0	0.0	37.6	15.5	0.0
LnGrp LOS	D	D		D	C		E	C		D	B	
Approach Vol, veh/h		153			798			506			1760	
Approach Delay, s/veh		40.2			33.1			32.1			24.8	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.1	25.6	24.1	12.4	6.0	47.6	7.6	28.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	31.0	41.0	36.0	36.0	31.0	41.0	31.0	36.0
Max Q Clear Time (g_c+I1), s	21.9	13.2	17.9	3.8	3.2	14.9	3.4	5.0
Green Ext Time (p_c), s	2.2	8.0	2.2	2.3	0.0	13.2	0.1	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	28.7
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	260	458	205	440	30	432	300	105	50	260	160
Future Volume (veh/h)	180	260	458	205	440	30	432	300	105	50	260	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	196	283	155	223	478	25	470	326	81	54	283	76
Adj No. of Lanes	2	3	0	1	3	0	2	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	288	841	380	264	1548	80	570	974	238	79	624	164
Arrive On Green	0.08	0.25	0.25	0.15	0.31	0.31	0.17	0.35	0.35	0.04	0.23	0.23
Sat Flow, veh/h	3442	3390	1531	1774	4941	256	3442	2801	684	1774	2752	723
Grp Volume(v), veh/h	196	283	155	223	327	176	470	204	203	54	180	179
Grp Sat Flow(s),veh/h/ln	1721	1695	1531	1774	1695	1807	1721	1770	1716	1774	1770	1705
Q Serve(g_s), s	4.2	5.2	6.4	9.3	5.6	5.6	10.0	6.5	6.7	2.3	6.6	6.9
Cycle Q Clear(g_c), s	4.2	5.2	6.4	9.3	5.6	5.6	10.0	6.5	6.7	2.3	6.6	6.9
Prop In Lane	1.00		1.00	1.00		0.14	1.00		0.40	1.00		0.42
Lane Grp Cap(c), veh/h	288	841	380	264	1062	566	570	615	597	79	401	387
V/C Ratio(X)	0.68	0.34	0.41	0.84	0.31	0.31	0.82	0.33	0.34	0.68	0.45	0.46
Avail Cap(c_a), veh/h	498	1561	705	303	1650	880	679	978	948	210	838	808
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.8	23.4	23.9	31.5	19.8	19.9	30.6	18.3	18.3	35.8	25.3	25.4
Incr Delay (d2), s/veh	2.8	0.2	0.7	17.4	0.2	0.3	7.0	0.3	0.3	9.8	0.8	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	2.5	2.8	5.8	2.6	2.8	5.3	3.2	3.2	1.3	3.3	3.3
LnGrp Delay(d),s/veh	36.6	23.7	24.6	48.8	20.0	20.2	37.7	18.6	18.7	45.5	26.1	26.3
LnGrp LOS	D	C	C	D	B	C	D	B	B	D	C	C
Approach Vol, veh/h		634			726			877			413	
Approach Delay, s/veh		27.9			28.9			28.8			28.7	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.4	30.4	15.3	22.9	16.6	21.2	10.4	27.8
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	9.0	42.0	13.0	35.0	15.0	36.0	11.0	37.0
Max Q Clear Time (g_c+I1), s	4.3	8.7	11.3	8.4	12.0	8.9	6.2	7.6
Green Ext Time (p_c), s	0.0	5.3	0.1	7.2	0.6	5.1	0.3	7.4

Intersection Summary	
HCM 2010 Ctrl Delay	28.6
HCM 2010 LOS	C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	31	374	658	214	212	37
Future Volume (veh/h)	31	374	658	214	212	37
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	37	451	793	0	255	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	62	2798	1966	0	342	305
Arrive On Green	0.04	0.55	0.39	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	37	451	793	0	255	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	0.6	1.4	3.5	0.0	4.2	0.0
Cycle Q Clear(g_c), s	0.6	1.4	3.5	0.0	4.2	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	62	2798	1966	0	342	305
V/C Ratio(X)	0.59	0.16	0.40	0.00	0.75	0.00
Avail Cap(c_a), veh/h	285	4245	2775	0	911	813
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	14.8	3.5	6.9	0.0	11.8	0.0
Incr Delay (d2), s/veh	8.7	0.0	0.1	0.0	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.6	1.6	0.0	2.4	0.0
LnGrp Delay(d),s/veh	23.5	3.5	7.1	0.0	15.1	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		488	793		255	
Approach Delay, s/veh		5.0	7.1		15.1	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		21.1		10.0	5.1	16.0		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		3.4		6.2	2.6	5.5		
Green Ext Time (p_c), s		9.4		0.5	0.0	6.3		

Intersection Summary	
HCM 2010 Ctrl Delay	7.7
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	169	595	211	161	740	300	181	346	165	270	495	121
Future Volume (veh/h)	169	595	211	161	740	300	181	346	165	270	495	121
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.86	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	206	726	23	196	902	0	221	422	0	329	604	139
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	234	863	332	223	840	376	198	556	473	362	573	132
Arrive On Green	0.13	0.24	0.24	0.13	0.24	0.00	0.11	0.30	0.00	0.20	0.39	0.39
Sat Flow, veh/h	1774	3539	1363	1774	3539	1583	1774	1863	1583	1774	1465	337
Grp Volume(v), veh/h	206	726	23	196	902	0	221	422	0	329	0	743
Grp Sat Flow(s),veh/h/ln	1774	1770	1363	1774	1770	1583	1774	1863	1583	1774	0	1802
Q Serve(g_s), s	14.3	24.4	1.6	13.6	29.7	0.0	14.0	25.7	0.0	22.7	0.0	49.0
Cycle Q Clear(g_c), s	14.3	24.4	1.6	13.6	29.7	0.0	14.0	25.7	0.0	22.7	0.0	49.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	234	863	332	223	840	376	198	556	473	362	0	705
V/C Ratio(X)	0.88	0.84	0.07	0.88	1.07	0.00	1.11	0.76	0.00	0.91	0.00	1.05
Avail Cap(c_a), veh/h	312	932	359	255	840	376	198	556	473	581	0	705
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	53.4	45.0	36.4	53.9	47.8	0.0	55.6	39.8	0.0	48.7	0.0	38.1
Incr Delay (d2), s/veh	19.3	6.6	0.1	25.7	53.0	0.0	98.0	9.4	0.0	12.1	0.0	49.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	12.8	0.6	8.3	20.6	0.0	12.2	14.7	0.0	12.4	0.0	33.9
LnGrp Delay(d),s/veh	72.7	51.7	36.5	79.6	100.8	0.0	153.6	49.2	0.0	60.8	0.0	87.1
LnGrp LOS	E	D	D	E	F		F	D		E		F
Approach Vol, veh/h		955			1098			643			1072	
Approach Delay, s/veh		55.8			97.0			85.1			79.1	
Approach LOS		E			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.6	41.4	19.7	34.5	18.0	53.0	20.5	33.7
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	41.6	22.0	18.0	33.0	14.0	49.0	22.0	29.0
Max Q Clear Time (g_c+I1), s	24.7	27.7	15.6	26.4	16.0	51.0	16.3	31.7
Green Ext Time (p_c), s	0.9	0.0	0.1	4.1	0.0	0.0	0.3	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	79.4
HCM 2010 LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	572	318	3	364	381
Future Volume (vph)	14	572	318	3	364	381
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.99		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1595		1860		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1595		1860		1770	1863
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	16	673	374	4	428	448
RTOR Reduction (vph)	506	0	1	0	0	0
Lane Group Flow (vph)	183	0	377	0	428	448
Confl. Peds. (#/hr)	1	1		1	1	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	10.4		14.3		15.6	33.9
Effective Green, g (s)	10.4		14.3		15.6	33.9
Actuated g/C Ratio	0.20		0.27		0.30	0.65
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	317		508		527	1207
v/s Ratio Prot	c0.12		c0.20		c0.24	0.24
v/s Ratio Perm						
v/c Ratio	0.58		0.74		0.81	0.37
Uniform Delay, d1	19.0		17.3		17.0	4.3
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	2.6		5.8		9.3	0.2
Delay (s)	21.5		23.1		26.3	4.5
Level of Service	C		C		C	A
Approach Delay (s)	21.5		23.1			15.1
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	284	83	135	472	104	135
Future Vol, veh/h	284	83	135	472	104	135
Conflicting Peds, #/hr	0	7	7	0	7	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	316	92	150	524	116	150

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	415	0	1200	376
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	831	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1144	-	204	670
Stage 1	-	-	-	-	699	-
Stage 2	-	-	-	-	428	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1137	-	175	662
Mov Cap-2 Maneuver	-	-	-	-	289	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	369	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	26.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	424	-	-	1137	-
HCM Lane V/C Ratio	0.626	-	-	0.132	-
HCM Control Delay (s)	26.7	-	-	8.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	4.2	-	-	0.5	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	217	10	13	367	220	30	157	24	270	206	282
Future Volume (veh/h)	265	217	10	13	367	220	30	157	24	270	206	282
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	291	238	6	14	403	223	33	173	0	297	226	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	319	1013	855	23	424	234	51	282	146	353	352	0
Arrive On Green	0.18	0.54	0.54	0.01	0.38	0.38	0.09	0.09	0.00	0.20	0.20	0.00
Sat Flow, veh/h	1774	1863	1572	1774	1125	622	550	3055	1583	1774	1863	0
Grp Volume(v), veh/h	291	238	6	14	0	626	110	96	0	297	226	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1572	1774	0	1747	1835	1770	1583	1774	1770	0
Q Serve(g_s), s	16.9	7.0	0.2	0.8	0.0	36.6	6.1	5.5	0.0	16.9	12.3	0.0
Cycle Q Clear(g_c), s	16.9	7.0	0.2	0.8	0.0	36.6	6.1	5.5	0.0	16.9	12.3	0.0
Prop In Lane	1.00		1.00	1.00		0.36	0.30		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	319	1013	855	23	0	658	169	163	146	353	352	0
V/C Ratio(X)	0.91	0.23	0.01	0.62	0.00	0.95	0.65	0.59	0.00	0.84	0.64	0.00
Avail Cap(c_a), veh/h	321	1013	855	67	0	681	297	286	256	456	454	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.3	12.5	11.0	51.6	0.0	31.8	46.1	45.8	0.0	40.5	38.7	0.0
Incr Delay (d2), s/veh	28.8	0.1	0.0	24.3	0.0	22.9	4.2	3.3	0.0	10.7	2.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.9	3.6	0.1	0.6	0.0	21.7	3.3	2.8	0.0	9.4	6.2	0.0
LnGrp Delay(d),s/veh	71.1	12.7	11.0	76.0	0.0	54.7	50.3	49.1	0.0	51.2	40.6	0.0
LnGrp LOS	E	B	B	E		D	D	D		D	D	
Approach Vol, veh/h		535			640			206			523	
Approach Delay, s/veh		44.4			55.2			49.7			46.6	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		13.7	5.3	61.2		24.9	22.9	43.6
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	56.0		27.0	19.0	41.0
Max Q Clear Time (g_c+I1), s		8.1	2.8	9.0		18.9	18.9	38.6
Green Ext Time (p_c), s		0.7	0.0	7.8		2.0	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.2
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	533	40	271	345	589	70	1210	594	572	320	300
Future Volume (veh/h)	220	533	40	271	345	589	70	1210	594	572	320	300
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1727	1652	1727	1727	1727	1727	1727	1900	1727	1570	1900
Adj Flow Rate, veh/h	237	573	0	291	371	0	75	1301	0	615	344	0
Adj No. of Lanes	2	3	1	2	3	1	1	3	0	2	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	10	10	15	10	10	10	10	10	10	10	21	21
Cap, veh/h	182	1045	311	297	1213	378	93	1281	0	695	2206	0
Arrive On Green	0.06	0.22	0.00	0.09	0.26	0.00	0.06	0.35	0.00	0.22	0.51	0.00
Sat Flow, veh/h	3191	4715	1404	3191	4715	1468	1645	4145	0	3191	4428	0
Grp Volume(v), veh/h	237	573	0	291	371	0	75	1301	0	615	344	0
Grp Sat Flow(s),veh/h/ln	1596	1572	1404	1596	1572	1468	1645	1209	0	1596	1429	0
Q Serve(g_s), s	8.0	15.1	0.0	12.7	8.9	0.0	6.3	49.4	0.0	26.1	5.9	0.0
Cycle Q Clear(g_c), s	8.0	15.1	0.0	12.7	8.9	0.0	6.3	49.4	0.0	26.1	5.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	182	1045	311	297	1213	378	93	1281	0	695	2206	0
V/C Ratio(X)	1.30	0.55	0.00	0.98	0.31	0.00	0.81	1.02	0.00	0.88	0.16	0.00
Avail Cap(c_a), veh/h	182	1045	311	297	1213	378	153	1281	0	1118	2206	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	66.0	48.3	0.0	63.3	41.9	0.0	65.2	45.2	0.0	53.0	17.9	0.0
Incr Delay (d2), s/veh	168.6	2.1	0.0	47.0	0.7	0.0	14.9	29.0	0.0	5.3	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	6.7	0.0	7.5	3.9	0.0	3.3	19.8	0.0	12.0	2.4	0.0
LnGrp Delay(d),s/veh	234.6	50.3	0.0	110.3	42.5	0.0	80.2	74.3	0.0	58.3	18.1	0.0
LnGrp LOS	F	D		F	D		F	F		E	B	
Approach Vol, veh/h		810			662			1376			959	
Approach Delay, s/veh		104.2			72.3			74.6			43.9	
Approach LOS		F			E			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	34.5	53.4	17.0	35.0	11.9	76.0	12.0	40.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	49.6	36.0	13.0	31.0	13.0	72.0	8.0	36.0
Max Q Clear Time (g_c+I1), s	29.1	51.4	14.7	17.1	8.3	7.9	10.0	10.9
Green Ext Time (p_c), s	2.4	0.0	0.0	5.7	0.1	21.4	0.0	7.6

Intersection Summary	
HCM 2010 Ctrl Delay	72.8
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	310	700	378	193	380	40	424	325	237	90	267	200
Future Volume (veh/h)	310	700	378	193	380	40	424	325	237	90	267	200
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	326	737	323	203	400	34	446	342	157	95	281	110
Adj No. of Lanes	2	3	0	1	3	0	2	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	412	1092	473	239	1587	133	535	749	337	121	577	220
Arrive On Green	0.12	0.32	0.32	0.13	0.33	0.33	0.16	0.32	0.32	0.07	0.23	0.23
Sat Flow, veh/h	3442	3446	1491	1774	4776	400	3442	2352	1057	1774	2491	950
Grp Volume(v), veh/h	326	725	335	203	282	152	446	255	244	95	197	194
Grp Sat Flow(s),veh/h/ln	1721	1695	1547	1774	1695	1786	1721	1770	1639	1774	1770	1672
Q Serve(g_s), s	9.1	18.4	18.7	11.1	6.0	6.2	12.5	11.4	11.8	5.2	9.6	10.0
Cycle Q Clear(g_c), s	9.1	18.4	18.7	11.1	6.0	6.2	12.5	11.4	11.8	5.2	9.6	10.0
Prop In Lane	1.00		0.96	1.00		0.22	1.00		0.64	1.00		0.57
Lane Grp Cap(c), veh/h	412	1075	490	239	1126	593	535	564	522	121	410	387
V/C Ratio(X)	0.79	0.67	0.68	0.85	0.25	0.26	0.83	0.45	0.47	0.78	0.48	0.50
Avail Cap(c_a), veh/h	659	1196	546	375	1264	666	728	803	743	232	660	623
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	29.4	29.5	41.9	24.1	24.2	40.7	26.9	27.1	45.5	33.0	33.1
Incr Delay (d2), s/veh	3.5	1.3	3.1	10.2	0.1	0.2	6.1	0.6	0.6	10.5	0.9	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	8.8	8.4	6.1	2.8	3.1	6.4	5.6	5.4	2.9	4.8	4.7
LnGrp Delay(d),s/veh	45.9	30.8	32.6	52.2	24.2	24.4	46.8	27.5	27.7	56.0	33.9	34.1
LnGrp LOS	D	C	C	D	C	C	D	C	C	E	C	C
Approach Vol, veh/h		1386			637			945			486	
Approach Delay, s/veh		34.8			33.2			36.6			38.3	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.8	35.6	17.4	35.4	19.4	27.0	15.9	37.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	13.0	45.0	21.0	35.0	21.0	37.0	19.0	37.0
Max Q Clear Time (g_c+I1), s	11.2	13.8	13.1	20.7	14.5	12.0	11.1	8.2
Green Ext Time (p_c), s	0.1	6.3	0.3	8.7	0.9	6.0	0.7	13.2

Intersection Summary	
HCM 2010 Ctrl Delay	35.5
HCM 2010 LOS	D

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	49	968	511	175	236	42
Future Volume (veh/h)	49	968	511	175	236	42
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	53	1041	549	0	254	0
Adj No. of Lanes	1	3	3	0	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	83	2857	1992	0	339	303
Arrive On Green	0.05	0.56	0.39	0.00	0.19	0.00
Sat Flow, veh/h	1774	5253	5421	0	1774	1583
Grp Volume(v), veh/h	53	1041	549	0	254	0
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	0	1774	1583
Q Serve(g_s), s	1.0	3.7	2.4	0.0	4.4	0.0
Cycle Q Clear(g_c), s	1.0	3.7	2.4	0.0	4.4	0.0
Prop In Lane	1.00			0.00	1.00	1.00
Lane Grp Cap(c), veh/h	83	2857	1992	0	339	303
V/C Ratio(X)	0.64	0.36	0.28	0.00	0.75	0.00
Avail Cap(c_a), veh/h	274	4079	2667	0	876	781
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	15.2	3.9	6.7	0.0	12.4	0.0
Incr Delay (d2), s/veh	7.9	0.1	0.1	0.0	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.7	1.1	0.0	2.4	0.0
LnGrp Delay(d),s/veh	23.0	4.0	6.8	0.0	15.7	0.0
LnGrp LOS	C	A	A		B	
Approach Vol, veh/h		1094	549		254	
Approach Delay, s/veh		4.9	6.8		15.7	
Approach LOS		A	A		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		22.2		10.2	5.5	16.7		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		26.0		16.0	5.0	17.0		
Max Q Clear Time (g_c+I1), s		5.7		6.4	3.0	4.4		
Green Ext Time (p_c), s		11.5		0.5	0.0	8.3		

Intersection Summary	
HCM 2010 Ctrl Delay	6.9
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	955	215	200	600	200	155	481	223	200	396	192
Future Volume (veh/h)	180	955	215	200	600	200	155	481	223	200	396	192
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	202	1073	82	225	674	0	174	540	0	225	445	200
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	232	1032	460	237	1042	466	177	574	488	237	416	187
Arrive On Green	0.13	0.29	0.29	0.13	0.29	0.00	0.10	0.31	0.00	0.13	0.34	0.34
Sat Flow, veh/h	1774	3539	1578	1774	3539	1583	1774	1863	1583	1774	1218	547
Grp Volume(v), veh/h	202	1073	82	225	674	0	174	540	0	225	0	645
Grp Sat Flow(s),veh/h/ln	1774	1770	1578	1774	1770	1583	1774	1863	1583	1774	0	1766
Q Serve(g_s), s	13.4	35.0	4.7	15.1	19.9	0.0	11.7	33.9	0.0	15.1	0.0	41.0
Cycle Q Clear(g_c), s	13.4	35.0	4.7	15.1	19.9	0.0	11.7	33.9	0.0	15.1	0.0	41.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	232	1032	460	237	1042	466	177	574	488	237	0	603
V/C Ratio(X)	0.87	1.04	0.18	0.95	0.65	0.00	0.98	0.94	0.00	0.95	0.00	1.07
Avail Cap(c_a), veh/h	325	1032	460	237	1042	466	177	574	488	237	0	603
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.2	42.5	31.8	51.6	36.9	0.0	53.9	40.4	0.0	51.6	0.0	39.5
Incr Delay (d2), s/veh	16.6	38.8	0.2	45.0	1.4	0.0	61.7	25.4	0.0	45.0	0.0	56.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	22.6	2.1	10.3	9.9	0.0	8.8	21.4	0.0	10.3	0.0	29.4
LnGrp Delay(d),s/veh	67.8	81.3	31.9	96.6	38.3	0.0	115.6	65.8	0.0	96.6	0.0	96.0
LnGrp LOS	E	F	C	F	D		F	E		F		F
Approach Vol, veh/h		1357			899			714			870	
Approach Delay, s/veh		76.3			52.9			77.9			96.2	
Approach LOS		E			D			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	41.0	20.0	39.0	16.0	45.0	19.7	39.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	16.0	37.0	16.0	35.0	12.0	41.0	22.0	29.0
Max Q Clear Time (g_c+I1), s	17.1	35.9	17.1	37.0	13.7	43.0	15.4	21.9
Green Ext Time (p_c), s	0.0	0.8	0.0	0.0	0.0	0.0	0.3	5.6

Intersection Summary	
HCM 2010 Ctrl Delay	75.6
HCM 2010 LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	426	422	5	660	341
Future Volume (vph)	14	426	422	5	660	341
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		1.00		1.00	1.00
Frpb, ped/bikes	0.98		1.00		1.00	1.00
Flpb, ped/bikes	1.00		1.00		1.00	1.00
Frt	0.87		1.00		1.00	1.00
Flt Protected	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1591		1859		1770	1863
Flt Permitted	1.00		1.00		0.95	1.00
Satd. Flow (perm)	1591		1859		1770	1863
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	15	453	449	5	702	363
RTOR Reduction (vph)	403	0	1	0	0	0
Lane Group Flow (vph)	65	0	453	0	702	363
Confl. Peds. (#/hr)		3		3	3	
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	8.8		22.9		35.3	62.2
Effective Green, g (s)	8.8		22.9		35.3	62.2
Actuated g/C Ratio	0.11		0.29		0.45	0.79
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	177		538		790	1466
v/s Ratio Prot	c0.04		c0.24		c0.40	0.19
v/s Ratio Perm						
v/c Ratio	0.37		0.84		0.89	0.25
Uniform Delay, d1	32.5		26.4		20.0	2.2
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.3		11.5		11.9	0.1
Delay (s)	33.8		37.8		31.9	2.3
Level of Service	C		D		C	A
Approach Delay (s)	33.8		37.8			21.8
Approach LOS	C		D			C

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	79.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	602	73	111	365	66	128
Future Vol, veh/h	602	73	111	365	66	128
Conflicting Peds, #/hr	0	6	6	0	6	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	647	78	119	392	71	138

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	732	0	1330	699
Stage 1	-	-	-	-	693	-
Stage 2	-	-	-	-	637	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	873	-	171	440
Stage 1	-	-	-	-	496	-
Stage 2	-	-	-	-	527	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	869	-	146	436
Mov Cap-2 Maneuver	-	-	-	-	282	-
Stage 1	-	-	-	-	494	-
Stage 2	-	-	-	-	453	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	26.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	368	-	-	869	-
HCM Lane V/C Ratio	0.567	-	-	0.137	-
HCM Control Delay (s)	26.8	-	-	9.8	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	3.4	-	-	0.5	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	337	498	10	42	351	200	10	252	92	310	152	339
Future Volume (veh/h)	337	498	10	42	351	200	10	252	92	310	152	339
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	344	508	3	43	358	175	10	257	0	316	155	0
Adj No. of Lanes	1	1	1	1	1	0	0	2	1	0	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	373	929	778	55	377	184	14	376	170	357	356	0
Arrive On Green	0.21	0.50	0.50	0.03	0.32	0.32	0.11	0.11	0.00	0.20	0.20	0.00
Sat Flow, veh/h	1774	1863	1561	1774	1181	577	130	3496	1583	1774	1863	0
Grp Volume(v), veh/h	344	508	3	43	0	533	143	124	0	316	155	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1561	1774	0	1759	1856	1770	1583	1774	1770	0
Q Serve(g_s), s	18.8	18.6	0.1	2.4	0.0	29.3	7.4	6.6	0.0	17.1	7.6	0.0
Cycle Q Clear(g_c), s	18.8	18.6	0.1	2.4	0.0	29.3	7.4	6.6	0.0	17.1	7.6	0.0
Prop In Lane	1.00		1.00	1.00		0.33	0.07		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	373	929	778	55	0	561	199	190	170	357	356	0
V/C Ratio(X)	0.92	0.55	0.00	0.79	0.00	0.95	0.72	0.65	0.00	0.88	0.43	0.00
Avail Cap(c_a), veh/h	377	929	778	108	0	569	357	340	304	395	394	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	38.2	17.1	12.5	47.6	0.0	32.9	42.7	42.4	0.0	38.4	34.6	0.0
Incr Delay (d2), s/veh	27.5	0.7	0.0	21.6	0.0	25.7	4.8	3.7	0.0	19.3	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.0	9.6	0.0	1.5	0.0	18.2	4.0	3.4	0.0	10.3	3.8	0.0
LnGrp Delay(d),s/veh	65.7	17.8	12.5	69.2	0.0	58.6	47.4	46.1	0.0	57.7	35.4	0.0
LnGrp LOS	E	B	B	E		E	D	D		E	D	
Approach Vol, veh/h		855			576			267			471	
Approach Delay, s/veh		37.0			59.4			46.8			50.4	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.6	7.0	53.3		23.9	24.8	35.5
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	6.0	47.0		22.0	21.0	32.0
Max Q Clear Time (g_c+I1), s		9.4	4.4	20.6		19.1	20.8	31.3
Green Ext Time (p_c), s		1.0	0.0	8.4		0.8	0.0	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	47.1
HCM 2010 LOS	D

Appendix F

Early Consultation: Comments Received during the First Draft Environmental Assessment Comment Period from December 28, 2018 to February 19, 2019 and Responses

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu`ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

EDUARDO P. MANGLALLAN
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 19-13

January 9, 2019

Ms. Tesha H. Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority
547 Queen Street
Honolulu, Hawaii 96813

Dear Ms. Malama:

Subject: Draft Environmental Assessment (DEA) for Hunt Kalaeloa Subdivision Roads Project

Thank you for the opportunity to review and comment on the subject project.

Our comments are as follows:

- Once construction phase commence, install approved Best Management Practices fronting all City drainage facilities.
- During construction and upon completion of project; any damages/deficiencies within the City right-of-way along all affected City roads shall be repaired to City Standards and accepted by the City and at no cost to the City and County of Honolulu.
- Our records indicate that Franklin D. Roosevelt Avenue is under the jurisdiction of the State of Hawaii, Department of Transportation.
- Division of Road Maintenance recommends that the Developer or others maintain their basins.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Ross S. Sasamura, P.E.
Director and Chief Engineer

cc: R.M. Towill Corporation - Brian Takeda

2024 North King Street
Suite 200
Honolulu Hawaii 96819-3470
Telephone 808 842 1133
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R. M. TOWILL CORPORATION
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Environmental Services
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Surveying
Construction Management

February 6, 2020

Mr. Ross S. Sasamura, P.E.
Director and Chief Engineer
City and County of Honolulu
Department of Facility Maintenance
1000 Uluohia Street, Suite 215
Kapolei, Hawai‘i 96707

Dear Mr. Sasamura:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated January 9, 2019, concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

The following has been prepared in response to your comments (your comments are *italicized* for reference):

1. *Once construction phase commences, install approved Best Management Practices fronting all City drainage facilities.*

HCDA will require that all design drawing submittals for the project include detailed, proven and effective Best Management Practices (BMPs) for review and approval by City and County of Honolulu (City) and State agencies as part of project grading and construction permit process. As an example of how City drainage facilities would be protected from construction-related storm water runoff, the BMPs Plan will consist of erosion control measures such as planting or hydromulching grass seedling, erecting silt fencing/curtains, berms, and/or other applicable erosion control devices to prevent construction-related soils and silt from mixing with storm water runoff.

2. *During construction and upon completion of project: any damages/deficiencies within the City right-of-way along all affected City roads shall be repaired to City standards and accepted by the city and at no cost to the City and County of Honolulu.*

HCDA concurs with DFM such that any inadvertent damage resulting during construction and upon completion of the project within the City right-of-way along all affected City roads shall be returned to pre-construction condition at no cost to the City.

3. *Our records indicate that Franklin D. Roosevelt Avenue is under the jurisdiction of the State of Hawaii, Department of Transportation.*

HCDA concurs that Franklin D. Roosevelt Avenue is under HDOT jurisdiction and is expected to be turned over to HCDA for a pilot project before it is then turned over to the City, in accordance with the 2016 Memorandum of Understanding.

4. *Division of Road Maintenance recommends that the Developer or others maintain their basins.*

The proposed basins will be maintained by a future association of property and/or business owners of the planned community.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to DFM-final_013020.doc

cc: Ms. Tesha Mālama, HCDA

OFFICE OF PLANNING
STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

LEO R. ASUNCION
PLANNING PROGRAM ADMINISTRATOR II
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DTS20190114094NA

January 14, 2019

Ms. Tesha H. Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority
547 Queen Street
Honolulu, Hawaii 96813

Dear Ms. Malama:

Subject: Draft Environmental Assessment for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, Ewa, Oahu, Hawaii

Thank you for the opportunity to provide comments on the Draft Environmental Assessment (Draft EA), received December 19, 2018, for Hunt Kalaeloa Subdivision Roads Project.

According to the subject Draft EA, Hunt Communities Hawaii LLC proposes to develop Kalaeloa Subdivision Roadway System Project within the former Barbers Point Naval Air Station property located in Ewa, Oahu, Hawaii. The entire 35-acre project area encompasses land and roadways on portions of multiple tax maps keys. The proposed project involves the subdivision of three parcels in the Kalaeloa Community Development District (Kalaeloa CDD), and infrastructure improvements that will consist of regional flood control and roadway drainage systems, private portable water and sewer systems, electrical power systems, street lighting, and telecommunications systems. The proposed infrastructure improvements will support the future Hunt residential community within the Kalaeloa CDD.

The project site is about 1.3 miles mauka of the shoreline, and is located outside the special management area as designated under the Hawaii Coastal Zone Management Act, Hawaii Revised Statutes (HRS) Chapter 205A. The use of state land and/or funds from the proposed action triggers the subject EA to meet the requirements of HRS Chapter 343.

The project cost is estimated at $50,000,000, and construction is scheduled in the second half of 2019 with a duration of approximately two years.

The Office of Planning (OP) has reviewed the Draft EA and has the following comments to offer:

1. Pages 25-26, the Draft EA states that contaminants of potential concern were identified in soil to a depth of 4 feet below ground surface at concentrations that exceed State of Hawaii Department of Health (DOH) environmental action levels for unrestricted land use. The OP recommends that the State DOH Hazard Evaluation and Emergency Response Office be consulted as to whether an environmental hazard management plan shall be prepared to mitigate potential impacts of soil and groundwater contaminants, and their exposure risk to human health.

2. The Draft EA, pages 29-30, discusses the climate change and sea level rises. The OP suggests that the Final EA refer to the findings of the Hawaii Sea Level Rise Vulnerability and Adaptation Report 2017, accepted by the Hawaii Climate Change Mitigation and Adaptation Commission. The Hawaii Sea Level Rise Viewer at climateadaptation.hawaii.gov particularly identifies 3.2-foot sea level rise exposure areas across the main Hawaiian Islands including Oahu, which may occur in the mid to latter half of the 21st century.

3. The Draft EA states that early consultation with the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) is recommended to determine if any further archaeological study is indicated. The Final EA should provide a determination from the SHPD as to whether an archaeological inventory survey is necessary for the project area. Should any archaeological or cultural resources, or burials be discovered during ground excavation, all construction work shall be ceased immediately. Subsequent work shall proceed only upon an archaeological clearance from the SHPD.

4. The OP concurs that exterior lighting and lamp posts associated with the proposed construction and facilities shall be cut-off luminaries to provide the necessary shielding to mitigate potential light pollution in the coastal areas, and lessen possible seabird strikes. No artificial light, except as provided in HRS § 205A-71(b) shall be directed to travel across property boundaries toward the shoreline and ocean waters.

5. Act 120, Session Laws of Hawaii (SLH) 2013, made permanent Act 160, SLH 2010. **9. Beach Protection**, page 65, should be referred to HRS § 205A-2(c)(9), as amended, for discussion.

6. The permits and approved listed on the Draft EA is incomplete. The Final EA should provide a list of all permits and approvals (state, federal, and county) required for the construction and operation of the proposed subdivision roads project.

If you have any questions regarding this comment letter, please contact Shichao Li of our office at (808) 587-2841.

Sincerely,

Leo R. Asuncion
Planning Program Administrator II

c: Mr. Brian Takeda ✓

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Planning
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Environmental Services
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Surveying
Construction Management

February 6, 2020

Mr. Leo R. Asuncion
Planning Program Administrator II
Office of Planning
State of Hawai‘i
P. O. Box 2359
Honolulu, Hawai‘i 96804

Dear Mr. Asuncion:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated January 14, 2019 (DTS20190114094NA) concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

1. *Pages 25-26, the Draft EA states that contaminants of potential concern were identified in soil to a depth of 4 feet below ground surface at concentrations that exceed State of Hawaii Department of Health (DOH) environmental action levels for unrestricted land use. The OP recommends that the State DOH Hazard Evaluation and Emergency Response Office be consulted as to whether an environmental hazard management plan shall be prepared to mitigate potential impacts of soil and groundwater contaminants, and their exposure risk to human health.*

The State DOH shall continue to be consulted as the planning and design of the project proceeds. As stated in reissued Draft EA Section 5.5, Soils and Potential Hazardous Materials, the recommended next steps in the Phase I Environmental Site Assessment (ESA) will include:

(1) The completion of a Phase II ESA. The purpose of the Phase II ESA is to characterize soil within the subject property to evaluate potential environmental hazards, associated risks, and potential construction/trench worker exposure. Soil sample results will also be used to characterize soil for on/off-site reuse and/or disposal.

(2) If Contaminants of Potential Concern (COPCs) are detected in the soil at concentrations exceeding State DOH Exposure Action Levels (EALs), then an Environmental Hazard

Evaluation (EHE) will be completed to evaluate potential environmental hazards, associated risks, and construction/trench worker exposure.

(3) If potential environmental hazards, associated risks, and/or construction/trench worker exposure are identified by the EHE, an Environmental Hazard Management Plan will be prepared to manage contaminated soil and mitigate potential environmental hazards and exposure risks.

2. *The Draft EA, pages 29-30, discusses the climate change and sea level rises. The OP suggests that the Final EA refer to the findings of the Hawaii Sea Level Rise Vulnerability and Adaptation Report 2017, accepted by the Hawaii Climate Change Mitigation and Adaptation Commission. The Hawaii Sea Level Rise Viewer at climateadaptation.hawaii.gov particularly identifies 3.2-foot sea level rise exposure areas across the main Hawaiian Islands including Oahu, which may occur in the mid to latter half of the 21st century.*

HCDA acknowledges this comment. The reissued Draft EA, Section 5.3, Climate, and Section 5.7, Natural Hazards, presents the findings of the Hawaii Sea Level Rise Vulnerability and Adaptation Report 2017. The project site elevation is 52 feet above sea level and direct inundation due to sea-level rise is not expected in the context of 21st-century sea-level rise projections. Furthermore, according to the Hawaiʻi Sea Level Rise (SLR) Viewer (accessed 2019), the project site is not within the 3.2-feet SLR Exposure Area.

3. *The Draft EA states that early consultation with the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) is recommended to determine if any further archaeological study is indicated. The Final EA should provide a determination from the SHPD as to whether an archaeological inventory survey is necessary for the project area. Should any archaeological or cultural resources, or burials be discovered during ground excavation, all construction work shall be ceased immediately. Subsequent work shall proceed only upon an archaeological clearance from the SHPD.*

HCDA acknowledges this comment. The project's Archaeological Literature Review and Field Inspection (ALRFI) Report has been submitted to the SHPD for review. Based on the results of the ALRFI, the recommendation is to undertake a combination of on-site and on-call monitoring due to the potential for historic surface and subsurface sites to be encountered within areas previously utilized by the Barbers Point Naval Air Station. Due to the heavily disturbed nature at the intersections, it is unlikely that historic properties would be encountered. Accordingly, HDCA intends to comply with SHPD's review and comments regarding the next steps required to appropriately protect and preserve historic resources in accordance with Hawaiʻi Revised Statutes, Chapter 6E. This would include any requirements should an Archaeological Inventory Survey be required.

4. *The OP concurs that exterior lighting and lamp posts associated with the proposed construction and facilities shall be cut-off luminaries to provide the necessary shielding to mitigate potential light pollution in the coastal areas, and lessen possible seabird strikes. No artificial light, except as provided in HRS § 205A-71 (b) shall be directed to travel across property boundaries toward the shoreline and ocean waters.*

HCDA acknowledges this comment and thanks the OP for its guidance. The design of this project will be in accordance with all applicable State and City and County of Honolulu standards. See the reissued Draft EA Section 5.8.2.2 and Table 10-1 for proposed mitigation measures and Best Management Practices to mitigate against the potential for light pollution in coastal areas, and reduce the possibility of seabird strikes.

5. *Act 120, Session Laws of Hawaii (SLH) 2013, made permanent Act 160, SLH 2010.* ***9. Beach Protection,*** *page 65, should be referred to HRS § 205A-2(c)(9), as amended, for discussion.*

The Draft EA includes a discussion of the project's consistency with HRS § 205A-2(c)(9), as amended.

6. *The permits and approved listed on the Draft EA is incomplete. The Final EA should provide a list of all permits and approvals (state, federal, and county) required for the construction and operation of the proposed subdivision roads project.*

HCDA acknowledges this comment. See the reissued Draft EA Section 8, Permits and Approvals that May be Required for an updated list of all permits and approvals that may be required for the proposed project. As the project is further developed, more information may be provided regarding the required permits in the Final EA.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to OP 01-30-20.doc

cc: Ms. Tesha Mālama, HCDA

DAVID Y. IGE
GOVERNOR

DR. CHRISTINA M. KISHIMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF SCHOOL FACILITIES AND SUPPORT SERVICES

January 15, 2019

TO: Tesha H. Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority

FROM: Kenneth G. Masden II
Public Works Manager, Planning Section
Facilities Development Branch

SUBJECT: **Draft Environmental Assessment for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, Ewa, Oahu, Hawaii**

The Hawaii State Department of Education (HIDOE) has the following comments for the Draft Environmental Assessment (DEA) for the proposed Hunt Kalaeloa Subdivision Roads (Project). According to the DEA, the Project consists of the subdivision of three parcels and the construction of roadway and infrastructure improvements on approximately 35 acres of land located at Kalaeloa, Ewa, Island of Oahu, Hawaii at various TMKs.

The DEA identifies Barbers Point Elementary School, Tax Map Key 9-1-013:003 (School) as one of the properties that are part of the Project. However, the DEA does not identify which Project elements will utilize School lands. This is essential in order to identify and mitigate all impacts to the School. The Final Environmental Assessment should state exactly how the proposed Project affects the School.

For DEA review purposes, the HIDOE will assume that School lands are part of the proposed Project.

The following improvements identified in the DEA will directly impact the School:

1. Roosevelt Avenue roadway improvements to include 10-foot widening and a 14-foot setback for a future 108-foot Right-of-Way (ROW) reserve;
2. Copahee Avenue roadway improvements to include 11-foot widening and 11-foot setback for a future 66-foot ROW;
3. Boxer Road roadway improvements to include 18-foot widening, 6-foot setback for a future 108-foot ROW, and realignment with Saratoga Avenue; and

4. Intersection improvements at Roosevelt and Copahee Avenues to include the widening of Roosevelt Avenue to provide a refuge island median for the mauka-bound left-turn storage and ewa-bound merge lane.

As part of the overall redevelopment of Kalaeloa, Hunt Communities Hawaii, LLC (Applicant) has discussed with HIDOE preliminary development plans and the desire to acquire School land to implement roadway improvements for Roosevelt and Copahee Avenues to meet City and County of Honolulu Standards. School lands identified in these discussions were a ten foot wide strip along Roosevelt Avenue and an 11 foot wide strip along Copahee Avenue.

School land acquisition along Roosevelt and Copahee Avenues will have long term impacts to the School. Impacts to grounds and facilities along Roosevelt Avenue are the existing school fence with a gated vehicular access, play area, baseball field with a backstop, and large mature trees. Impacts to grounds and facilities along Copahee Avenue are the existing school fence, school walkways, school bus pull in for loading and unloading, driveway access to and from School, internal transportation patterns, and large mature trees.

Schools lands were transferred to the State of Hawaii from the federal government, by quitclaim deed dated July 7, 2000, after the closure of Barber's Point Naval Air Station. The following conditions as taken from the executed quitclaim deed that will affect potential land acquisition are:

1. For a period of thirty (30) years from the date of this Deed, the Property will be used solely and continuously for the educational purposes set forth in accordance with the proposed program and plan of GRANTEE described in its Application, and for no other purposes. Grantor reserves the right to enter and inspect Property during said period.

2. During the above period of thirty (30) years GRANTEE will not sell, resell, lease, rent, mortgage, encumber, or otherwise transfer any interest in any part of the Property except as GRANTOR may authorize in advance in writing.

If the Applicant pursues the acquisition School lands, HIDOE needs to be informed as soon as possible of the location and amount.

The School has a main driveway access to and from Boxer Avenue. This driveway access will be permanently eliminated with the proposed realignment of Boxer Avenue with Saratoga Avenue. The elimination of this driveway will have a long term impact to the Schools internal and external traffic patterns.

There will be upgrades to all existing utilities; however specific locations for these upgrades have not been identified in the DEA. We request consultation and coordination with the Facilities Development Branch, Public Works Administrator, as early as possible to identify and minimize impacts to School facilities and operations during these upgrades.

The School's student enrollment for the 2018-19 school year is 518.

The School will be subject to long term impact of the elimination of one of two driveways due to the Boxer Avenue realignment. A mutually agreed upon second driveway, over Applicants land, will be required to mitigate this impact. At this time HIDOE cannot identify long term impacts nor propose mitigation measures for roadway improvements to Roosevelt and Copahee Avenues. Once the HIDOE knows how the Project will affect School lands, further review can be made to identify the presence or absence of additional long term impacts.

The School will be subject to short-term construction related impacts from noise and fugitive dust, especially for improvements along Roosevelt and Copahee Avenues. Driveway access to and from the School and student transportation services will be impacted from temporary changes to traffic patterns. The HIDOE currently has seven school buses transporting students to and from the School. There are four buses for regular students and three for special education students.

We request consultation and coordination with the School prior to and during construction in order to further identify and minimize impacts in general and during school hours. We also request consultation and coordination with HIDOE Student Transportation Services Branch Manager, James Kauhi, to identify and minimize impacts to existing HIDOE transportation services.

For the reasons provided HIDOE does not agree with the DEA determination that there are no long term, secondary, and cumulative effects from the proposed Project to school facilities. Nor does HIDOE agree with the DEA determination that that there will be no substantial impacts or effects on public facilities.

Thank you for the opportunity to comment. Should you have questions, please contact Robyn Loudermilk, School Lands and Facilities Specialist of the Facilities Development Branch, Planning Section at 784-5093 or via email at robyn_loudermilk@notes.k12.hi.us.

KGM:rll

c: Sean Tajima, Complex Area Superintendent, Campbell-Kapolei Complex
Jaclyn Riel, Principal, Barber's Point Elementary School
John Chung, Facilities Development Branch
James Kauhi, Student Transportation Services Branch
✓ Brian Takeda, R.M. Towill Corporation.
Office of Environmental Quality Control

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R. M. TOWILL CORPORATION
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Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

February 6, 2020

Mr. Kenneth G. Masden II
Public Works Manager, Planning Section
Facilities Development Branch
State of Hawai‘i
Department of Education
P. O. Box 2360
Honolulu, Hawai‘i 96804

Dear Mr. Masden:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated January 15, 2019, concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment on this reissued document.

The following has been prepared in response to your comments (your comments are *italicized* for reference):

1. *The DEA identifies Barbers Point Elementary School, Tax Map Key 9-1-013:003 (School) as one of the properties that are part of the Project. However, the DEA does not identify which Project elements will utilize School lands. This is essential in order to identify and mitigate all impacts to the School. The Final Environmental Assessment should state exactly how the proposed Project affects the School*

HCDA acknowledges this comment. The reissued Draft EA Sections 5.14.1 Roads and Transportation, and Section 5.14.7, Schools and Libraries addresses the existing conditions and anticipated project impact on the Barbers Point Elementary School. However, we add that the design of the project is not yet final and our expectation is that HCDA, Hunt, and the State of Hawai‘i Department of Education (HIDOE) would continue to have future discussions on how we can maintain a healthy and viable school campus while providing for future transportation improvement of the area.

2. *The School will be subject to long term impact of the elimination of one of two driveways due to the Boxer Avenue realignment. A mutually agreed upon second driveway, over Applicants land, will be required to mitigate this impact. At this time HIDOE cannot identify long term impacts nor propose mitigation measures for roadway improvements to Roosevelt and Copahee Avenues. Once the HIDOE knows how the Project will affect School lands, further review can be made to identify the presence or absence of additional long term impacts.*

As stated above, consultation between HCDA, Hunt, and the HIDOE will continue through the design process to ensure that an alternative access is provided and that adverse impacts can be minimized or avoided.

3. *The School will be subject to short-term construction related impacts from noise and fugitive dust, especially for improvements along Roosevelt and Copahee Avenues. Driveway access to and from the School and student transportation services will be impacted from temporary changes to traffic patterns. The HIDOE currently has seven school buses transporting students to and from the School. There are four buses for regular students and three for special education students.*

HCDA acknowledges this comment. The reissued Draft EA Section 10.1, Short Term Effects, outlines mitigation measures that will be implemented to address the generation of short-term construction-related impacts.

Noise will be temporarily generated from construction activities and the related mobilization of equipment. To mitigate impacts from noise the contractor shall follow the mitigation measures outlined in the reissued Draft EA Section 5.10, Noise, including muffling all internal combustion powered equipment in accordance with standard engine operating practices. Upon the completion of work, noise levels will return to preexisting ambient levels.

Fugitive dust may be generated during construction. The contractor will be required to control fugitive dust through the regular wetting of soils and ground areas susceptible to the generation of dust during work activities. Only enough water to wet the surface of the ground will be used to prevent the generation of runoff.

The major source of disturbance to traffic is anticipated from construction activities during deliveries and transit of vehicles to and from the job site. Occasional increases in construction traffic may also result from the periodic movement of vehicles to and from the job site to dispose of demolition debris. To minimize traffic circulation problems throughout the Kalaeloa neighborhood, the contractor will prepare and implement a traffic safety and control plan. As described in the reissued Draft EA, Section 5.14.7, Schools and Libraries, mitigative measures will include the planning of construction activities during the daytime hours with no night work anticipated to be required, and the use of flagmen and/or traffic controls to maintain accessibility for businesses and residents who may use the surrounding area roads. As recommended by City and County of Honolulu, Department of Transportation Services, construction materials and

equipment will be transferred to and from the project site during off-peak traffic hours (8:30 AM to 3:30 PM) to minimize any possible disruption to traffic on the local streets, and after the morning school rush to minimize impacts to schools in the area.

4. *We request consultation and coordination with the School prior to and during construction in order to further identify and minimize impacts in general and during school hours. We also request consultation and coordination with HIDOE Student Transportation Services Branch Manager, James Kauhi, to identify and minimize impacts to existing HIDOE transportation services.*

As stated in response to comment No. 2 above, HCDA and Hunt will continue to consult and coordinate with HIDOE staff as the design and construction phase plans progress.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to DOE 013020.doc

cc: Ms. Tesha Mālama, HCDA

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

January 16, 2019

Ms. Tesha Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority
547 Queen Street
Honolulu, Hawaii 96813

Dear Ms. Malama:

Subject: Draft Environmental Assessment
Hunt Kalaeloa Subdivision Roads Project
Kalaeloa, Hawaii

In response to a letter from Mr. Brian Takeda of R. M. Towill Corporation dated December 17, 2018, regarding the abovementioned subject, the Honolulu Fire Department (HFD) reviewed the submitted information and requires that the following be complied with:

1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; 2012 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1.)

   A fire department access road shall extend to within 50 feet of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2012 Edition, Section 18.2.3.2.1.)

2. A water supply approved by the county, capable of supplying the required fire flow for fire protection, shall be provided to all premises upon which facilities or buildings, or portions thereof, are hereafter

constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ [Authority Having Jurisdiction]. (NFPA 1; 2012 Edition, Section 18.3.1, as amended.)

3. The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1; 2012 Edition, Sections 18.2.3.4.1.1 and 18.2.3.4.1.2, as amended.)

4. Submit civil drawings to the HFD for review and approval.

Should you have questions, please contact Battalion Chief Wayne Masuda of our Fire Prevention Bureau at 723-7151 or wmasuda@honolulu.gov.

Sincerely,

SOCRATES D. BRATAKOS
Assistant Chief

SDB/CM:bh

cc: Brian Takeda, R. M. Towill Corporation

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Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

February 6, 2020

Mr. Socrates D. Bratakos
Assistant Chief
Honolulu Fire Department
City and County of Honolulu
636 South Street
Honolulu, Hawai‘i 96813-5007

Dear Assistant Chief Bratakos:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated January 16, 2019, concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

The following has been prepared in response to your comments (your comments are *italicized* for reference):

1. *Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; 2012 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1.)*

   A fire department access road shall extend to within 50 feet of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2012 Edition, Section 18.2.3.2.1.)

HCDA acknowledges this comment. The proposed project roadway improvements will comply with Kalaeloa Community Development Plan (KCDP) and all applicable City and County of Honolulu (CCH) design standards to meet health and fire safety requirements as cited in your comment above.

2. *A water supply approved by the county, capable of supplying the required fire flow for fire protection, shall be provided to all premises upon which facilities or buildings, or*

> *portions thereof, are hereafter constructed, or moved into or within the county. When any portion of the facility or building is in excess of 150 feet from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ [Authority Having Jurisdiction]. (NFPA 1; 2012 Edition, Section 18.3.1, as amended.)*

HCDA acknowledges this comment. The water supply and routing systems for the proposed project are being designed in accordance with all applicable KCDP and CCH standards.

3. *The unobstructed width and unobstructed vertical clearance of a fire apparatus access road shall meet county requirements. (NFPA 1; 2012 Edition, Sections 18.2.3.4.1.1 and 18.2.3.4.1.2, as amended.)*

As stated in the responses to Comments 1 and 2 above, all applicable KCDP and CCH standards to meet health and fire safety requirements will be incorporated in the project design.

4. *Submit civil drawings to the HFD for review and approval.*

HFD will continue to be consulted during the review and approval process for the proposed project, including the developer's submittal of design plans for the department's review and comments.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to Fire Dept 013020.doc

cc: Ms. Tesha Mālama, HCDA

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
LYNN A.S. ARAKI-REGAN
DEREK J. CHOW
ROSS M. HIGASHI
EDWIN H. SNIFFEN

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

IN REPLY REFER TO:
DIR 1423
STP 8.2580

January 23, 2019

Mr. Aedward Los Banos
Executive Director
Hawaii Community Development Authority
547 Queen Street
Honolulu, Hawaii 96813

Attention: Ms. Tesha H. Malama

Dear Ms. Malama:

Subject: Hunt Kalaeloa Subdivision Roads Project
Draft Environmental Assessment (DEA)
Kalaeloa, Ewa, Oahu, Hawaii
TMK: (1) 9-1-Various Plats and Parcels

The State Department of Transportation (DOT) understands the applicant proposes to construct improvements to roadways, intersections and utility systems within the Hunt Kalaeloa Subdivision. DOT comments on the subject project are as follows:

Airports Division (DOT-AIR)

1. The subject project site is approximately 2,928 feet from Runway 11 at Kalaeloa Airport (JRF). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf.

2. Section 2 and Section 3 of the subject DEA states that the subject project will involve approximately five acres for off-site drainage facilities. Standing water creates a potential wildlife attractant and therefore creates a bird-strike risk to aircrafts flying over the property proximity.

   The design and landscaping for the drainage improvements shall not create conditions to attract wildlife. Federal Aviation Administration (FAA) Advisory Circular150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*, provides guidance for developments and wildlife management near airports.

If wildlife is attracted to the project site and poses a potential hazard to aircrafts, Hunt Communities Hawaii LLC (Hunt) or the responsible subdivision property owner shall take appropriate measures to ensure the proper mitigation of the potential wildlife hazard, upon notification by DOT-AIR.

3. Section 2 and 3 of the subject DEA also indicate: The project will support the future development of public and residential land uses, schools and commercial uses within Kalaeloa Community Development District (Kalaeloa CDD); the proposed action involves the subdivision of three parcels (1, 2 and 3) in the Kalaeloa CDD. Based on Hunt's potential future development plans, DOT-AIR provides the following comments:

    a. JRF Runway 22 Right/4 Left is 8,000 feet in length and Runway 11/29 is 6,000 feet long. FAA regulation requires the submittal of FAA Form 7460-1, Notice of Proposed Construction or Alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

    b. If the proposed residential and commercial development near JRF includes photovoltaic (PV) panel installations, the responsible solar installation proponent shall conduct a glint and glare analysis to ensure that the solar energy installation does not create hazardous conditions to JRF and Daniel K. Inouye International Airport (HNL) flights. Please see the following website for more information: www.sandia.gov/glare. Large-scale solar energy installations also have the potential to emit radio frequency interference (RFI).

    c. Glint, glare, RFI, PV panels and tall equipment (such as cranes that may be used during construction) can create hazardous conditions to pilots. Any such PV system, construction equipment, and/or other structure that creates such a hazardous condition for pilots, shall be immediately mitigated by the owner upon notification by the DOT-AIR and/or FAA.

    d. Due to the development proximity to JRF, there is a potential for fumes, smoke, vibrations, odors, etc., from aircraft flight operations over the proposed development. The project may also be subject to single event noise from aircraft operations.

4. Hunt Communities Hawaii LLC shall grant assurances of flight safety over the proposed site to DOT-AIR via an avigation easement.

Highways Division (DOT-HWY)

1. Any work on the roads and intersections under DOT jurisdiction will require approval by DOT. This includes, Franklin D. Roosevelt Avenue (between West Perimeter Road and Enterprise Avenue) and West Perimeter Road (between Franklin D. Roosevelt Avenue and Saratoga Avenue) which have not yet been conveyed from DOT to the Hawaii Community Development Authority (HCDA) in accordance with the July 25, 2016 Memorandum of Understanding.

2. While the proposed action (transportation improvements) is being treated as the primary action under Hawaii Revised Statutes (HRS) Chapter 343, it is typically treated as the secondary action to the development, which is typically the primary action. Please explain the reason for this action.

3. The DOT-HWY has not been consulted prior to the DEA publication, which is a concern due to having jurisdiction and responsibility for the aforementioned DOT roads.

4. The proposed action is in DOT jurisdiction; therefore, the DOT-HWY should be consulted on other State environmental regulations, such as HRS Chapter 6E and 195D.

5. The DOT-HWY also has not been consulted on other matters besides the DEA, such as jurisdiction, planning, design, construction, use and transfer of DOT roads.

6. HCDA is notified that work in the Oahu Railway and Land Company right-of-way triggers federal environmental regulations.

7. Related to the HCDA Infrastructure Masterplan Updates dated October 2010 draft:

    a. The proposed action is not consistent with the masterplan, describe the differences and explain the reason and justification for the differences.

    b. Provide phasing of masterplan and proposed action.

8. Related to the informally submitted Traffic Impact Analysis Report (TIAR) dated 12/12/17:

    a. The proposed action identified in said TIAR is not consistent with the October 2010 masterplan, describe the differences and explain the reason and justification for it.

    b. The proposed action phasing is not provided.

    c. The 2020 buildout year is not reasonable, explain how the buildout can be implemented in less than two years.

If there are any questions, please contact Mr. Blayne Nikaido of the DOT Statewide Transportation Planning Office at (808) 831-7979 or by email at blayne.h.nikaido@hawaii.gov.

Sincerely,

JADE T. BUTAY
Director of Transportation

c: Brian Takeda, R. M. Towill Corporation

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R. M. TOWILL CORPORATION
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Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

February 6, 2020

Mr. Jade T. Butay
Director
State of Hawai‘i
Department of Transportation
869 Punchbowl Street
Honolulu, Hawai‘i 96813-5097

Dear Mr. Butay:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated January 23, 2019 (DIR 1423 STP 8.2580) concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

The following has been prepared in response to your comments (your comments are *italicized* for reference):

Airports Division (DOT-AIR)

1. *The subject project site is approximately 2,928 feet from Runway 11 at Kalaeloa Airport (JRF). All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link:http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016. pdf.*

HCDA acknowledges this comment and thanks DOT-AIR for its guidance. The reissued Draft EA Section 7.1.1, Federal Aviation Administration (FAA) Order 5190.6B, now includes a discussion of the proposed Hunt Kalaeloa roadways project’s relationship to FAA Order 5190.6B, per the State of Hawai‘i Office of Planning TAM issued in August 2016. This TAM is also included in the References section of the reissued Draft EA.

2. *Section 2 and Section 3 of the subject DEA states that the subject project will involve approximately five acres for off-site drainage facilities. Standing water creates a*

potential wildlife attractant and therefore creates a bird-strike risk to aircrafts flying over the property proximity.

The design and landscaping for the drainage improvements shall not create conditions to attract wildlife. Federal Aviation Administration (FAA) Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, provides guidance for developments and wildlife management near airports.

If wildlife is attracted to the project site and poses a potential hazard to aircrafts, Hunt Communities Hawaii LLC (Hunt) or the responsible subdivision property owner shall take appropriate measures to ensure the proper mitigation of the potential wildlife hazard, upon notification by DOT-AIR.

The design of roadway and related off-site drainage facilities shall be in accordance with all applicable Federal, State, and City and County of Honolulu standards and regulations, including avoidance of potential adverse effects on wildlife in the area. The reissued Draft EA Section 7.1.1, Federal Aviation Administration (FAA) Order 5190.6B, notes that the design and landscaping of the drainage improvements would not create conditions to attract wildlife. If wildlife is attracted to the project site, the applicant shall take appropriate measures to ensure proper mitigation of the potential wildlife hazard. Further, Hunt will continue to consult with HDOT-Airports regarding appropriate mitigation measures to ensure that the proposed project and future subdivision may not attract hazardous wildlife, glint/glare hazard, or aerial obstructions.

3. *Section 2 and 3 of the subject DEA also indicate: The project will support the future development of public and residential land uses, schools and commercial uses within Kalaeloa Community Development District (Kalaeloa CDD); the proposed action involves the subdivision of three parcels (1, 2 and 3) in the Kalaeloa CDD. Based on Hunt's potential future development plans, DOT-AIR provides the following comments:*

   a. *JRF* [Kalaeloa Airport or John Rodgers Field] *Runway 22 Right/4 Left is 8,000 feet in length and Runway 11/29 is 6,000 feet long. FAA regulation requires the submittal of FAA Form 7460-1, Notice of Proposed Construction or Alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portalJsp.*

   b. *If the proposed residential and commercial development near JRF includes photovoltaic (PV) panel installations, the responsible solar installation proponent shall conduct a glint and glare analysis to ensure that the solar energy installation does not create hazardous conditions to JRF and Daniel K. Inouye International Airport (HNL) flights. Please see the following website for more information: www.sandia.gov/glare. Large-scale solar energy installations also have the potential to emit radio frequency interference (RFI).*

c. *Glint, glare, RFI, PV panels and tall equipment (such as cranes that may be used during construction) can create hazardous conditions to pilots. Any such PV system, construction equipment, and/or other structure that creates such a hazardous condition for pilots, shall be immediately mitigated by the owner upon notification by the DOT-AIR and/or FAA.*

d. *Due to the development proximity to JRF, there is a ·potential for fumes, smoke, vibrations, odors, etc., from aircraft flight operations over the proposed development. The project may also be subject to single event noise from aircraft operations.*

HCDA acknowledges the references and information provided and will review them for regulatory applicability to this project. The subdivision roadways project does not include the installation of photovoltaic panels or tall equipment; therefore, a glint and glare analysis is not required for the subject project. However, Hunt will continue to consult with DOT-AIR regarding appropriate mitigation measures to ensure that the proposed project and future subdivision not create hazardous conditions that attract wildlife, cause a glint/glare hazard, or result in aerial obstructions. See the reissued Draft EA Section 7.1.1, Federal Aviation Administration (FAA) Order 5190.6B.

4. *Hunt Communities Hawaii LLC shall grant assurances of flight safety over the proposed site to DOT-AIR via a navigation easement.*

As stated above, consultation with DOT-AIR shall take place as the design of the Hunt Kalaeloa roadways project proceeds. This would include discussions concerning the need for an avigation easement.

Highways Division (DOT-HWY)

1. *Any work on the roads and intersections under DOT jurisdiction will require approval by DOT. This includes, Franklin D. Roosevelt Avenue (between West Perimeter Road and Enterprise Avenue) and West Perimeter Road (between Franklin D. Roosevelt Avenue and Saratoga Avenue) which have not yet been conveyed from DOT to the Hawaii Community Development Authority (HCDA) in accordance with the July 25, 2016 Memorandum of Understanding.*

HCDA acknowledges this comment and will consult with DOT-HWY as required to address regulatory, and land use and ownership requirements. This will include obtaining the necessary authorizations and permits to conduct work in DOT-HWY right-of-ways.

2. *While the proposed action (transportation improvements) is being treated as the primary action under Hawaii Revised Statutes (HRS) Chapter 343, it is typically treated as the secondary action to the development, which is typically the primary action. Please explain the reason for this action.*

The subject roadways project is being developed first to facilitate and support the development of the future residential, commercial and public facilities envisioned in the master planned

documents cited and discussed in the Draft EA. These land uses that will support the Kalaeloa and Hunt Master Plans will follow the roadways project and will be further analyzed in a Development Permit application, as required, in accordance with Hawai‘i Administrative Rules (HAR), Chapter 15-215, Kalaeloa Community Development District Rules.

3. *The DOT-HWY has not been consulted prior to the DEA publication, which is a concern due to having jurisdiction and responsibility for the aforementioned DOT roads.*

DOT-HWY was consulted in various forms as a part of consulation; first as documented in two Memoranda of Understanding (MOUs), which includes DOT-HWY as a jurisdictional agency in both MOUs. Jurisdictional assignments are summarized below.

The former Barbers Point Naval Air Station (BPNAS) Redevelopment Commission, DOT-HWY, and the City and County of Honolulu (CCH) entered into an MOU on February 27, 2001, which transferred the ownership of various roadways at Kalaeloa to DOT-HWY and CCH. Under this MOU, the DOT-HWY and CCH both accepted ownership and the responsibility to construct, operate, and maintain roadways, associated drainage systems, and future roadway rights. Once roads were constructed to CCH standards, it was intended that roadways transferred to DOT-HWY would be dedicated to the CCH.

Commencing in 2014, at the request of Councilmember Kymberly Marcos Pine, quarterly meetings were held with the HCDA, DOT-HWY, the CCH Department of Planning and Permitting (DPP), the CCH Department of Transportation Services (DTS), and the CCH Department of Facility Maintenance (DFM) to discuss the status of the roadways in Kalaeloa. On July 25, 2016, a second MOU was executed between HCDA, DOT-HWY, and CCH to initiate a demonstration project to improve Franklin D. Roosevelt (FDR) Avenue. The MOU stipulated that DOT-HWY would transfer their ownership of FDR Avenue from West Perimeter Road to Enterprise Avenue (referred to in the MOU as “FDR-West”) and a portion of West Perimeter Road (referred to in the MOU as “WPR-Mauka) to HCDA.

4. *The proposed action is in DOT jurisdiction; therefore, the DOT-HWY should be consulted on other State environmental regulations, such as HRS Chapter 6E and 195D.*

HCDA acknowledges the references provided and will review them for regulatory applicability to this project. This will include consultations as required to address HRS, Chapter 6E, Historic Preservation and HRS, Chapter 195D, Conservation of Aquatic Life, Wildlife and Land Plants.

5. *The DOT-HWY also has not been consulted on other matters besides the DEA, such as jurisdiction, planning, design, construction, use and transfer of DOT roads.*

As indicated in response to Item No. 3 above, early consultation has been taking place prior to the signing of the 2001 MOU. Additionally, more recent discussions and communications were initiated which ultimately resulted in the signing of the 2016 MOU. HCDA intends to continue consultation with DOT-HWY throughout the EA process, during the subsequent preparation of

the design and construction documents of the proposed project, and during the implementation of the MOU.

6. *HCDA is notified that work in the Oahu Railway and Land Company right-of-way triggers federal environmental regulations.*

Preliminary plans are to limit project improvements outside the limits of the former OR&L ROW. Hunt and HCDA will continue consultation with DOT-HWY and the affected parties as the design and construction plans for the proposed project proceed.

7. *Related to the HCDA Infrastructure Masterplan Updates dated October 2010 draft:*
    a. *The proposed action is not consistent with the masterplan, describe the differences and explain the reason and justification for the differences.*
    b. *Provide phasing of masterplan and proposed action.*

As HCDA's masterplan update proceeds, any inconsistencies between the proposed project shall be mitigated in the updated master plan. The reissued Draft EA Section 7.1.8, HCDA Kalaeloa Master Plan – Draft Infrastructure Master Plan Updates (2010) includes a discussion on the proposed project's consistency with the HCDA Infrastructure Master Plan. As noted in the Draft EA, the HCDA is currently updating the Infrastructure Master Plan which is anticipated to include the master plan phasing.

8. *Related to the informally submitted Traffic Impact Analysis Report (TIAR) dated 12/12/17:*
    a. *The proposed action identified in said TIAR is not consistent with the October 2010 masterplan, describe the differences and explain the reason and justification for it.*
    b. *The proposed action phasing is not provided.*
    c. *The 2020 buildout year is not reasonable, explain how the buildout can be implemented in less than two years.*

The reissued Draft EA, Section 7.1.8, HCDA Kalaeloa Master Plan – Draft Infrastructure Master Plan Updates (2010), has been updated to discuss the differences between the 2010 masterplan and 2017 TIAR. Additionally, as the project's design and construction plans are developed and finalized, the DOT-HWY will continue to be consulted to discuss any changes to the targeted buildout year.

We appreciate your review of the subject document and this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to DOT 013020.doc

cc: Ms. Tesha Mālama, HCDA

DAVID Y. IGE
GOVERNOR

CURT T. OTAGURO
COMPTROLLER

AUDREY HIDANO
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1900.4

JAN 24 2019

MEMORANDUM

TO: Tesha H. Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority

FROM: Curt T. Otaguro
Comptroller

SUBJECT: Draft Environmental Assessment (DEA) for
Hunt Kalaeloa Subdivision Roads Project
Kalaeloa, Ewa, Island of Oahu, Hawaii

Thank you for the opportunity to provide comments for the subject project. We have no comments to offer at this time, as the subject project does not appear to directly impact any Department of Accounting and General Services' managed facilities. However, we do intend to monitor this project as it develops, given the proximity of certain State facilities that are located within Kapolei.

If you have any questions, your staff may call Mr. Dennis Chen of the Public Works Division at 586-0491, or at dennis.yk.chen@hawaii.gov.

c: Mr. Brian Takeda, R. M. Towill Corporation

2024 North King Street
Suite 200
Honolulu Hawaii 96819-3470
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
SINCE 1930

Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

February 6, 2020

Mr. Curt T. Otaguro
Comptroller
State of Hawai‘i
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawai‘i 96810-0119

Dear Mr. Otaguro:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated January 24, 2019 (File No. (P)1900.4) concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

HCDA acknowledges that the Department of Accounting and General Services has no comments on the proposed action at this time.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\..\DEA Comment Letters\DEA Response letters-CS\Response DAGS 01-30-20.doc

cc: Ms. Tesha H. Mālama, HCDA

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 29, 2019

Hawaii Community Development Agency
Attention: Ms. Tesha H. Malama
Kalaeloa Director of Planning
547 Queen Street
Honolulu, Hawaii 96813

via email: tesha.malama@hawaii.gov

Dear Ms. Malama:

SUBJECT: Draft Environmental Assessment (DEA) for **Hunt Kalaeloa Subdivision Roads** located in Kalaeloa, Ewa, Island of Oahu; TMK: (1) Various

Thank you for the opportunity to review and comment on the subject matter. The Land Division of the Department of Land and Natural Resources (DLNR) distributed or made available a copy of your request pertaining to the subject matter to DLNR's Divisions for their review and comments.

At this time, enclosed are comments from the (a) Engineering Division and (b) Land Division – Oahu District on the subject matter. Should you have any questions, please feel free to call Barbara Lee at (808) 587-0453. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosures
cc: R. M. Towill Corporation (w/copies)
Attn: Mr. Brian Takeda (via email: briant@rmtowill.com)
Planning Project Manager
Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION
2019 JAN 16 AM 10:42
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

DEC 24 PM01:28 ENGINEERING

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 24, 2018

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
X Engineering Division
___Div. of Forestry & Wildlife
___Div. of State Parks
X Commission on Water Resource Management
___Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM

FROM: Russell Y. Tsuji, Land Administrator
TO

SUBJECT: Draft Environmental Assessment (DEA) for **Hunt Kalaeloa Subdivision Roads**
LOCATION: Kalaeloa, Ewa, Island of Oahu; TMK Nos. (1) various
APPLICANT: Hunt Communities Hawaii LLC

Transmitted for your review and comment is information on the above-referenced project. Please submit any comments by **January 18, 2019.**

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on the Current Environmental Notice in the middle of the page.)

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

( ) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed: _____

Print Name: Carty S. Chang, Chief Engineer
Date: 1/15/19

Attachments
cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Draft Environmental Assessment (DEA) for Hunt Kalaeloa Subdivision Roads, Kalaeloa, Ewa, Island of Oahu; TMK Nos. (1) various

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4846.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 1/15/19

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
LAND DIVISION
2018 DEC 27 AM 6:23
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

December 24, 2018

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_ Engineering Division
___Div. of Forestry & Wildlife
___Div. of State Parks
_X_ Commission on Water Resource Management
___Office of Conservation & Coastal Lands
_X_ Land Division – Oahu District
_X_ Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Draft Environmental Assessment (DEA) for **Hunt Kalaeloa Subdivision Roads**
LOCATION: Kalaeloa, Ewa, Island of Oahu; TMK Nos. (1) various
APPLICANT: Hunt Communities Hawaii LLC

Transmitted for your review and comment is information on the above-referenced project. Please submit any comments by **January 18, 2019.**

The DEA can be found on-line at: http://health.hawaii.gov/oeqc/ (Click on the Current Environmental Notice in the middle of the page.)

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

( ) We have no objections.
(x) We have no comments.
( ) Comments are attached.

Signed: Darlene Bryant-Takamatsu

Print Name: Darlene Bryant-Takamatsu
Date: 12/24/18

Attachments
cc: Central Files

2024 North King Street
Suite 200
Honolulu Hawaii 96819-3470
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
SINCE 1930

Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

February 6, 2020

Mr. Russell Y. Tsuji
Land Administrator
State of Hawai‘i
Department of Land and Natural Resources
Land Division – O‘ahu District
P.O. Box 621
Honolulu, Hawai‘i 96809

Attention: Carty S. Chang, Chief Engineer, Engineering Division Darlene J. Bryant-Takamatsu, Land Agent, Land Division- O‘ahu District

Dear Mr. Tsuji:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated January 29, 2019, concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

The following has been prepared in response to comments received from the following DLNR Divisions: (a) Engineering Division and (b) Land Division – O‘ahu District (DLNR comments have been *italicized* for reference):

(a) Engineering Division

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within Special Flood Hazard Area (high risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated

> *on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FRAT) (http://gis.hawaiinfip.org/FHAT).*

HCDA acknowledges the above comment. Section 5.4.1, Surface Water of the reissued Draft EA identifies the project site is within flood hazard Zone D, defined as areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted in Zone D as reflected in FEMA-FIRM Map No. 15003C0310G (HI-NFIP, 2011). There are no streams or surface water features in or near the subject lots that could cause potential flood hazards. Potential impacts of the project are related to construction and will be mitigated through the use of erosion control measures and Best Management Practices. Once constructed, the project is not expected to exacerbate flooding conditions.

(b) Land Division – O‘ahu District

HCDA acknowledges that the State Department of Land and Natural Resources, Land Division – O‘ahu District has no comments to offer at this time.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response DLNR Land Div_013020.doc

cc: Ms. Tesha H. Mālama, HCDA

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

KIRK CALDWELL
MAYOR

KATHY K. SOKUGAWA
ACTING DIRECTOR

TIMOTHY F. T. HIU
DEPUTY DIRECTOR

EUGENE H. TAKAHASHI
DEPUTY DIRECTOR

2018/ELOG-2487 (FH)

January 30, 2019

Ms. Tesha H. Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority
547 Queen Street
Honolulu, Hawaii 96813

Dear Ms. Malama:

SUBJECT: Comments on the Draft Environmental Assessment (DEA) for the Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, District of Ewa, Oahu, Hawaii

Thank you for the opportunity to comment on the above referenced project. The Department of Planning and Permitting (DPP) offers the following comments on the DEA:

1. The Final Environmental Assessment (FEA) should include a more complete description of how the proposed project conforms to the Ewa Development Plan (DP).

2. The FEA should note that the Historic Oahu Rail and Land (OR&L) rail line corridor is identified as a significant historic resource in the Ewa DP, which contains guidelines (Section 3.4.2.3) for its protection and preservation. These include a minimum 50-foot setback on either side of the OR&L right-of-way (ROW); adaptive reuse which calls for the development of a parallel paved pedestrian path/bikeway either within or adjacent to the ROW, as part of the Pearl Harbor Historic Trail; and landscaping along the pedestrian path/bikeway.

   In light of the proposed project's proximity to the OR&L, the FEA should note if and where the proposed improvements affect the 50-foot setback, and include a discussion on how the proposal relates to the above guidelines.

3. The DEA references a December 2017 Traffic Impact Analysis Report (TIAR) in the roadway descriptions. Prior to approval of construction plans, the TIAR should be updated to include the following:

a) A schedule of current ownership and proposed future ownership, including timing as to when roads will be developed to City and County of Honolulu roadway standards.

b) A list of the current ROW and road sections with future road setbacks, if any, as well as the proposed and final build-out ROW and road sections. Also, indicate whether the roadway is planned to remain or be abandoned. All roadways should be coordinated with the Kalaeloa Master Plan (March 2006) to minimize the amount of reconstruction or abandonment of roadways being built with this project.

c) A phasing plan of all roadways and intersection improvements.

d) An analysis of left/right turn lane storage lengths.

5. The project's compliance with the City's Storm Drainage Standards and Rules Relating to Water Quality will be verified during the review of the construction plans.

6. For the FEA, list all of the required City permits and approvals, e.g., grading permits, subdivision approvals, etc.

7. The Department of Facility Maintenance (DFM) was not listed as an agency consulted with during the environmental review process. If the proposed roadways are to be maintained by the City and County, the DFM should be an agency consulted during the FEA for their review and comment.

Should you have any questions, please contact Frank Hall, of our staff, at 768-8862.

Very truly yours,

Kathy K. Sokugawa
Acting Director

KKS:ah

cc: Mr. Brian Takeda
R. M. Towill Corporation

2024 North King Street
Suite 200
Honolulu Hawaii 96819-3470
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
SINCE 1930

Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

February 6, 2020

Ms. Kathy Sokugawa
Acting Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai‘i 96813

Dear Ms. Sokugawa:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter (2018/ELOG-2487 (FH)) dated January 30, 2019, concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

The following has been prepared in response to your comments (your comments are *italicized* for reference):

1. *The Final Environmental Assessment (FEA) should include a more complete description of how the proposed project conforms to the Ewa Development Plan (DP).*

Section 7.2.2, ‘Ewa Development Plan, of the reissued Draft EA, has been expanded to provide a more complete description of how the proposed project conforms to the ‘Ewa DP.

2. *The FEA should note that the Historic Oahu Rail and Land (OR&L) rail line corridor is identified as a significant historic resource in the Ewa DP, which contains guidelines (Section 3.4.2.3) for its protection and preservation. These include a minimum 50-foot setback on either side of the OR&L right-of-way (ROW); adaptive reuse which calls for the development of a parallel paved pedestrian path/bikeway either within or adjacent to the ROW, as part of the Pearl Harbor Historic Trail; and landscaping along the pedestrian path/bikeway.*

   In light of the proposed project's proximity to the OR&L, the FEA should note if and where the proposed improvements affect the 50-foot setback, and include a discussion on how the proposal relates to the above guidelines.

HCDA acknowledges the references provided and will review them for regulatory applicability to this project. In the vicinity of the project area, the historic OR&L railroad corridor alignment runs parallel to Franklin D. Roosevelt (FDR) Avenue, and is identified as a significant historic resource in the 'Ewa DP, which includes guidelines for its protection and preservation, including a minimum 50-foot setback on either side of the OR&L ROW. Section 7.2.2, 'Ewa Development Plan, of the reissued Draft EA, has been expanded to include discussion of the OR&L railroad corridor alignment that runs parallel to Franklin D. Roosevelt (FDR) Avenue.

3. *The DEA references a December 2017 Traffic Impact Analysis Report (TIAR) in the roadway descriptions. Prior to approval of construction plans, the TIAR should be updated to include the following:*

   a) *A schedule of current ownership and proposed future ownership, including timing as to when roads will be developed to City and County of Honolulu roadway standards.*

   b) *A list of the current ROW and road sections with future road setbacks, if any, as well as the proposed and final build-out ROW and road sections. Also, indicate whether the roadway is planned to remain or be abandoned. All roadways should be coordinated with the Kalaeloa Master Plan (March 2006) to minimize the amount of reconstruction or abandonment of roadways being built with this project.*

   c) *A phasing plan of all roadways and intersection improvements.*

   d) *An analysis of left/right turn lane storage lengths.*

Section 5.14.1, Roads and Transportation; Section 5.14.2, Utilities; and Section 7.2.2, 'Ewa Development Plan, of the reissued Draft EA have been updated to include the current ownership of the affected ROW and expected transfer to the City and County of Honolulu (CCH), proposed improvements for the ROW, roadways, intersections, and utilities, coordination with the Kalaeloa Master Plan, phasing, and discussion of left/right turn lanes.

5. *The project's compliance with the City's Storm Drainage Standards and Rules Relating to Water Quality will be verified during the review of the construction plans.*

Construction plans will be submitted to CCH for review and approval. The reissued Draft EA Section 8, Permits and Approvals That May Be Required lists specific permits and approvals for the proposed project.

6. *For the FEA, list all of the required City permits and approvals, e.g., grading permits, subdivision approvals, etc.*

As stated above, Section 8, Permits and Approvals That May Be Required of the reissued Draft EA contains a list of the permits and approvals anticipated for the proposed project.

7. *The Department of Facility Maintenance (DFM) was not listed as an agency consulted with during the environmental review process. If the proposed roadways are to be maintained by the City and County, the DFM should be an agency consulted during the FEA for their review and comment.*

The reissued Draft EA has been reviewed by DFM and the department's comments and a response letter have been included in the reissued Draft EA. HCDA will continue to consult with DFM throughout the design and construction phases.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to DPP 013020.doc

cc: Ms. Tesha Mālama, HCDA

DEPARTMENT OF PARKS & RECREATION

CITY AND COUNTY OF HONOLULU

1000 Uluohia Street, Suite 309, Kapolei, Hawaii 96707
Phone: (808) 768-3003 • Fax: (808) 768-3053
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHELE K. NEKOTA
DIRECTOR

JEANNE C. ISHIKAWA
DEPUTY DIRECTOR

February 4, 2019

Mr. Brian Takeda
Planning Project Manager
R. M. Towill Corporation
2024 North King Street
Honolulu, Hawaii 96819

Dear Mr. Takeda:

SUBJECT: Draft Environmental Assessment
Hunt Kalaeloa Subdivision Roads Project

Thank you for the opportunity to review and comment on the subject Draft Environmental Assessment.

The Department of Parks and Recreation has no comment. As the proposed project will have no impact on any program or facility of the Department, you may remove us as a consulted party to the balance of the EIS process.

Should you have any questions, please contact John Reid, Planner at 768-3017.

Sincerely,

Michele K. Nekota
Director

MKN:jr
(754641)

2024 North King Street
Suite 200
Honolulu Hawaii 96819-3470
Telephone 808 842 1133
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R. M. TOWILL CORPORATION
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Planning
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Environmental Services
Photogrammetry
Surveying
Construction Management

February 6, 2020

Ms. Michele K. Nekota
Director
Department of Parks and Recreation
City and County of Honolulu
1000 Uluohia Street, Suite 309
Kapolei, Hawai‘i 96707

Dear Ms. Nekota:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated February 4, 2019, concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA.

We acknowledge that the Department of Parks and Recreation has no comments and that you have requested to be removed as a consulted party for the balance of the environmental review process.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to DPR 013020.doc

cc: Ms. Tesha Mālama, HCDA

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
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KIRK CALDWELL
MAYOR

ROBERT J. KRONING, P.E.
DIRECTOR

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

February 7, 2019

Ms. Tesha H. Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority
547 Queen Street
Honolulu, Hawaii 96813

Dear Ms. Malama,

Subject: Draft Environmental Assessment for Hunt Kalaeloa Subdivision Roads Project Kalaeloa, Ewa, Oahu, Hawaii

Thank you for the opportunity to review and comment. The Department of Design and Construction's Civil Division had the following comments.

The City recently paved the following streets in the Hunt Kalaeloa Development Subdivision in 2018. 1) Kapolei Parkway (Kalaeloa Blvd. to Kamokila Blvd.), 2) Boxer Road, 3)Hornet Street and 4) Saratoga Avenue.

Should you have any further questions regarding this comment, please contact Howard Koza at 768-8836.

Sincerely,

Robert J. Kroning, P.E.
Director

RJK:ms (754499)

RECEIVED
2019 FEB 12 PM 1:49
HAWAII COMMUNITY DEVELOPMENT AUTHORITY

2024 North King Street
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Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

February 6, 2020

Mr. Robert Kroning, P.E.
Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawai‘i 96813

Dear Mr. Kroning:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated February 7, 2019, concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

Your appreciated receiving information regarding the City and County of Honolulu’s work in 2018 involving the paving of Kapolei Parkway (Kalaeloa Blvd. to Kamokila Blvd.), Boxer Road, Hornet Street and Saratoga Avenue in the Hunt Kalaeloa Development Subdivision, and by reference have noted this for the EA record.

Thank you for allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to DDC 013020.doc

cc: Ms. Tesha Mālama, HCDA

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

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ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

February 19, 2019

Ms. Tesha H. Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority
547 Queen Street
Honolulu, Hawaii 96813

Dear Ms. Malama:

Subject: Your Letter Dated December 17, 2018, Requesting Comments on the Draft Environmental Assessment Addressing the Hunt Kalaeloa Subdivision Roads Project in Kalaeloa, Ewa, Island of Oahu, Hawaii

Thank you for the opportunity to comment on the proposed roadway project.

The Honolulu Board of Water Supply does not have any water system located within the project area. All water services shall be provided by the private system.

If you have any questions, please contact Robert Chun, Project Review Branch of our Water Resources Division at 748-5443.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Brian Takeda, R. M. Towill Corporation

2024 North King Street
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Planning
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Environmental Services
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Construction Management

February 6, 2020

Mr. Ernest Y. W. Lau, P.E.
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawai‘i 96843

Dear Mr. Lau:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter dated February 19, 2019, concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

We acknowledge that the Board of Water Supply does not have any water system within the project area and that all services are to be provided by the private system.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

\\rmtc-fs\1project\plan\23105-00 HUNT Kalaeloa Roads\Narrative\FEA\DEA Comment Letters\DEA Response letters-CS\Response to BWS_013020.doc

cc: Ms. Tesha Mālama, HCDA

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
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KIRK CALDWELL
MAYOR

WES FRYSZTACKI
DIRECTOR

JON Y. NOUCHI
DEPUTY DIRECTOR

TP12/18-755262R

January 31, 2019

Ms. Tesha H. Malama
Kalaeloa Director of Planning
Hawaii Community Development Authority
547 Queen Street
Honolulu, Hawaii 96813

Dear Ms. Malama:

SUBJECT: Draft Environmental Assessment (DEA) for the Hunt Kalaeloa Subdivision Roads Project in Kalaeloa, Oahu

Thank you for the opportunity to provide comments on the DEA for the Hunt Kalaeloa Subdivision Roads Project. In response to your letter dated December 17, 2018 we have the following comments:

1. **Traffic Impact.** The following comments are related to transportation impacts:

    a. **Transportation Assessment.** A TA has not been provided with the DEA. Provide a Transportation Assessment (TA) that analyzes the need for street typologies, traffic control devices, streetscape and intersection improvements that encourage walking, bicycling, and transit use as the primary access modes for the proposed project.

        i. Use person trips instead of vehicle trip rates from the ITE Trip Generation Manual and assign these trips to the transportation system. This will require analysis of crossing treatments using NCHRP 562 methodology for pedestrian measures.

        ii. The following performance measures still need to be addressed in this study:
            1. V/C ratio targets that are >1 for 1st and/or 2nd highest peak hours

2. Identify where vehicle Level of Service (LOS) will not be used
3. Pedestrian Level-of-Service (LOS)
4. Bicycle Level of Traffic Stress (LTS)
5. Transit Capacity and Quality of Service (TCQSM)

iii. In addition to the calculated LOS, the observational LOS should be provided.

iv. Please provide observed bicycle and pedestrian counts to Department of Transportation Services (DTS) in the Department's standard format. Contact Byron Nakamura, Traffic Technician of the Special Plans Branch at bnakamura@honolulu.gov to obtain the Traffic Count Summary Reporting instructions and template.

v. Please contact Nicola Szibbo of the Regional Planning Branch at nicola.szibbo@honolulu.gov to obtain the above multimodal transportation assessment tools.

vi. Please contact David Wade of the OahuMPO at david.wade@oahumpo.org for access to the latest Regional Travel Demand Model (Version 6, 2015) for the transportation assessment.

2. **Complete Streets.** The following comments are related to Complete Streets:

a. **Consistency with Complete Streets Policies.** The EA should contain a discussion of compliance with County and State Complete Streets policies, pursuant to Act 54, Session Laws of Hawaii 2009, HRS §264-20.5 and ROH 12-15. The Project should elaborate on how it will comply with Complete Streets policies, including specific adherence to the following key Complete Streets principles: 1) safety; 2) Context Sensitive Solutions; 3) accessibility and mobility for all; 4) use and comfort of all users; 5) consistency of design guidelines and standards; 6) energy efficiency; 7) health; and 8) green infrastructure.

b. **Complete Streets Improvements.** The EA should evaluate whether improvements and facilities are needed to aid vehicular, pedestrian, bicycle and public transportation circulation by implementing Complete Streets principles. To the extent practicable, the design of the project should be consistent with the City's Complete Streets ordinance, assign street typologies, and include features to encourage walking, bicycling and public transit.

c. **Sidewalk Zone.** The applicant shall provide both plans and sections how the streetscape meets the requirements of the Complete Streets Sidewalk Zone as per page 175-176 of the Complete Streets Manual. Delineate in section the 1) curb zone; 2) the furniture zone; 3) the pedestrian zone; and 4) the frontage zone and include the dimensions for each zone.

d. **Bike Lanes.** Bike lanes shall be implemented along Saratoga Avenue and Roosevelt Avenue to conform to the Oahu Bike Plan. Please contact Chris Sayers at csayers@honolulu.gov for information on bike lane design.

3. **Roads and Transportation.** The following comments are related to roads and transportation:

   a. In Section 15-14.1, the jurisdiction of the roadways should be added to the discussion of the description of the existing roadways in the area.

   b. The speed along Kalaeloa Boulevard should be verified.

4. **Construction Impacts.** The following comments are related to short-term construction impacts:

   a. **Traffic Management Plan (TMP).** The EA should include a Traffic Management Plan, which discusses traffic impacts the project may have on any surrounding City roadways, including short-term impacts during construction and long-term impacts after construction with corresponding measures to mitigate these impacts by applying Complete Streets principles.

b. **Best Practice TMPs.** Best practice TMPs provide the City with information by which to monitor construction areas. The City will require cameras where sidewalks are closed to help assess effectiveness of management.

c. **Joint TMP Review.** The TMP shall be jointly reviewed and accepted by the City's Department of Transportation Services and the Department of Planning and Permitting.

d. **Construction Materials and Equipment.** Construction materials and equipment should be transferred to and from the project site during off-peak traffic hours (8:30 a.m. to 3:30 p.m.) to minimize any possible disruption to traffic on the local streets, and after the morning school rush to minimize impacts to schools in the area.

e. **Safety Measures for Existing Access.** Any existing pedestrian, bicycle and vehicle access/crossing will be maintained with the highest safety measures during construction. Pedestrian detour routes should be established around construction activities situated within the sidewalk area. These detour routes should be located adjacent to or near the property line and near to the bus stop. For example, if a water or sewer line installation takes place within the sidewalk area, then the pedestrian detour route can be located within the project's property. In this way, the pedestrian does not have to travel a far distance or round-about path to get to the bus stop. Pedestrian detour plans shall be submitted to the DTS for review and approval.

f. **Best Management Practice Controls.** Best Management Practice controls should be included at construction site to prevent trailing of dirt and debris on City roadways.

g. **Americans with Disabilities Act (ADA) Requirements.** Any damage to the existing roadway that is caused by the project should be repaired to current City standards as well as meet Americans with Disabilities Act requirements.

h. **Neighborhood Impacts.** The area Neighborhood Board, as well as the area businesses, emergency personnel (fire, ambulance and police), Oahu Transit Services, Inc. (TheBus and TheHandi-Van), etc., should be kept apprised of the details of the proposed project and the

impacts that the project may have on the adjoining local street area network.

i. **Street Usage Permits.** A street usage permit from the City's Department of Transportation Services should be obtained for any construction-related work that may require the temporary closure of any traffic lane on a City street.

j. **Public Transit Service Area.** The project is in an existing public transit service area. To ensure that the project development does not affect public transit services (bus operations, bus routes, bus stops and para-transit operations); submit project plans to DTS – Public Transit Division (PTD) for review and approval. Contact DTS-PTD at 768-8396, 768-8370, 769-8374 or TheBusStop@honolulu.gov.

5. **Disability and Communication Access Board.** Project plans (interior and exterior layouts, vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, reduced-width traffic lanes, etc.) should be reviewed and approved by the Disability and Communication Access Board to ensure full compliance with the ADA.

6. **Sea Level Rise and Resilience**. Infrastructure improvements located within areas potentially exposed to chronic flooding with sea level rise shall be subject to an in-depth analysis of the potential impacts of sea level rise on elevation, tolerance for risk, and the lifetime of the proposed structure or infrastructure. Any significant improvements within existing footprints should be dependent on established, resilient design guidelines, or otherwise be subject to relocation to a more suitable area.

   The potential for chronic flooding with 3.2 feet of sea level rise (SLR-XA) shall be used as the vulnerability zone for planning purposes. Maps of the project area shall be provided for both the SLR-XA and flooded highways. The applicant shall recommend strategies and designs that increase the flood resiliency for new development or improvements within the SLR-XA that cannot be relocated, or seek opportunities to plan new development or projects well landward of the SLR-XA. See the following to determine vulnerability: http://www.pacioos.hawaii.edu/shoreline/slr-hawaii.

We reserve the right to further comment pending review of the EA.

Thank you for the opportunity to review this matter. Should you have any questions, please contact Nicola Szibbo of my staff at 768-8359.

Very truly yours,

Wes Frysztacki
Director

√ cc: Brian Takeda, R.M. Towill Corporation

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Planning
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Photogrammetry
Surveying
Construction Management

February 6, 2020

Mr. Wes Fryszlacki, Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawai‘i 96813

Dear Mr. Fryszlacki:

Subject: **Response to Comments for Hawai‘i Revised Statutes, Chapter 343, Draft Environmental Assessment (EA) for Hunt Kalaeloa Subdivision Roads Project, Kalaeloa, ‘Ewa, O‘ahu, Hawai‘i**

On behalf of the State of Hawai‘i, Community Development Authority (HCDA), we thank you for your letter (TP12/18-755262R) dated January 31, 2019 concerning the subject project. The HCDA is reissuing the subject Draft EA and will incorporate by reference your comments and this letter into the preparation of a new reissued Draft EA. As with any Draft EA, you will be provided the opportunity to comment to this reissued document.

The following has been prepared in response to your comments (your comments are *italicized* for reference):

1. *Traffic Impact. The following comments are related to transportation impacts:*
    a. *Transportation Assessment. A TA has not been provided with the DEA. Provide a Transportation Assessment (TA) that analyzes the need for street typologies, traffic control devices, streetscape and intersection improvements that encourage walking, bicycling, and transit use as the primary access modes for the proposed project.*
        i. *Use person trips instead of vehicle trip rates from the ITE Trip Generation Manual and assign these trips to the transportation system. This will require analysis of crossing treatments using NCHRP 562 methodology for pedestrian measures.*
        ii. *The following performance measures still need to be addressed in this study:*
            1. *V/C ratio targets that are >1 for 1st and/or 2nd highest peak hours*
            2. *Identify where vehicle Level of Service (LOS) will not be used*
            3. *Pedestrian Level-of-Service (LOS)*
            4. *Bicycle Level of Traffic Stress (LTS)*
            5. *Transit Capacity and Quality of Service (TCQSM)*
        iii. *In addition to the calculated LOS, the observational LOS should be provided.*

iv. *Please provide observed bicycle and pedestrian counts to Department of Transportation Services (DTS) in the Department's standard format. Contact Byron Nakamura, Traffic Technician of the Special Plans Branch at bnakamura@honolulu.gov to obtain the Traffic Count Summary Reporting instructions and template.*
v. *Please contact Nicola Szibbo of the Regional Planning Branch at nicola.szibbo@honolulu.gov to obtain the above multimodal transportation assessment tools.*
vi. *Please contact David Wade of the OahuMPO at david.wade@oahumpo.org for access to the latest Regional Travel Demand*

HCDA acknowledges the references provided and will review them for regulatory applicability to this project. Section 5.14.1, Roads and Transportation, of the reissued Draft EA summarizes the Hunt Kalaeloa roadway, public transit, bicycle, and pedestrian system as described in a Traffic Impact Analysis Report (TIAR) conducted by Fehr and Peers in December 2017. The full TIAR is provided in its entirety in Appendix E of the reissued Draft EA.

2. *Complete Streets. The following comments are related to Complete Streets:*
   a. *Consistency with Complete Streets Policies. The EA should contain a discussion of compliance with County and State Complete Streets policies, pursuant to Act 54, Session Laws of Hawaii 2009, HRS §264-20.5 and ROH 12-15. The Project should elaborate on how it will comply with Complete Streets policies, including specific adherence to the following key Complete Streets principles: 1) safety;2) Context Sensitive Solutions; 3) accessibility and mobility for all;4) use and comfort of all users; 5) consistency of design guidelines and standards; 6) energy efficiency; 7) health; and 8) green infrastructure.*
   b. *Complete Streets Improvements. The EA should evaluate whether improvements and facilities are needed to aid vehicular, pedestrian, bicycle and public transportation circulation by implementing Complete Streets principles. To the extent practicable, the design of the project should be consistent with the City's Complete Streets ordinance, assign street typologies, and include features to encourage walking, bicycling and public transit.*
   c. *Sidewalk Zone. The applicant shall provide both plans and sections how the streetscape meets the requirements of the Complete Streets Sidewalk Zone as per page 175-176 of the Complete Streets Manual. Delineate in section the 1) curb zone; 2) the furniture zone; 3) the pedestrian zone; and 4) the frontage zone and include the dimensions for each zone.*
   d. *Bike Lanes. Bike lanes shall be implemented along Saratoga Avenue and Roosevelt Avenue to conform to the Oahu Bike Plan. Please contact Chris Sayers at csayers@honolulu.gov for information on bike lane design.*

The reissued Draft EA will include a discussion of the proposed project's consistency with Act 54, Session Laws of Hawai‘i 2009, HRS §264-20.5 and ROH 12-15 in Section 7.1.6, Act 54,

Session Laws of Hawai‘i (SLH), Complete Streets. A few of the key points in reference to the above comment includes:

- Improvements are needed to aid vehicular, pedestrian, bicycle and public transportation circulation as the existing roadways on the project site are dilapidated and have not been subject to major repairs since closure of the Barbers Point Naval Air Station in 1999.
- The proposed improvements incorporate the Complete Streets design principles as promulgated in Honolulu City Council Ordinance No. 12-15 (2012) which includes the consideration for the use of the sidewalk zone per the Honolulu Complete Streets Design Manual (2012 and finalized in 2016).
- The incorporation of bike lanes, planter strips, and sidewalks to create a pedestrian-friendly environment. This would include the incorporation of bike lanes on Saratoga Avenue and Roosevelt Avenue consistent with the TIAR (2017).
- The proposed improvements to the roadway system will be designed to City and County of Honolulu standards.

We further expect our participation in an on-going process of review to accomplish the objectives of Complete Streets as the roadway designs are reviewed and finalized by governmental agencies such as DTS. This will occur, however, following the completion of the HRS, Chapter 343 Environmental Assessment review process.

3. *Roads and Transportation. The following comments are related to roads and transportation:*
   a. *In Section 15-14.1, the jurisdiction of the roadways should be added to the discussion of the description of the existing roadways in the area.*
   b. *The speed along Kalaeloa Boulevard should be verified.*

The Draft EA does not have a Section 15-14.1. We therefore understand this to be a reference to Section 5.14.1. Accordingly, a discussion on the jurisdiction of the roadways under study will be provided in the Final EA under preparation for this project. This will include a verification of the posted speed limit along Kalaeloa Boulevard.

4. *Construction Impacts. The following comments are related to short-term construction impacts:*
   a. *Traffic Management Plan (TMP). The EA should include a Traffic Management Plan, which discusses traffic impacts the project may have on any surrounding City roadways, including short-term impacts during construction and long-term impacts after construction with corresponding measures to mitigate these impacts by applying Complete Streets principles.*
   b. *Best Practice TMPs. Best practice TMPs provide the City with information by which to monitor construction areas. The City will require cameras where sidewalks are closed to help assess effectiveness of management.*

c. *Joint TMP Review. The TMP shall be jointly reviewed and accepted by the City's Department of Transportation Services and the Department of Planning and Permitting.*
d. *Construction Materials and Equipment. Construction materials and equipment should be transferred to and from the project site during off peak traffic hours (8:30 a.m. to 3:30 p.m.) to minimize any possible disruption to traffic on the local streets, and after the morning school rush to minimize impacts to schools in the area.*
e. *Safety Measures for Existing Access. Any existing pedestrian, bicycle and vehicle access/crossing will be maintained with the highest safety measures during construction. Pedestrian detour routes should be established around construction activities situated within the sidewalk area. These detour routes should be located adjacent to or near the property line and near to the bus stop. For example, if a water or sewer line installation takes place within the sidewalk area, then the pedestrian detour route can be located within the project's property. In this way, the pedestrian does not have to travel a far distance or round-about path to get to the bus stop. Pedestrian detour plans shall be submitted to the DTS for review and approval.*
f. *Best Management Practice Controls. Best Management Practice controls should be included at construction site to prevent trailing of dirt and debris on City roadways.*
g. *Americans with Disabilities Act (ADA) Requirements. Any damage to the existing roadway that is caused by the project should be repaired to current City standards as well as meet Americans with Disabilities Act requirements.*
h. *Neighborhood Impacts. The area Neighborhood Board, as well as the area businesses, emergency personnel (fire, ambulance and police), Oahu Transit Services, Inc. (TheBus and TheHandi-Van), etc., should be kept apprised of the details of the proposed project and the impacts that the project may have on the adjoining local street area network.*
i. *Street Usage Permits. A street usage permit from the City's Department of Transportation Services should be obtained for any construction-related work that may require the temporary closure of any traffic lane on a City street.*
j. *Public Transit Service Area. The project is in an existing public transit service area. To ensure that the project development does not affect public transit services (bus operations, bus routes, bus stops and para-transit operations); submit project plans to DTS - Public Transit Division {PTO) for review and approval. Contact DTS-PTD at 768-8396, 768-8370, 769-8374 or TheBusStop@honolulu.gov.*

We offer the following response to the above list of traffic impacts:

- A TMP will be prepared by the project's construction contractor as part of the construction plan review process as required. The TMP will be review and approved by the appropriate State and CCH agencies and entitles. This may include the joint review of the TMP by the DTS and Department of Planning and Permitting (DPP), as required.
- Best Practice TMPs will be prepared the project's construction contractor as part of the construction plan review process as required. Specified measures such as the use of

cameras will be provided based on the appropriate State and CCH agency review comments.

- The recommended handling and transportation of construction materials and equipment shall be in accordance with Federal, State and City regulatory requirements.
- Safety measures to maintain existing access including pedestrian detour plans shall be reviewed as required by the appropriate State and City agencies.
- Best Management Practices (BMPs) relating to NPDES construction storm water permits as regulated and managed by the State Department of Health, Clean Water Branch and CCH shall be provided as required by law.
- The repair of damage to existing State and CCH roadways caused by the project shall be to current standards including Americans with Disabilities Act requirements.
- The project's construction contractor and owner, in accordance with law, shall provide for notice to the area neighborhood, including appropriate public and private groups, organizations, and individuals.
- Street usage and other required construction permits shall be obtained for the proposed project.
- Other public notifications, coordination, and/or submittal of documents including permits to government agencies shall be undertaken as required by law. This shall include ensuring that the project development does not affect public transit services such as bus operations, bus routes, bus stops and para-transit operations, as managed or coordinated by the DTS, Public Transit Division.

5. *Disability and Communication Access Board. Project plans (interior and exterior layouts, vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, reduced-width traffic lanes, etc.) should be reviewed and approved by the Disability and Communication Access Board to ensure full compliance with the ADA.*

The comment is acknowledged. The project construction plans will be prepared and submitted to State, CCH agencies, utility companies, and the Disability and Communication Access Board, for review and approval.

6. *Sea Level Rise and Resilience. Infrastructure improvements located within areas potentially exposed to chronic flooding with sea level rise shall be subject to an in-depth analysis of the potential impacts of sea level rise on elevation, tolerance for risk, and the lifetime of the proposed structure or infrastructure. Any significant improvements within existing footprints should be dependent on established, resilient design guidelines, or otherwise be subject to relocation to a more suitable area.*

   The potential for chronic flooding with 3.2 feet of sea level rise (SLR-XA) shall be used as the vulnerability zone for planning purposes. Maps of the project area shall be provided for both the SLR-XA and flooded highways. The applicant shall recommend

> *strategies and designs that increase the flood resiliency for new development or improvements within the SLR-XA that cannot be relocated, or seek opportunities to plan new development or projects well landward of the SLR-XA. See the following to determine vulnerability: http://www.pacioos.hawaii.edu/shoreline/slr-hawaii.*

This comment is acknowledged. The reissued Draft EA, Section 5.3, Climate, and Section 5.7, Natural Hazards, presents the findings of the Hawaii Sea Level Rise Vulnerability and Adaptation Report 2017. The project site elevation is 52 feet above sea level and direct inundation due to sea-level rise is not expected in the context of 21st-century sea-level rise projections. Furthermore, according to the Hawai‘i Sea Level Rise (SLR) Viewer (accessed 2019), the project site is not within the 3.2-feet SLR Exposure Area.

We appreciate your review of the subject document and allowing us this opportunity to respond. Your letter and this response will be included in the reissued Draft EA. Should you have any questions, please contact me by phone at (808) 842-1133 or by e-mail at BrianT@rmtowill.com.

Sincerely,

Brian Takeda

Brian Takeda
Planning Project Manager

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cc: Ms. Tesha Mālama, HCDA