DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

MEMORANDUM

TO: Mr. Scott Glenn, Director
Office of Environmental Quality Control
Department of Health

FROM: Scott M. Ojiri
Acting Public Works Administrator

SUBJECT: Draft Environmental Impact Statement for the Hawaii State Hospital, New Patient Facility and Campus Master Plan Development
Kaneohe (Koolaupoko), Oahu, Hawaii
DAGS Job Number 12-20-2701

Attached for your action is the Department of Accounting and General Services' (DAGS) submittal of the documents package for the Draft Environmental Impact Statement (DEIS) for the Department of Health's Hawaii State Hospital, New Patient Facility and Campus Master Plan Development, Kaneohe (Koolaupoko), Oahu, Hawaii, situated at Tax Map Keys: (1) 4-5-023:002, (1) 4-5-023:016 (remnant), and (1) 4-5-023:017 (remnant) in the Kaneohe (Koolaupoko) District on the island of Oahu, for publication of a notice of availability for public comment for 60-days in the next available edition of the State, Office of Environmental Quality Control, *Environmental Notice* (OEQC) bulletin. The DEIS includes copies of all written comments received during early pre-consultation for the project and the thirty-day EISPN public review period.

Also enclosed is a DEIS distribution list for verification by OEQC under Section 11-200-21, Hawaii Administrative Rules. Upon receiving verification from OEQC (along with the bulletin proof of the notice containing the pertinent details for commenters), we will make the DEIS and the bulletin proof available to those so indicated on the distribution list so that they will have the full 60-day statutory period to review and comment on the DEIS.

17-198

Finally, enclosed is a completed OEQC Publication Form, DEIS in both hard copy form and electric form (Adobe Acrobat PDF file on CD), and an electronic copy of the publication form in Microsoft Word format for your use and reference. Simultaneous with this letter, we have submitted a summary of the proposed action in a text file by electronic mail to OEQC. Additionally, we have sent the DEIS (hard copy and CD of PDF), distribution list and publication form to the Governor's Office as the Accepting Authority for the project.

If you have any questions on this matter, your staff may call Mr. Brian Isa of the Planning Branch at 586-0484.

BI:mo
Enclosures:
OEQC Publication Form (PDF & MS Word)
One Draft EIS Hardcopy
CD (includes PDF of Draft EIS)

c: The Honorable Virginia Pressler, M.D., DOH
Ms. Lynn Fallin, DOH
Mr. Mark Fridovich, DOH
Mr. William May, DOH
Mr. John Messina, DOH

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

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STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

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MEMORANDUM

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

TO: The Honorable David Y. Ige
Governor of Hawaii

FROM: for Douglas Murdock Audrey Hidano
Comptroller

SUBJECT: Draft Environmental Impact Statement for the Hawaii State Hospital
New Patient Facility and Campus Master Plan Development
Kaneohe (Koolaupoko), Oahu, Hawaii
DAGS Job Number 12-20-2701

Under the provisions of Act 172 (12), we have determined at the outset that an Environmental Impact Statement is required for the Department of Health's Hawaii State Hospital, New Patient Facility and Campus Master Plan Development, Kaneohe (Koolaupoko), Oahu, Hawaii, located at Tax Map Keys (1) 4-5-023:002, (1) 4-5-023:016 (remnant), and (1) 4-5-023:017 (remnant). Notice of this project and its Environmental Impact Statement Preparation Notice (EISPN) was published in the Sunday, May 8, 2016, issue of the State Department of Health (DOH), Office of Environmental Quality Control (OEQC), *Environmental Notice* bulletin; and, its thirty-day public review and comment period closed on Wednesday, June 8, 2016.

We have received written comments during early pre-consultation and the thirty-day EISPN public review period and included the comments and responses in this Draft Environmental Impact Statement (DEIS). Notice of this project and its DEIS will be published in the Tuesday, November 8, 2016, issue of the DOH OEQC, *Environmental Notice* bulletin. Its sixty-day public review and comment period will begin on November 8, 2016, and will end on Monday, January 9, 2017. A hard copy of our DEIS document is provided for your review and comment.

We understand your office will be the Accepting Authority for the EIS process for this proposed action. The Hawaii State Hospital is owned and operated by the DOH, Adult Mental Health Division, and DAGS is the expending agency acting on their behalf for the project. The Final EIS is currently anticipated to be completed for OEQC publication in early 2017.

Should there be any questions on this matter, your staff may call Mr. Brian Isa of the Public Works Division at 586-0484.

Enclosures: Draft Environmental Impact Statement (hard copy and PDF via CD)
DEIS distribution list
OEQC Publication Form
Transmittal letter to OEQC (copy)
EIS Checklist

FILE COPY
NOV 08 2016

AGENCY PUBLICATION FORM

Project Name:	State of Hawai'i, Department of Health, Hawai'i State Hospital, New Patient Facility and Campus Master Plan Development, O'ahu
Project Short Name:	Hawai'i State Hospital, New Patient Facility and Campus Master Plan Development
HRS §343-5 Trigger(s):	• Use of State lands • Use of State funds
Island(s):	O'ahu
Judicial District(s):	Kāne'ohe (Ko'olaupoko)
TMK(s):	(1)4-5-023:002, (1)4-5-023:016 (remnant) and (1)4-5-023:017 (remnant)
Permit(s)/Approval(s):	Certificate of Need (DOH-SHPDA); Plan Review Use Application (CCH-DPP); CWA Section 401 Water Quality Certification (DOH-CWB), Section 402 NPDES Permit (DOH-CWB) and CWA Section 404 / Section 10 Department of Army Permit (USACE); DLNR-SHPD Historic Architectural, Archaeological and Cultural Sites; ADAAG Accessibility Review (DOH-DCAB); and Building Permit / Civil Plan Review (CCH-DPP)
Proposing/Determining Agency:	State of Hawai'i, Department of Accounting and General Services (DAGS), Division of Public Works
Contact Name, Email, Telephone, Address	Contact Name: Christine L. Kinimaka P.E. (Acting DAGS Public Works Administrator) Email: Chris.Kinimaka@Hawaii.Gov Telephone: 808.586.0500 Address: Kalanimoku Building, 1151 Punchbowl Street, Room 426, Honolulu, Hawai'i 96813
Accepting Authority:	Governor, State of Hawai'i
Contact Name, Email, Telephone, Address	Contact Name: The Honorable David Ige Email: http://governor.hawaii.gov/contact-us/contact-the-governor Telephone: 808.586.0034 Address: Hawai'i State Capitol, 5th Floor, 415 South Beretania Street, Honolulu, Hawai'i 96813
Consultant:	Brown and Caldwell
Contact Name, Email, Telephone, Address	Contact Name: Mike Nishimura, P.E., LEED AP Email: MNishimura@BrwnCald.Com Telephone: 808.533.0226 Address: Pacific Guardian Center—Mauka Tower, 737 Bishop Street, Suite 3000, Honolulu, Hawai'i 96813

Status (select one)	**Submittal Requirements**
____ DEA-AFNSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
____ FEA-FONSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
____ FEA-EISPN	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.
____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the proposing agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
_X_ DEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 60-day comment period follows from the date of publication in the Notice.

____ FEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ FEIS Acceptance Determination	The accepting authority simultaneously transmits to both the OEQC and the proposing agency a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.
FEIS Statutory Acceptance	Timely statutory acceptance of the FEIS under Section 343-5(c), HRS, is not applicable to agency actions.
____ Supplemental EIS Determination	The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is or is not required; no EA is required and no comment period ensues upon publication in the Notice.
____ Withdrawal	Identify the specific document(s) to withdraw and explain in the project summary section.
____ Other	Contact the OEQC if your action is not one of the above items.

Project Summary

Provide a description of the proposed action and purpose and need in 200 words or less.

The State of Hawai'i Department of Health plans to improve its primary adult behavioral health facility, Hawai'i State Hospital, on the windward side of O'ahu to address the growing population of patient admissions from across the state while maintaining safe and secure operation of the campus. The patient facility is already at full capacity and in urgent need of a new patient care facility with additional beds and proper treatment care and activities—the first phase of which is proposed at the existing Goddard building site at the back of the campus, which has been abandoned for more than two decades. Demolition of the existing Goddard building is currently under way under a separate project.

This Draft Environmental Impact Statement summarizes the proposed campus improvements, describes the environment that could be affected by the improvements, identifies potential impacts the work could have on the environment, and assesses any mitigation measures to address any prospective adverse impacts on these resources by the project.

Draft Environmental Impact Statement

STATE OF HAWAIʻI,
DEPARTMENT OF HEALTH

HAWAIʻI STATE HOSPITAL, NEW PATIENT FACILITY AND CAMPUS MASTER PLAN DEVELOPMENT

KĀNEʻOHE (KOʻOLAUPOKO),
OʻAHU, HAWAIʻI

Prepared for:
State of Hawaiʻi, Department of Accounting and General Services
DAGS Job 12-20-2701
Honolulu, Hawaiʻi
November 2016

Draft Environmental Impact Statement
State of Hawai‘i, Department of Health
Hawai‘i State Hospital, New Patient Facility and Campus Master Plan Development
Kāne‘ohe (Ko‘olaupoko), O‘ahu, Hawai‘i

Prepared for:
State of Hawai‘i, Department of Accounting and General Services
Honolulu, Hawai‘i
November 2016

State of Hawai‘i, Department of Health
Hawai‘i State Hospital, New Patient Facility
and Campus Master Plan Development
Kāne‘ohe (Ko‘olaupoko), O‘ahu, Hawai‘i
State of Hawai‘i, Department of Accounting and General Services
DAGS Job 12-20-2701

Brown AND Caldwell
737 Bishop Street, Suite 3000
Honolulu, Hawai‘i 96813

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List of Abbreviations

°F	degree(s) Fahrenheit
μg/m^3	microgram(s) per cubic meter
ABH	adult behavioral health
AC	asphaltic concrete
Act	Hawai‘i State Planning Act
ADA	*Americans with Disabilities Act*
AE	archaeological evaluation
AeE	‘Alaeloa silty clay
AG-2	general agricultural zoned land
AHJ	authority having jurisdiction
AIS	archaeological inventory survey
AJD	Approved Jurisdictional Determination
AMA	American Medical Association
AMHD	Adult Mental Health Division
AMSL	above mean sea level
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BMP	best management practice
BSF	Behavioral Stability Facility
Btuh	British thermal unit(s) per hour
CAB	Clean Air Branch
CAD	computer-aided design
CATV	cable television
CCRT	Center for Conservation Research and Training
CCTV	closed-circuit television
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CIA	cultural impact assessment
City	City and County of Honolulu
Cl^-	chloride
CO	carbon monoxide
CON	Certificate of Need
CSH	Cultural Surveys Hawai‘i Inc.
CWA	*Clean Water Act*
CWB	Clean Water Branch
CZM	Coastal Zone Management
DAGS	Department of Accounting and General Services
dB	decibel(s)
dBA	A-weighted decibel(s)
DBEDT	Department of Business, Economic Development and Tourism
DCAB	Disability and Communication Access Board
DEIS	Draft Environmental Impact Statement *(this document)*
DLNR	Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife
DOH	Department of Health
DOT	Department of Transportation
DPP	Department of Planning and Permitting
DTS	Department of Transportation Services
EA	Environmental Assessment
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EJ	environmental justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPO	Environmental Planning Office
FEIS	Final Environmental Impact Statement
FEL	front-end loading
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
ft	foot/feet
FTA	Federal Transit Administration
gpad	gallon(s) per acre per day
gpcd	gallon(s) per capita daily
gpd	gallon(s) per day
gpm	gallon(s) per minute
H_2S	hydrogen sulfide
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HAR	*Hawai‘i Administrative Rules*
HBMP	Hawai‘i Biodiversity and Mapping Program

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HBWS	Honolulu Board of Water Supply
HoLIS	Honolulu Land Information System
HECO	Hawaiian Electric Company
HEP	Highway Administration, Office of Planning, Environment, and Realty
HEPA	*Hawai‘i Environmental Policy Act*
HFD	Honolulu Fire Department
HoLIS	Honolulu Land Information System
HPD	Honolulu Police Department
HRS	*Hawai‘i Revised Statutes*
HSH	Hawai‘i State Hospital
HSTP	Hawaii Statewide Transportation Plan
HSWG	Ha‘ikū Stairs Working Group
IBC	International Building Code
IES	Illuminating Engineering Society
IRHB	Indoor and Radiological Health Branch
km	kilometer(s)
KNB	Kāne‘ohe Neighborhood Board
KSCP	*Ko‘olaupoko Sustainable Communities Plan*
kV	kilovolt(s)
kVA	kilovolt-ampere(s)
kW	kilowatt(s)
KWMP	*Ko‘olaupoko Watershed Management Plan*
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
LF	lineal foot/feet
LID	low-impact development
L/min	liter(s) per minute
LoB	Loleka‘a Silty Clay
LOS	level of service
LPG	liquefied propane gas
LUO	*Land Use Ordinance*
LUPD	Land Use Permits Division
m	meter(s)
MDD	maximum day demand
mgd	million gallons per day
mg/L	milligram(s) per liter
mm	millimeter(s)
MP	Master Plan
MPU	Master Plan Update
MS4	municipal separate storm sewer system
MSA	Metropolitan Statistical Area
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NAMS	National Air Monitoring Station
NATA	National Air Toxics Assessment
NEPA	*National Environmental Policy Act*
NFPA	National Fire Protection Association
NGPC	Notice of General Permit Coverage
NH_4	ammonium
NO_2	nitrogen dioxide
NO_3	nitrate
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPF	New Patient Facility
NPL	National Priority List
NRCS	National Resources Conservation Service
O_3	ozone
OEQC	Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
O&M	operations and maintenance
OP	Office of Planning
OSHA	Occupational Safety and Health Act
Pb	lead
PHD	peak hour demand
PJD	Preliminary Jurisdictional Determination
$PM_{2.5}$	particulate matter with diameters of 2.5 micrometers or less
PM_{10}	particulate matter with diameters of 10 micrometers or less
POTW	publicly owned treatment works
ppb	part(s) per billion
ppm	part(s) per million
PRU	Plan Review Use
psi	pound(s) per square inch
psig	pound(s) per square inch gauge
PTZ	pan, tilt, zoom
RCNM	Roadway Construction Noise Model

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RCP	reinforced concrete pipe
RHA	Rivers and Harbor Act
RMP	Risk Management Plan
ROH	*Revised Ordinances of Honolulu*
SCS	Soil Conservation Service
SHPD	State Historic Preservation Division
SHPDA	State Health Planning and Development Agency
SLAMS	State and Local Air Monitoring Station
SMA	Special Management Area
SNF	Skilled Nursing Facility
SO_2	sulfur dioxide
State	State of Hawai‘i
TDM	traffic demand management
TIAR	Traffic Impact Analysis Report
TMDL	total maximum daily load
TMK	Tax Map Key
TN	total nitrogen
TP	total phosphorus
TSDF	treatment storage and disposal facilities
TSS	total suspended solids
UH	University of Hawai‘i
UHCC	University of Hawai‘i Community Colleges
USACE	U.S. Army Corps of Engineers, Honolulu District, Regulatory Office
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USi	Underground Services, Inc.
UST	underground storage tank
V	volt(s)
VCP	vitrified clay pipe
WCC	Windward Community College
WCHC	Windward Comprehensive Health Center
WLA	wasteload allocation
WQC	Water Quality Certification
WRCC	Western Regional Climate Center
yd^3	cubic yard(s)
ZRPB	Zoning Regulations & Permits Branch

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Executive Summary

The State of Hawaiʻi (State) Department of Health (DOH) Adult Mental Health Division (AMHD) owns and operates the Hawaiʻi State Hospital (HSH) in Kāneʻohe (Koʻolaupoko), Oʻahu, Hawaiʻi. HSH has been in service since the 1930s (formerly known as the "Territorial Hospital" and later, the "Hawaiʻi State Mental Hospital") and is operated as the only State-owned adult behavioral health (ABH) facility for the treatment and housing of court-appointed (judicial order) patients. HSH is currently undersized and outdated, and campus-wide capital improvements are being planned in the near and long terms over several phases based on 2005 and 2015 master planning efforts. Because of the considerable expense of the project—the 2016 State Legislature appropriated $160 million for the planning, design, and construction of the first phase of improvements (New Patient Facility [NPF], which includes a Rehabilitation Mall and supporting infrastructure)—and, because the improvements are located on State-owned property, an Environmental Impact Statement (EIS) is being prepared under the *Hawai'i Environmental Policy Act* (HEPA) in accordance with Chapter 343, *Hawaiʻi Revised Statutes* (HRS), Chapter 200 of Title 11, *Hawaiʻi Administrative Rules* (HAR), and *Act 172-2012*. This document is managed by the State Department of Accounting and General Services (DAGS)—acting as the proposing and expending agency on behalf of DOH-AMHD—and serves as the Draft Environmental Impact Statement (DEIS) for public notice of the project.

An Environmental Impact Statement Preparation Notice (EISPN) was prepared and published in the May 2016 issue of the State DOH Office of Environmental Quality Control's (OEQC's) *The Environmental Notice*, in order to seek initial 30-day public comments on potential environmental, social, and economic impacts of the proposed improvement work at HSH. Comments received on the EISPN, and DAGS responses to them, are included in this DEIS. Following the publication of this DEIS in *The Environmental Notice*, DAGS is allowing public review and feedback for 60 days (greater than the required 45 days) to provide flexibility in the construction procurement of any of the HSH facility improvements should DOH and the governor decide to implement the course enacted by Senate Bill 2540 (now known as Act 90), which was passed into law in 2016. Comments on this DEIS, and DAGS responses to them, will be included and addressed in the Final Environmental Impact Statement (FEIS) for the project. While the FEIS will also be published in *The Environmental Notice*, it will not have a public comment period associated with it.

Proposed Project Purpose and Need

HSH provides inpatient ABH services for the entire state of Hawaiʻi, complementing the State's community mental health centers, Child and Adolescent Mental Health Division family guidance centers, and private mental health agencies and practitioners. While institutional support exists for the HSH campus, HSH is the only facility in the state that can be mandated to admit court-ordered patients according to the following criteria:

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- Psychiatric illness
- Need for active hospital-level treatment, usually longer term
- No complicating or coexisting medical/surgical illness, which requires general hospital care
- Unavailable appropriate psychiatric treatment elsewhere, because of one or both of the following:
  - Lack of psychiatric bed space
  - Lack of available reimbursement for patient care
- Judicial commitment

Because HSH's patients are committed and discharged according to judicial order, HSH has no control over its patient population, which has led to overcrowding and operational challenges. The HSH campus is currently able to house 178 patients in the Guensberg building, as well as Buildings E, F, H, and I. Because of the lack of bed capacity at HSH, 40 additional patients are housed, under contract, at the independently operated Kāhi Mōhala Behavioral Health (Kāhi Mōhala) facility in ‘Ewa Beach, for a total of 218 beds—well below the 259-bed total after a 1988 expansion of the HSH campus that added new buildings and patient beds. Since 1988, buildings have deteriorated to the point of abandonment because of safety concerns. From April 2010 to July 2015, the population of Hawai‘i grew from about 1.36 million to 1.43 million residents—a 5.2 percent increase, which is representative of the correlating probable increase in the number of patients requiring the services of HSH. In addition, staffing shortages have put a strain on the existing operation and security of the HSH facilities, so the need for optimization of existing building use and the need for a new comprehensive patient facility are critical. This project will address these needs in the long term with a phased overall campus buildout of improvements, and in the short term, with the construction of NPF and all associated supporting infrastructure.

Project Information Summary

This section presents a summary of key project information.

Proposing agency:

State of Hawai‘i
Department of Accounting and General Services
Division of Public Works
Kalanimoku Building
1151 Punchbowl Street, Room 426
Honolulu, HI 96813

Contact: Christine L. Kinimaka, P.E.
Acting DAGS Public Works Administrator
Phone: 808.586.0500
Fax: 808.586.0482
Email: Chris.Kinimaka@Hawaii.Gov

Prepared by:

Brown and Caldwell
Pacific Guardian Center—Mauka Tower
737 Bishop Street, Suite 3000
Honolulu, HI 96813

Brown AND Caldwell
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	Contact: Mike S. Nishimura, P.E., LEED AP Phone: 808.523.8499 Fax: 808.533.0226 Email: MNishimura@BrwnCald.Com
Accepting authority:	Governor, State of Hawai‘i Hawai‘i State Capitol, 5th Floor 415 South Beretania Street Honolulu, HI 96813
Project name:	Hawai‘i State Hospital, New Patient Facility and Campus Master Plan Development, Kāne‘ohe (Ko‘olaupoko), O‘ahu, Hawai‘i DAGS Job 12-20-2701
Project Tax Map Key (TMK):	(1)4-5-023:002 (1)4-5-023:016 *(remnant)* (1)4-5-023:017 *(remnant)*
Project address:	Hawai‘i State Hospital 45-691/710 Kea‘ahala Road Kāne‘ohe, HI 96744-3597
Land area:	Approximately 92 acres
State land use district:	Urban
Land Use Ordinance zoning:	AG-2 General Agriculture
Special Management Area:	Project area is not located in a Special Management Area (SMA) established by the City and County of Honolulu (City)
Flood zone designation:	Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Community Panel 270 of 395, Map 15003C0270J, revised and effective November 5, 2014: Zone D (areas in which flood hazards are undetermined, but possible) and Zone X (areas determined to be outside the 0.2 percent annual chance floodplain)

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Project Background

The HSH site is located in Kāne‘ohe, Ko‘olaupoko District, on the island of O‘ahu (Figure ES-1), and comprises Tax Map Keys (TMKs) (1)4-5-023:002, (1)4-5-023:016 *(remnant)*, and (1)4-5-023:017 *(remnant)* as shown on Figure ES-2. The main access to HSH is from Po‘okela Street via Kea‘ahala Road, located *mauka* off of Kahekili Highway. The secondary access to HSH is from the Hakipu‘u Learning Center access road, which is located off of Kea‘ahala Road and runs behind the Kāne‘ohe District Courthouse and Hawai‘i State Department of Transportation (DOT) Baseyard (Figure ES-2).

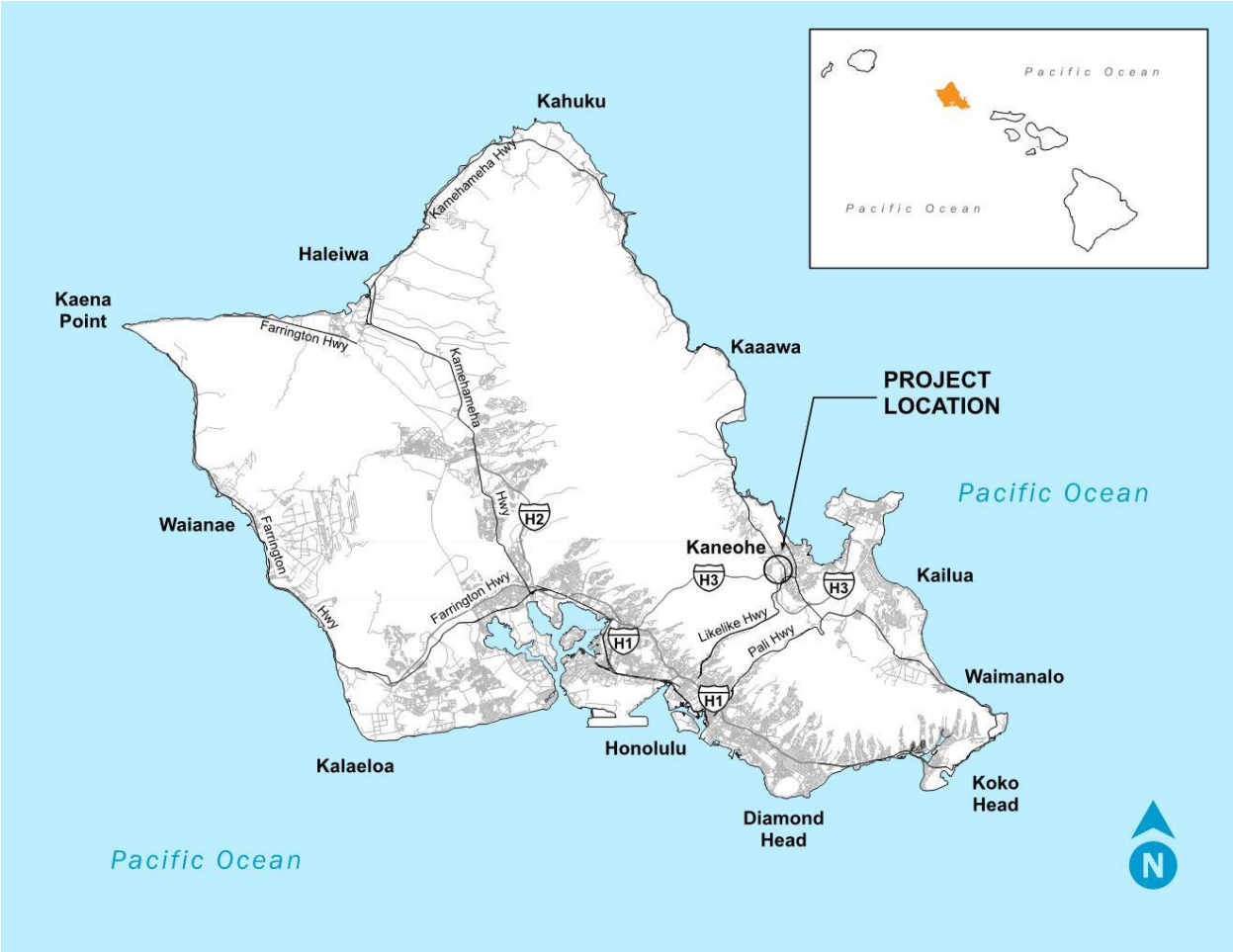

Figure ES-1. HSH location map

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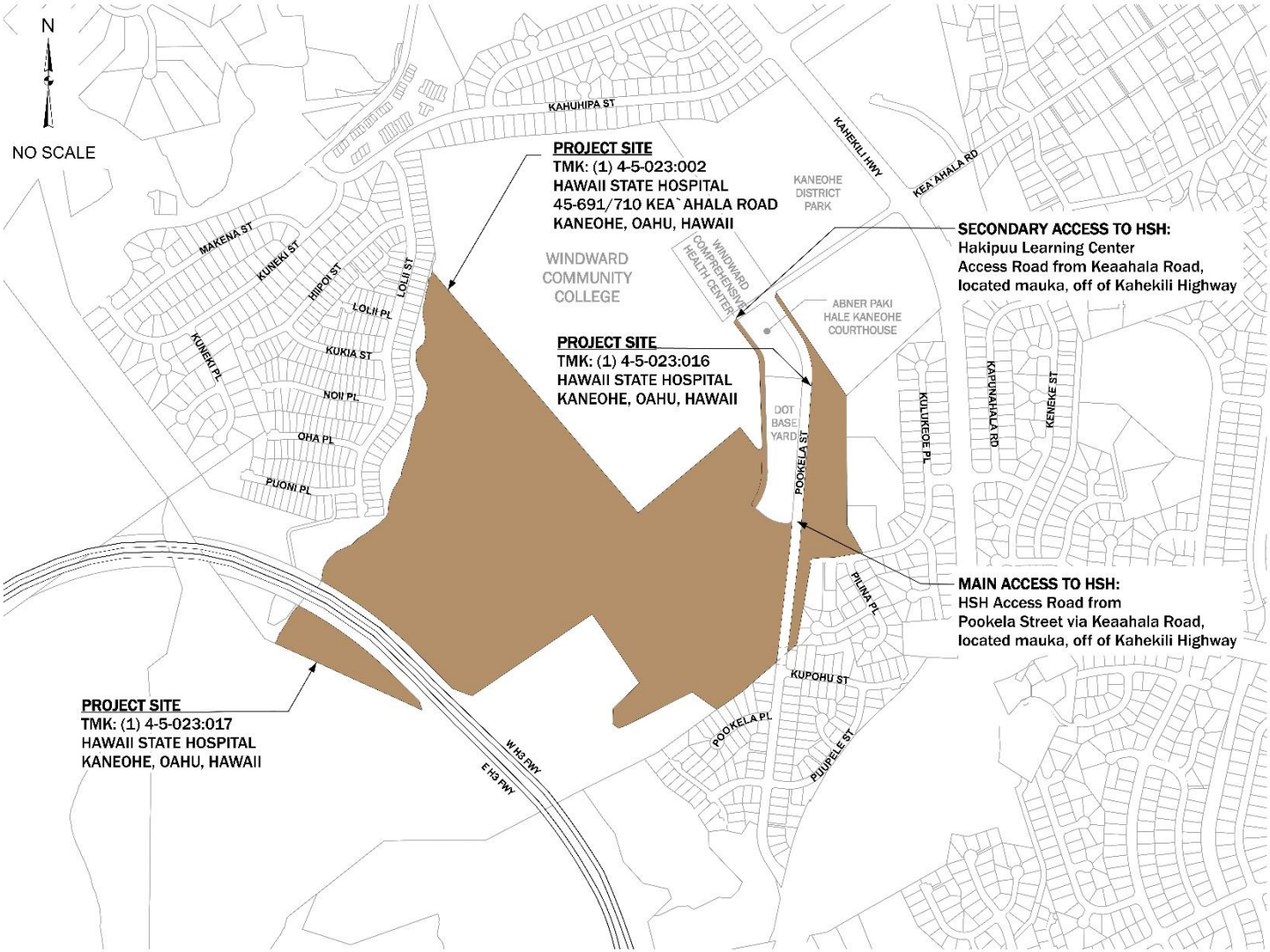

Figure ES-2. HSH vicinity map

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HSH (formerly known as the "Territorial Hospital" and later, the "Hawaiʻi State Mental Hospital") first opened in 1932, at its present site in Kāneʻohe on the island of Oʻahu. HSH was originally constructed and operated by the Territory of Hawaiʻi. Today, DOH-AMHD owns, operates, and maintains the land and buildings that compose HSH's current 92-acre campus. At the time of its opening and historically, HSH has been located in a primarily agricultural area at the base of the windward side of the Koʻolau Mountains. Today, the campus remains zoned for general agricultural uses.

The local community has grown steadily around the HSH campus since its establishment in the 1930s, including residential subdivisions to its northwest and southeast and elevated portions of Interstate H-3 to its southwest. Windward Community College (WCC) borders HSH to the northeast on land that was previously owned by DOH and is now under the control of the State University of Hawaiʻi Community Colleges (UHCC). Adjacent to the HSH entrance on its southeastern portion of the site, DOT occupies land through *Executive Order 3432* for its construction and maintenance baseyard. The Alcoholic Rehabilitation Services of Hawaiʻi,doing business as Hina Mauka, a private, independently operated drug and alcohol rehabilitation treatment facility, also operates on HSH's land under a lease in this area opposite the HSH guard shack and vehicle entrance to the HSH campus, as shown in the HSH campus layout map on Figure ES-3.

The HSH campus is an amalgamation of buildings built during different eras over the last 80 years with different functions and uses. The oldest buildings on campus—ʻIolani, Hāloa, Cooke, and Bishop, built circa 1930 to 1940—are currently being used in limited capacities or are abandoned. The Goddard building, built in 1947, was the first major structure on the HSH campus and the first building to house consolidated patient services. Over time, it has become dilapidated and has not been occupied since 1990; thus, it is currently being demolished because of its inability to provide the functionality needed at HSH and for safety reasons. Following the construction of the Goddard building, many new buildings, expansions of existing buildings, and improvements to the HSH campus facilities were completed, as shown on Figure ES-3.

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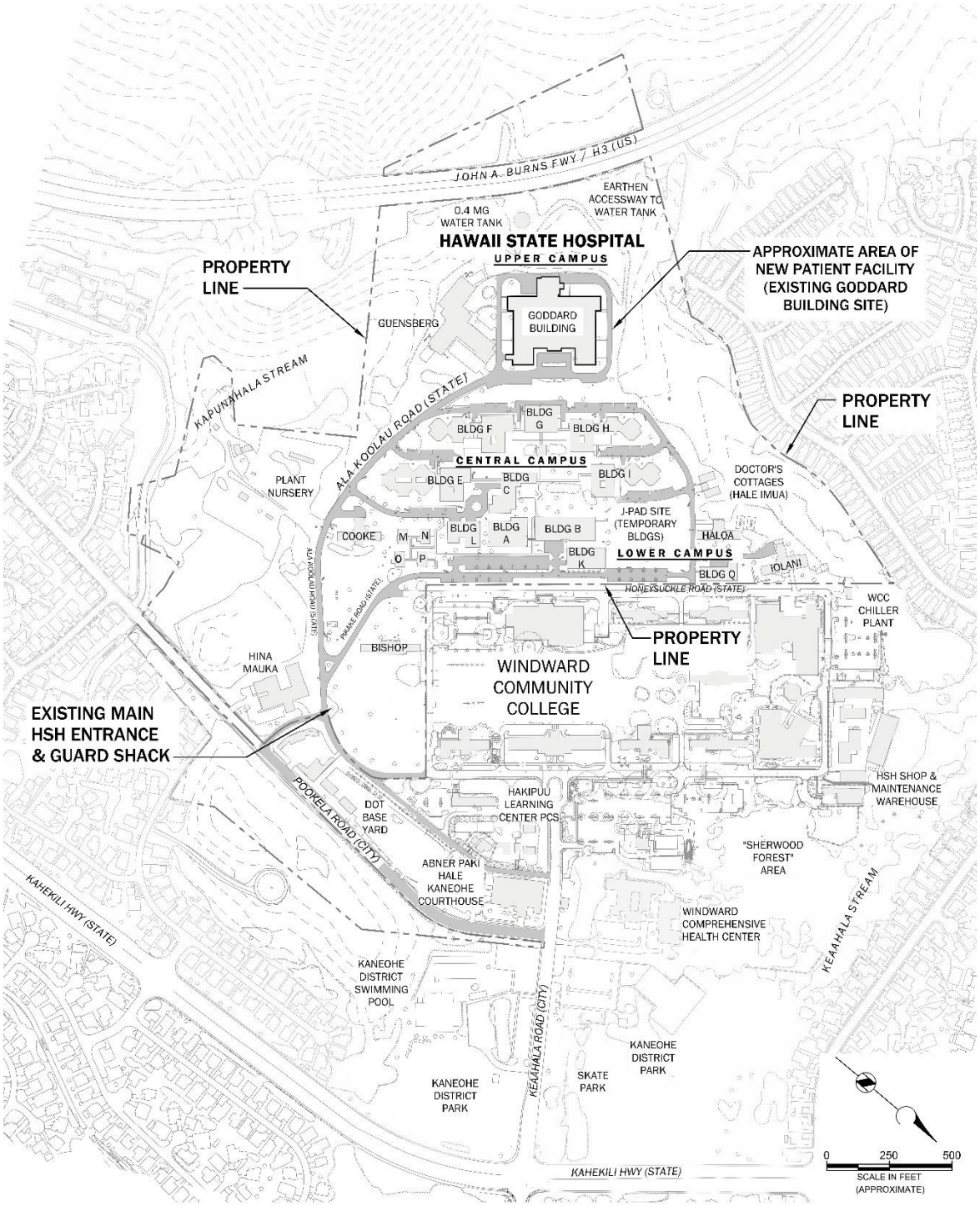

Figure ES-3. HSH campus layout map

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Proposed Action Summary

This DEIS comprises two parts commensurate with the two separate proposed approaches to HSH campus improvement, as identified and outlined in the 2005 Master Plan (MP) and 2015 Master Plan Update (MPU). The first approach is at the project level, specific to the first phase of proposed improvements: the design and construction of the NPF, including a Rehabilitation Mall (144-bed patient facility and associated improvements), to be built on the site of the existing Goddard building, and supporting infrastructure. The second approach is programmatic and based on the remaining campus improvement planning zones of the long-term plan of the 2005 MP and 2015 MPU, which is further described in Section 2.3. The programmed future improvements will be completed on different schedules—undetermined at this time—based on their need and their appropriated and available budgets. This DEIS is planned to be updated or supplemented, if necessary, as the timing and extents/details of each long-term improvement are determined.

Part I: New Patient Facility

As identified in both the 2005 MP and 2015 MPU, the first phase of improvements of the HSH short-term plan includes the proposed NPF to be built in place of the existing Goddard building, currently under demolition under a separate project. This phase includes:

- NPF, including Rehabilitation Mall, construction on the demolished Goddard building site, which includes 144 new beds and the possibility of increased parking stalls commensurate with increased anticipated staff and visitors proportional to the increase in patients
- Use of existing onsite parking and the possibility of the conversion of the neighboring DOT Baseyard to HSH parking lot via a property transfer
- Use of existing transportation for patients between facilities and possible re-routing of existing transportation of staff between existing onsite or newly acquired parking lots and facilities
- Associated infrastructure improvements associated with stormwater, water, wastewater, chilled water, electricity, communications, natural gas, and solid waste
- Secure safety fencing, closed-circuit television (CCTV), security lighting, landscaping, and associated improvements required for an ABH facility treating court-appointed patients

The parking and lookout area at the front of the building is planned to remain, while the flagpole will be either salvaged for eventual relocation to the *mauka* side of the NPF, or disposed of. The demolition work of the existing Goddard building is expected to be completed by the end of 2016.

As part of this first phase, the proposed NPF’s associated supporting infrastructure will be identified and evaluated on a project level as part of this EIS process. The NPF will be designed to accommodate 144 patient beds in alignment with the goals of the MP documents by separating high-acuity patients from lower-acuity patients. While the facility is meant primarily to treat court-appointed and high-acuity patients, flexibility will be built into the facility by integrating a 24-bed medical unit that can be used as regular patient housing if medical needs are low.

Additionally, sustainable design measures being considered in the design of NPF will follow the 2012 International Building Code (IBC) and Leadership in Energy and Environmental Design (LEED) with the goal of becoming LEED Silver-accredited. Design elements will be included for the building construction and interior design, landscaping elements, water usage, and efficiencies in operations and maintenance (O&M). However, because of the security provisions required for public safety, these elements will have to be integrated without negative impact to safety. DOH will work closely with the City during the Plan Review Use (PRU) approval process to maximize sustainable design elements to the extent practical.

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For security purposes, lighting will be placed throughout NPF. The recreation yard and other patient access points will be well-lit and security lighting will be placed around the perimeter of the facility. In addition, the entrances will be properly secured with fencing and monitored via CCTV. Additional cameras will be placed in the main lobby, around the facility perimeter, and will have both stationary and pan, tilt, zoom (PTZ) cameras throughout.

Part II: Long-Term Master Plan Implementation

NPF (short-term plan) is one of the 15 planning zones identified in the 2015 MPU that will compose the overall campus buildout of improvements to meet DOH goals. Refer to Section 2.3 for specific 2015 MPU information regarding the established planning zones. The overall campus buildout of improvements will be identified and evaluated on a programmatic level as part of this DEIS process to serve as the basis for the future project-level Environmental Assessments (EAs) for identified long-term planning phases of the 2015 MPU. As the timing, funding, details and extents, and design of future improvements become known, it will be determined if this EIS will need to be updated or supplemented with project-specific EAs. In addition, regulatory agency coordination, applicable permitting, and other approvals will be determined as those projects are better identified.

Alternatives to the project were considered, including the No-Action, Offsite Development, and Contracted Private Facility, and Land Exchange alternatives. Descriptions of each alternative and reasons for not being considered further are provided below:

- **No-Action alternative:** A continuation of the existing program, which has been neither updated nor implemented significantly since the initial construction of HSH in 1932. The No-Action alternative constitutes continued operation of the existing facility without any campus improvements other than routine repair work to maintain the status quo of the existing structures and utilities. The existing facility does not have enough beds and facilities to accommodate the forecasted patient admission population. Patients of different acuity levels are unable to be sufficiently and adequately managed and separated, and the safety of patients, DOH personnel, and visitors would continue to be in jeopardy, and could possibly worsen as the facility further ages and the patient population continues to grow. The No-Action alternative does not support DOH’s vision for the facility’s program of creating a safe, effective ABH facility for all patients, personnel, and visitors, commensurate with the growing population of the state of Hawai‘i.
- **Offsite Development alternative:** DOH has considered alternatives to either subdivide parts of the existing State-owned HSH lot and sell the subdivided land or lease parts of the lot to a residential or healthcare developer. DOH would use the proceeds from the land sale or lease to purchase or lease land at an alternative location to build a new patient care facility like the proposed NPF offsite. However, costs, time, and community impacts for an offsite patient care facility would be greater than those of replacing the existing Goddard building with the proposed NPF. Locating a site for a new patient care facility that can meet safety and security, privacy, and operability requirements is anticipated to be a lengthy process because of the difficulty of finding a site that is acceptable to the neighboring community; however, because of the self-contained environment that has already been established at its current site, HSH would be better served by retaining all of its services in a single campus. The footprint of the existing HSH campus is able to accommodate new construction and demolition of existing buildings, including the existing Goddard building, while still being operational at HSH’s current bed capacity.
- **Contracted Private Facility alternative:** DOH contracts with Sutter Health to use adult beds and mental health services at its Kāhi Mōhala facility in ‘Ewa Beach, and currently 40 of the “lowest-acuity” HSH patients fill all of Kāhi Mōhala’s available adult capacity. Because of the difficulty to

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license other facilities that are able to accept the type of ABH patients that HSH treats, no other facilities have been considered for private contracting other than Kāhi Mōhala and it is not anticipated that other facilities will be considered in the future. Additionally, as the only ABH hospital in Hawai‘i is already at capacity, increasing shared and contracted use with Kāhi Mōhala eliminates the Contracted Private Facility alternative from consideration.

- **Land Exchange alternative:** WCC had offered to swap the land on which the Skilled Nursing Facility (SNF) would sit (the area encompassing the existing Bishop building as indicated in the 2015 MPU) with land (“Sherwood Forest”) at the Windward Comprehensive Health Center (WCHC) in the northeastern portion and front of the WCC campus property. The proposed land exchange was addressed by DOH in a letter to the University of Hawai‘i (UH) on June 22, 2015. DOH carefully considered WCC’s offer but ultimately concluded that it was not feasible because of, at least in part, the following factors:
  - Timing: Adverse impacts to the overall implementation schedule incurred by using a site other than the Bishop building location, which may require additional agency coordination, reviews, and approvals; permits; etc.
  - Higher, additional costs associated with clearing the alternate location, which is characterized, in general, by dense vegetation and trees.
  - The alternate site is in a relatively low-elevation, potential sump portion of the property, where an apparent storm drain system retention basin and possible existing utility mains are located. Additionally, it is in relatively close proximity to Kea‘ahala Stream.
  - Potential adverse impacts to visual resources: The alternate location is in relatively close proximity to major roadways, residential neighborhoods, and Kāne‘ohe District Park; thus, SNF would be more visible to more public viewing vantage points.
  - Potential adverse impacts to traffic and challenges in accessing the site: The alternate location would be accessible from Kea‘ahala Road near entrances to WCC and Kāne‘ohe District Court (Abner Pākī Hale Kāne‘ohe Courthouse), which could create traffic concerns especially during “rush” hours.

  Thus, the Land Exchange alternative is eliminated from consideration.

SNF is part of the future, overall campus buildout of improvements, which will be completed on different schedules—undetermined at this time—based on their need and appropriated and available budgets. This EIS is planned to be updated or supplemented, as needed if necessary, as the timing and extents of each long-term improvement are determined. Thus, as needed, this EIS will be updated in the future with a programmatic environmental document to accommodate and address any significant differences from this EIS attributed to the proposed SNF once the planning horizon, scope, timing, appropriated and available budget, and details of SNF components are better defined and established.

Project Schedule

Because of the urgent need for NPF, meeting its fast-tracked schedule is a primary driver for the project. The EISPN, the first step in notifying the public that an EIS is being prepared, was submitted to the State DOH OEQC and published in the May 8, 2016 edition of *The Environmental Notice*. This DEIS is being submitted for public comment in late 2016 and the FEIS is planned for publication in early 2017. The City PRU Application for the overall HSH campus and design for the first phase of construction will follow immediately thereafter. DOH anticipates evaluating the proposed buildout of the remaining improvements to the HSH campus at some point following the completion of this entitlement process. This EIS—in conjunction with the 2005 MP, 2015 MPU, and PRU Application for

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the HSH facility—is intended to provide guidance and a baseline for the overall campus buildout of improvements of the HSH campus. Furthermore, as needed, this EIS and the PRU Application will be updated in the future with programmatic EAs and PRU modifications to accommodate and address any significant differences from the EIS and PRU Application attributed to the remaining campus improvements once the planning horizons, timings, appropriated and available budgets, and details of the proposed buildout components are better defined and established. Entirely new environmental documents, PRU Applications, and/or Certificates of Need (CONs) commensurate with these future construction phases may be needed depending on their timing with approval expirations and extents of work.

Project Funding

The entire first phase of the project—entitlement documents, design, and construction—is being funded by the State, with its budget appropriated by the 2016 Hawai‘i State Legislature. The 2015 MPU contains the estimate~~s~~ for the first phase of the project. In the future, as facility needs arise, it is anticipated that DOH and DAGS will identify the specific scopes and phase~~s~~ of facility improvements, and prepare estimates for the work once timings and details of the improvements are better defined and established, commensurate with the prevailing construction climate at the time of each phase. It is anticipated that the planning, design, and construction of NPF will cost approximately $160 million, and the costs for long-term programmatic improvements covered in the 2005 MP and 2015 MPU will be determined as those elements are better defined.

Intergovernmental Coordination

This section describes intergovernmental coordination that was completed as part of the DEIS development. Efforts included coordination through the development of the EISPN, comments received during the 30-day EISPN public comment period, direct agency coordination, and the identification of potentially required project and programmatic permits.

Pre-Consultation Coordination Efforts

The following agencies were notified about the pre-consultation process and were coordinated with to develop the EISPN and this DEIS, as well as to identify permits and agency approvals likely to be needed for the project:

- City Department of Planning and Permitting (DPP), Land Use Permit Division (LUPD), Zoning Regulations and Permits Branch (ZRPB)
- City DPP, Wastewater Branch
- City of Honolulu Board of Water Supply (HBWS)
- Hawai‘i Gas
- Hawaiian Electric Company (HECO)
- Hawaiian Telecom
- Hina Mauka (Alcoholic Rehabilitation Services of Hawai‘i)
- Kāne‘ohe Neighborhood Board, c/o Mr. Maurice “Mo” Radke (Chair)
- Oceanic Time Warner Cable
- State DAGS, Public Works Division
- State Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW)
- State DOH-AMHD

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- State DOH, Environmental Management Division, Clean Water Branch (CWB)
- State DOH-OEQC
- State DOH, Solid and Hazardous Waste Branch
- State DOT, Highways Division
- State Office of Planning (OP)
- UH Center for Conservation Research and Training (CCRT), Hawai‘i Biodiversity and Mapping Program (HBMP)
- UHCC
- U.S. Army Corps of Engineers (USACE), Honolulu District
- U.S. Department of the Interior, Fish and Wildlife Service (USFWS), Pacific Island Fish and Wildlife Office
- WCC

EISPN Comments Coordination Efforts

The EISPN was published in the May 8, 2016, edition of OEQC's *The Environmental Notice* for public notification, review, and comment over a 30-day period. Overall, comments were received from the following 12 organizations:

- City DPP-LUPD-ZRPB
- HBWS
- HECO
- Oceanic Time Warner Cable
- State DLNR-DOFAW
- State DOH-CWB
- State DOH Environmental Planning Office (EPO)
- State DOT
- State OP
- UNITE HERE, Local 5
- USACE, Honolulu District
- WCC

Comments varied across resource areas, as summarized in Table ES-1. Comments covered sustainability of the proposed facility and surrounding ecosystem, related mostly to water, air, electrical infrastructure, and traffic. Other areas of general concern included environmental permitting and impacts to infrastructure and utilities servicing the project site. Comments about SNF, which is a future improvement, were addressed in a programmatic way based on details provided in the master plans only.

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Table ES-1. Summary of EISPN Comments Received (by Affected Environment Area)

Affected Environment Area	Resource Section	Comment
Permitting	Section 404/401 of Clean Water Act (CWA) (Section 1.7.3)	Determine if a Section 404 permit is required through USACE or any other effects on State/U.S. waters.
	General compliance (Section 1.7.4)	Review the State’s e-permitting portal for permit requirements.
Proposed project description	Sustainable design practices (Section 2)	Provide how sustainable and healthy design will be included in the proposed project and use the standards provided on the EPO website.
	Section 401 of CWA (Section 1.7.3)	Determine if need for National Pollutant Discharge Elimination System (NPDES) permit for wastewater to a publicly owned treatment works (POTW) or stormwater to surface receiving streams.
	Skilled Nursing Facility (Section 2.2)	Full analysis of SNF, part of the Long-term Master Plan Implementation.
Natural environment	Surface water (Section 3.5)	Project improvements must not violate water quality standards, anti-degradation policy (HAR, Section 11-54-1-1), or designated uses of nearby water bodies.
		Include the State’s position on water quality and the beneficial uses of State waters.
		USACE concurs no impacts will occur on the adjacent Aloha Gardens from NPF construction; however, DOH will coordinate with USACE in the future on long-term implementation of the MP if impacts are expected on additional HSH improvements.
	Flora and fauna (Section 3.9)	Install measures to avoid introduction or spread of invasive plants or animals into the project or surrounding area.
		Contact DLNR immediately if listed plants or animals are discovered during the project.
Human environment	Vehicular traffic (Section 4.6)	Traffic Impact Analysis Report (TIAR) has been completed for NPF and no impacts have been determined by DOT. Additional studies will be warranted in the future, as needed for the long-term MP implementation.
		Assess impacts from traffic impacts on WCC.
	Visual resources (Section 4.9)	Address not only the visual impacts from NPF but also the long-term MP implementation.
Infrastructure and utilities	Stormwater (Section 5.5)	Address potential impacts from stormwater runoff to surface receiving streams and mitigate if needed.
		Should identify best management practices (BMPs) for proper stormwater control, including use of green solutions.
		How could stormwater runoff affect the Coastal Zone Management (CZM)?
	Potable and fire water (Section 5.2)	HBWS states adequate supply for NPF but to continue to work with them as the design progresses.
		Coordinate with HBWS on construction schedule to minimize water interruptions.
		Coordinate with the Fire Prevention Bureau of the Honolulu Fire Department (HFD).
	Potable and fire water (Section 5.2), wastewater (Section 5.3), chilled water (Section 5.4), and stormwater (Section 5.5)	Evaluate the ability to reduce, reuse, and recycle water.
	Electrical power supply and lighting systems (Section 5.8)	Maintain existing power easements for future maintenance access.

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Table ES-1. Summary of EISPN Comments Received (by Affected Environment Area)		
Affected Environment Area	Resource Section	Comment
	Communication, security, and alarm system (Section 5.9)	Coordinate on underground utilities during construction of NPF using the One Call process.
Socioeconomic environment	Land use (Section 6.3)	Review the requirements under the Hawai‘i State Plan under HAR 11-200-17(h).
		Continue to coordinate with City of Honolulu, Zoning Regulations and Permits Branch, DPP required use of AG-2 General Agricultural District zoned property.
	Environmental justice (EJ) (Section 6.1)	Use the EJSCREEN tool in the evaluation for EJ impacts

Description of the Proposed Action

This section presents a description of the proposed action for HSH capital improvements, its purpose and need, and MP background and development. The proposed action is divided into two parts—Part I covers the nearer, short-term first phase of improvements, which is the design and construction of NPF, the Rehabilitation Mall, and supporting infrastructure; Part II covers the further, long-term overall campus buildout of improvements.

This DEIS (and subsequent PRU Application) will complement the 2005 HSH MP and short- and long-term plans contained within the 2015 MPU, which provide the framework for more detailed planning, development, and investment decisions by DOH. While these entitlement documents look forward over an indefinite timeline for the complete and overall campus buildout of improvements, actual implementation of these improvements is anticipated to proceed incrementally in phases in response to facility needs for more patient beds, treatment facilities, and staffing, as well as economic cycles and availability of funding. Implementation of the facility improvements shall be administered through the MP documents with specific work details materializing during the design phase of each increment. Any mitigation actions identified in this planning process via the EISPN, DEIS, and FEIS will be implemented as well.

The PRU Application will include specific provisions and criteria for the proposed campus improvement components, features, and approaches—some of which may deviate from established standards, criteria, and guidelines set forth by the City because of limiting site- or project-specific circumstances, constraints, and/or requirements. The PRU Application will be submitted to the City for review, acceptance, and approval by the Honolulu City Council following the completion of the EIS process to reflect specific anticipated features of improvement work, some of which may not conform to applicable and prevailing agency requirements (i.e., *Land Use Ordinance* [LUO]).

Affected Environment Impacts

Sections 3 through 6 within this DEIS provide the details of the existing conditions of the affected environment and impacts evaluation from NPF and long-term overall campus buildout of improvements for resource areas related to the natural environment, human environment, infrastructure and utilities, and socioeconomic environment, respectively. As shown below in Table ES-2, most of the impacts (see Figure ES-3), whether adverse or beneficial, are expected to be measurable but localized to a small area, have low intensity, or be temporary. Impacts that are likely to be more substantial include demographics, public services, and HSH-related employment and economic activity. All of these more substantial impacts are considered to be beneficial and adverse.

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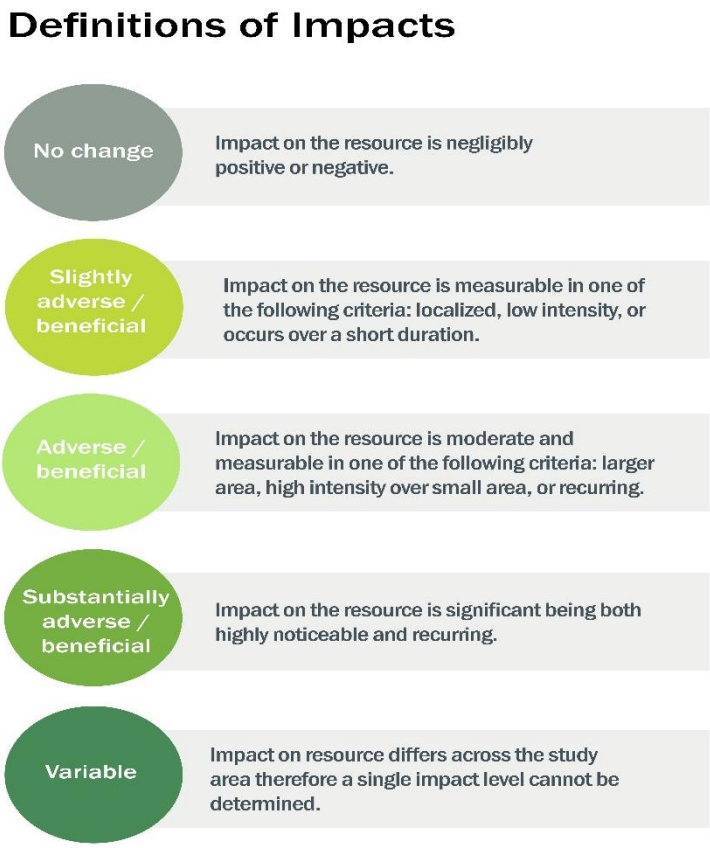

Figure ES-3. Definitions of impacts

Table ES-2. Overall Hawai‘i State Hospital Potential Impacts

Resource Area		Impact				
		New Patient Facility	Overall Campus Building of Improvements	Improvement/Mitigation	Permanent	Temporary
Natural environment	Topography and geology	No change	Slightly adverse	Because finish grades are anticipated to be similar to existing, no mitigation measures are proposed.		✓
	Surface water	No change	Slightly adverse	BMP approaches will be used to minimize change in runoff patterns.	✓	✓
Human environment	Noise	Slightly adverse	Slightly adverse	As noise levels generated by construction-related activities are anticipated to exceed allowable limits, a permit must be obtained from the DOH Indoor and Radiological Health Branch (IRHB) in compliance with Title 11, HAR, DOH, Chapter 46, Community Noise Control. DOH may grant permits to operate vehicles, construction equipment, and power tools that emit noise levels in excess of allowable limits.		✓

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Table ES-2. Overall Hawai‘i State Hospital Potential Impacts

Resource Area		Impact				
		New Patient Facility	Overall Campus Building of Improvements	Improvement/Mitigation	Permanent	Temporary
	Light emissions	Beneficial	Beneficial	Additional lights will increase visibility and pedestrian travel on the campus and provide increased security for the HSH campus and to the surrounding community.	✓	
	Air quality	Slightly adverse	Slightly adverse	Air pollution control measures will be used during construction.		✓
	Vehicular traffic	Slightly adverse	Adverse	The proposed expansion of Kahekili Highway and Ha‘ikū Road will decrease congestion. Also, the campus will examine incentivized alternative transportation options to minimize the increase in traffic.	✓	
	HSH campus vehicular traffic	Slightly beneficial	Slightly beneficial	Expansion and repaving of roads and parking lots will improve traffic patterns on the campus.	✓	✓
	Pedestrian and bicycle access	Slightly beneficial	Slightly beneficial	Development of pedestrian walkways and bicycle lanes will increase functionality, accessibility, and relaxed environment at HSH.	✓	
	Open-space, recreational, and visual resources	Slightly adverse	No change	Visual impact assessment will show projected building height with impact to scenic resources.	✓	
Infrastructure and utilities	Roadways, parking, and fire truck maneuverability	Slightly beneficial	Slightly beneficial	Repaving and increased size of roadways will make them more accessible and fire truck maneuverable in certain areas.	✓	
	Potable and fire water	Slightly beneficial	No change	Increased number of fire pumps and hydrants near NPF.	✓	
	Wastewater	No change	Slightly adverse	Recommendations for replacement of defected segments.	✓	
	Chilled water	Slightly beneficial	No change	The proposed NPF will have its own chiller plant.	✓	
	Stormwater	No change	Slightly adverse	Low-impact design techniques will be examined to minimize change in stormwater volumes and patterns.	✓	

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Table ES-2. Overall Hawai'i State Hospital Potential Impacts

Resource Area		Impact				
		New Patient Facility	Overall Campus Building of Improvements	Improvement/Mitigation	Permanent	Temporary
	Fuel sources	Slightly beneficial	Slightly beneficial	The proposed NPF will install a new 499-gallon liquefied propane gas (LPG) tank. The overall campus improvements will increase capacities by replacing the 499-gallon LPG tank with 1,150-/2,000-gallon LPG tanks and adding a new 250-gallon LPG tank and four 199,000-British-thermal-unit per hour (Btuh) instant gas water heaters.	✓	
	Solid waste and medical/hazardous waste	Slightly beneficial	Slightly beneficial	The increased waste being generated will increase the collection containers and services provided around the HSH campus.	✓	
	Electrical power supply and lighting systems	Slightly beneficial	Slightly adverse	The proposed NPF will increase the total electrical load to HSH, but the overall campus improvements may reduce HECO's capacity to provide power to new customers.	✓	
	Communication, security, and alarm systems	Substantially beneficial	Substantially beneficial	Improved security and alarms will foster a sense of enhanced safety and quality of life on the HSH campus and in the community.	✓	
Socioeconomic Environment	Demographics	Slightly beneficial	Beneficial	The larger HSH facility will alleviate overcrowding of patients in other ABH institutions. This expansion will increase the number of staff potentially living in the area.	✓	
	Land use	Variable	No change	The land use will differ from the general standard LUO criteria and thresholds; therefore, a PRU application will be processed after the FEIS.	✓	
	Public services	Beneficial	Beneficial	Increased safety on the HSH campus will reduce stress on the schools in the community.	✓	
	Public safety and life safety	Substantially beneficial	Substantially beneficial	Increased access control, card swipes, fire alarms, CCTV, and facility-wide alarm systems will increase public safety.	✓	
	HSH-related employment and economic activity	Beneficial	Beneficial	The development of HSH will increase employment opportunities for individuals in the construction and medical fields. Because of the increase in power, food, and water required by HSH, economic activities will increase.	✓	✓

Climate, soils, hydrogeology, tsunami, hurricanes, earthquakes, flora and fauna, archaeological and historic resources, cultural practices and conditions, and land ownership are not listed in this table because the impact categorization is considered "no change."

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Cumulative Impacts

This section describes the potential cumulative impacts of NPF and overall campus buildout of improvements at HSH as they relate to the consistency between the proposed action and land use plans, policies, and controls, and other relevant projects in the area. These plans and projects combined with NPF or the future phases of the overall campus buildout of improvements at HSH could have adverse or beneficial cumulative impacts to the natural, human, infrastructure, and socioeconomic environments that would otherwise be measured by each project individually. The projects and plans described in the following section are the best representation of the major projects and plans known to be currently established that impact the local area to HSH, the Kāne‘ohe area, the Ko‘olaupoko district/ahupua‘a (also Ko‘olaupoko), the island of O‘ahu, and the entire state of Hawai‘i. Projects or plans that are speculative are not included in this cumulative impacts assessment.

Cumulative Impacts by Affected Environment Category

The cumulative impacts from these projects described below, combined with HSH improvements, are not expected to have any significantly adverse impacts to the surrounding community. Below are the impacts summarized by affected environment category.

Natural Environment

As described in Section 3, very minimal adverse impacts and no beneficial impacts to the natural environment are expected from NPF and the overall campus buildout of improvements. The minimal adverse impacts for water quality will also be controlled with best management practices (BMPs) and good housekeeping during facility operations to control pollutants and stormwater runoff. As a consequence, there are likely no adverse, substantial or slight, cumulative impacts as a result of NPF or the overall campus buildout of improvements.

Human Environment

Traffic is a primary concern for adverse impacts to the community by the project. Existing low levels of traffic service (congestion/backup) at nearby street intersections and traffic patterns along nearby roadways during peak periods are already an issue; improvements and expansions of HSH and WCC will likely worsen these conditions. A recommendation in the Traffic Impact Analysis Report (TIAR) identifies DOT’s planned widening of Kahekili Highway in one of its traffic modeling scenarios, which anticipates that traffic density and patterns could improve significantly if implemented. It is suggested that additional coordination with DOT, City Department of Transportation Services (DTS), and WCC review and traffic modeling be conducted in the future at the time WCC improvements and expansions, and components of the overall campus buildout of improvements at HSH, are done to ascertain whether adverse cumulative impacts will likely still occur from the HSH projects in combination with improvements and expansions at WCC. If so, the extents of the anticipated impacts and possible mitigation measures should be assessed.

Infrastructure and Utilities

Because the population (and corresponding water demand) of the area encompassing the HSH campus is anticipated to remain unchanged or decrease over the next 30 years, no adverse impacts on the water supply are anticipated—neither on its quality nor on its groundwater aquifer sustainable yield. Growing interest combined with various legal requirements for the incorporation of sustainable, reuse, use minimization/conservation, and LEED elements into improvements, design, and construction further suggest limited adverse impacts on these resources/supplies. BMPs, good housekeeping, and integration of low-impact development (LID) into the HSH improvement designs

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will lessen any burden on the stormwater infrastructure. The facility will generate both “standard” solid waste and medical waste (no other hazardous material waste is anticipated). This would entail expanding the agreement with existing contractors that currently collect and haul off the solid and medical waste from the HSH facility to accommodate any increase in these waste streams by NPF (and the remaining overall campus buildout of site improvements in the long term).

Socioeconomic Environment

Improvements to HSH through NPF and the long-term overall campus buildout of improvements will increase employment opportunities for the surrounding community during construction and subsequent facility operations, which will have positive cumulative impacts on the community. In addition, HSH has been a fixture in the neighborhood for decades and changes to HSH from NPF or the overall campus buildout of improvements will not change the setting of HSH within the community.

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Section 1

Introduction

This section identifies the purpose of this Draft Environmental Impact Statement (DEIS); discusses key project information, background, schedule, and funding; provides a summary of the proposed action; and discusses the intergovernmental coordination that took place in the writing of this DEIS.

1.1 Purpose of the Environmental Impact Statement

The State of Hawaiʻi (State) Department of Health (DOH) Adult Mental Health Division (AMHD) owns and operates the Hawaiʻi State Hospital (HSH) in Kāneʻohe (Koʻolaupoko), Oʻahu, Hawaiʻi. HSH has been in service since the 1930s (formerly known as the "Territorial Hospital" and later, the "Hawaiʻi State Mental Hospital") and is operated as the only State-owned adult behavioral health (ABH) facility for the treatment and housing of court-appointed (judicial order) patients. HSH is currently undersized and outdated, and capital improvements are being planned in the near and long terms based on the 2005 and 2015 master planning efforts. Because of the considerable expense of the project—the 2016 State Legislature appropriated $160 million for the planning, design, and construction of the first phase of improvements (New Patient Facility [NPF], Rehabilitation Mall, and supporting infrastructure)—and, because the improvements are being located on State-owned property, an Environmental Impact Statement (EIS) is being prepared under the *Hawai'i Environmental Policy Act* (HEPA) in accordance with Chapter 343, *Hawaiʻi Revised Statutes* (HRS), Chapter 200 of Title 11, *Hawaiʻi Administrative Rules* (HAR), and *Act 172-2012*. This document serves as the DEIS for public notice.

An EIS is typically the second and more comprehensive step of the two-part environmental review process, following the requirements of HEPA in accordance with HRS Chapter 343 and, as applicable for any federal involvement with the project, the *National Environmental Policy Act* (NEPA), as implemented by the Council on Environmental Quality (CEQ) Regulations (*Code of Federal Regulations* [CFR] Title 40 Parts 1500–1508 [1997]). An EIS is prepared or commissioned by the owners (applicant or agency) of a development or improvement project to present the potential environmental, social, and economic impacts of the project on the public and, as such, allow the public to comment on these potential impacts to fully analyze alternatives and propose mitigation measures. An EIS was triggered under HRS Section 343-5(a)(1) for use of State lands and funds for HSH capital expenditures (in their entirety). No federal involvement is anticipated for the project.

The publishing of an EIS has traditionally been preceded by the issuance of an Environmental Assessment (EA) for a proposed undertaking. The EA determines if an EIS will be required for a proposed action through public comment and stakeholder identification. *Act 172-2012*, also known as the *Direct to EIS Law*, was passed by the Hawaiʻi State Legislature in 2012, which amended HRS Sections 343-5(b) and 343-5(e) to allow a proposing agency to bypass the typical EA process if it determines that an EIS will most likely be required for the proposed work. The State Department of Accounting and General Services (DAGS), acting as the proposing and expending agency on behalf of DOH-AMHD in coordination with the Governor's Office (as the accepting authority), determined that this rule be applied to this HSH project based on its expedited schedule, potentially burdensome utility infrastructure needs (i.e., storm and sanitary wastewater conveyance systems), and possible visual impacts to the community from proposed building improvements partially hindering views of the nearby Koʻolau mountains or the Pacific Ocean (Kāneʻohe Bay).

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An Environmental Impact Statement Preparation Notice (EISPN) was prepared and published in May 2016 (see Section 1.5) in order to seek initial 30-day public comment on potential environmental, social, and economic impacts of the proposed improvement work at HSH. Following the publication of this DEIS in *The Environmental Notice*, DAGS is allowing public review and feedback for 60 days (greater than the required 45 days) to provide flexibility in the construction procurement of any of the HSH facility improvements should DOH and the governor decide to implement the course enacted by Senate Bill 2540 (now known as Act 90), which was passed into law in 2016. A DEIS Comment Form is provided in Appendix A. Comments on the DEIS will be included and addressed in the Final Environmental Impact Statement (FEIS). While published in *The Environmental Notice*, HEPA's State EIS process does not have a public comment period on the FEIS.

1.2 Project Information Summary

This section presents a summary of key project information.

Proposing agency:	State of Hawai‘i Department of Accounting and General Services Division of Public Works Kalanimoku Building 1151 Punchbowl Street, Room 426 Honolulu, HI 96813 Contact: Christine L. Kinimaka, P.E. Acting DAGS Public Works Administrator Phone: 808.586.0500 Fax: 808.586.0482 Email: Chris.Kinimaka@Hawaii.Gov
Prepared by:	Brown and Caldwell Pacific Guardian Center—Mauka Tower 737 Bishop Street, Suite 3000 Honolulu, HI 96813 Contact: Mike S. Nishimura, P.E., LEED AP Phone: 808.523.8499 Fax: 808.533.0226 Email: MNishimura@BrwnCald.Com
Accepting authority:	Governor, State of Hawai‘i Hawai‘i State Capitol, 5th Floor 415 South Beretania Street Honolulu, HI 96813
Project name:	Hawai‘i State Hospital, New Patient Facility and Campus Master Plan Development, Kāne‘ohe (Ko‘olaupoko), O‘ahu, Hawai‘i DAGS Job 12-20-2701

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Project Tax Map Key (TMK):	(1)4-5-023:002 (1)4-5-023:016 *(remnant)* (1)4-5-023:017 *(remnant)*
Project address:	Hawai‘i State Hospital 45-691/710 Kea‘ahala Road Kāne‘ohe, HI 96744-3597
Land area:	Approximately 92 acres
State land use district:	Urban
Land Use Ordinance zoning:	AG-2 General Agriculture
Special Management Area:	Project area is not located in a Special Management Area (SMA) established by the City and County of Honolulu (City)
Flood zone designation:	Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Community Panel 270 of 395, Map 15003C0270J, revised and effective November 5, 2014: Zone D (areas in which flood hazards are undetermined, but possible) and Zone X (areas determined to be outside the 0.2 percent annual chance floodplain)

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1.3 Project Background

The HSH site is located in Kāne‘ohe, Ko‘olaupoko District, on the island of O‘ahu (Figure 1-1), and comprises Tax Map Keys (TMKs) (1)4-5-023:002, (1)4-5-023:016 *(remnant)*, and (1)4-5-023:017 *(remnant)* as shown on Figure 1-2. The main access to HSH is from Po‘okela Street via Kea‘ahala Road, located *mauka* off of Kahekili Highway. The secondary access to HSH is from the Hakipu‘u Learning Center access road, which is located off of Kea‘ahala Road and runs behind the Kāne‘ohe District Courthouse and State Department of Transportation (DOT) Baseyard (Figure 1-2).

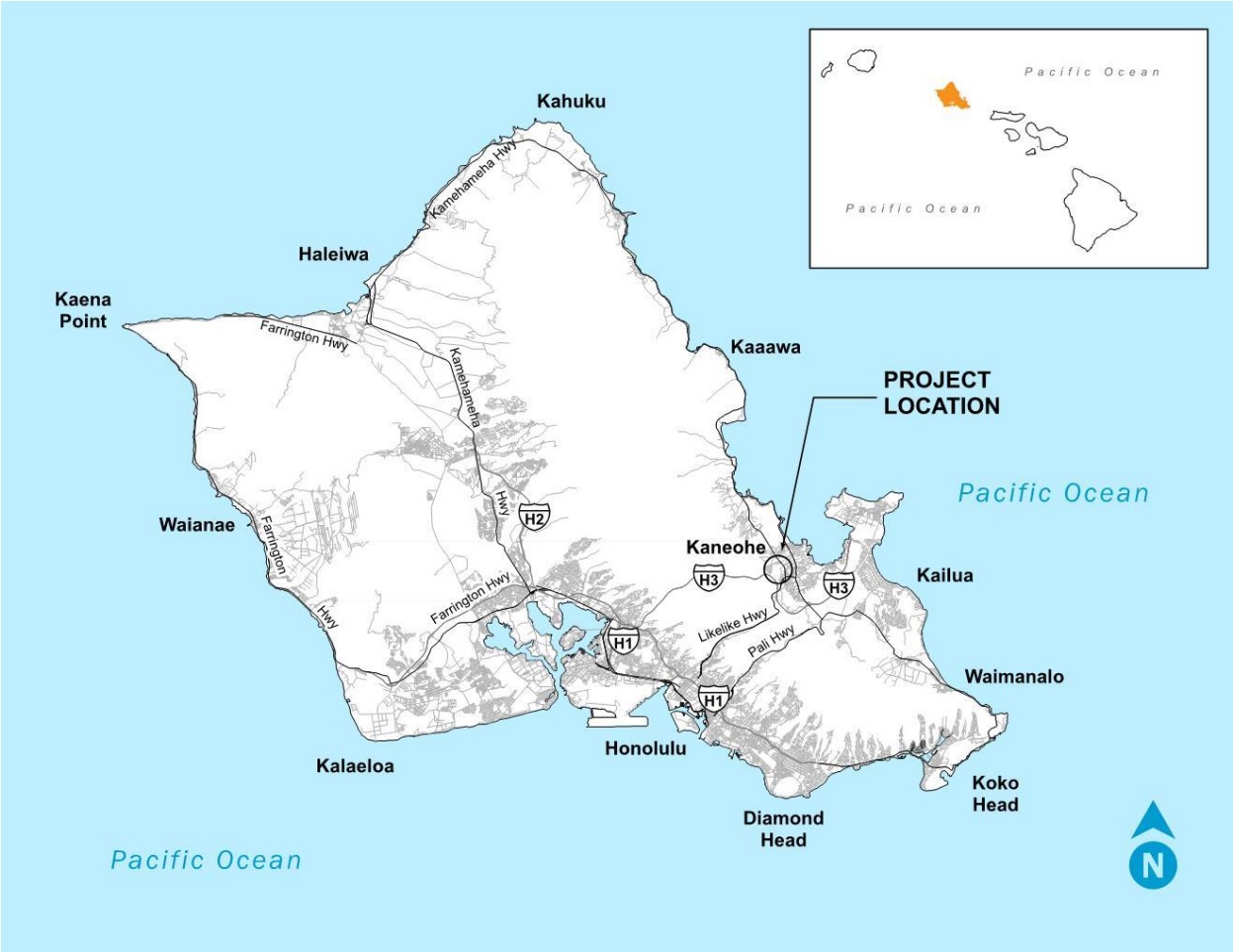

Figure 1-1. HSH location map

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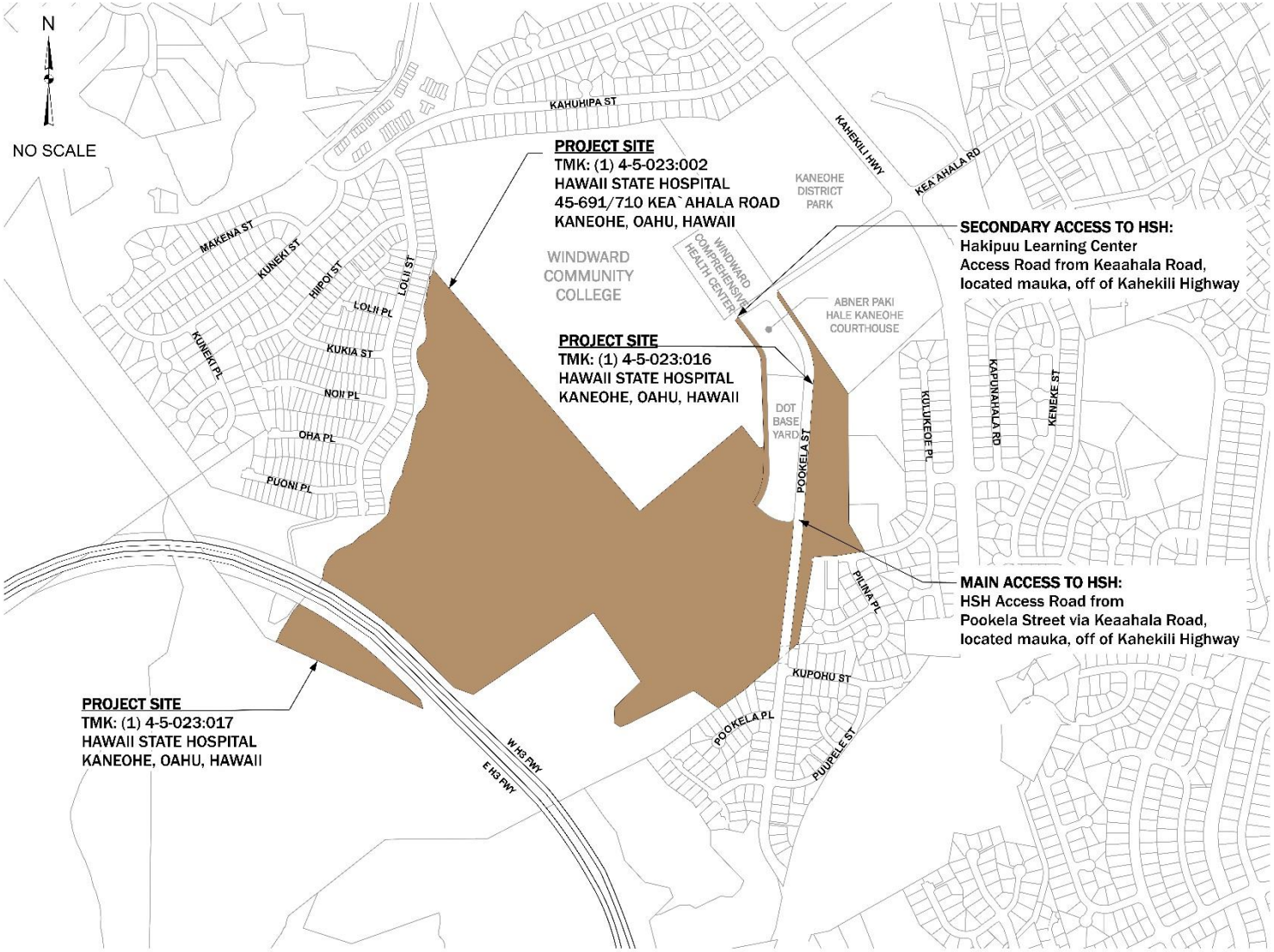

Figure 1-2. HSH vicinity map

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HSH (formerly known as the "Territorial Hospital" and later, the "Hawaiʻi State Mental Hospital") first opened in 1932 at its present site in Kāneʻohe on the island of Oʻahu. HSH was originally constructed and operated by the Territory of Hawaiʻi. Today, DOH-AMHD owns, operates, and maintains the land and buildings that compose HSH's current 92-acre campus. At the time of its opening and historically, HSH has been located in a primarily agricultural area at the base of the windward side of the Koʻolau mountains. Today, the campus remains zoned for general agricultural uses.

The community has grown around the HSH campus, including residential subdivisions to its northwest and southeast, and elevated portions of Interstate H-3 to its southwest. Windward Community College (WCC) borders HSH to the northeast on land that was previously owned by DOH and is now under the control of the State University of Hawaiʻi Community Colleges (UHCC). Adjacent to the HSH entrance on its southeastern portion of the site, DOT occupies land through *Executive Order 3432* for its construction and maintenance baseyard. The Alcoholic Rehabilitation Services of Hawaiʻi doing business as Hina Mauka, a private, independently operated drug and alcohol rehabilitation treatment facility, also operates on HSH's land under a lease in this area opposite the HSH guard shack and vehicle entrance to the HSH campus, as shown in the HSH campus layout map on Figure 1-3.

The HSH campus is an amalgamation of buildings built during different eras over the last 80 years with different functions and uses. The oldest buildings on campus—ʻIolani, Hāloa, Cooke, and Bishop, built circa 1930 to 1940—are currently either being used in limited capacities or are abandoned. The Goddard building, built in 1947, was the first major structure on the HSH campus and the first building to house consolidated patient services. Over time, it has become dilapidated and has not been occupied since 1990; thus, it is currently being demolished because of its inability to provide the functionality needed at HSH and for safety reasons. Following the construction of the Goddard building, many new buildings, expansions of existing buildings, and improvements to the HSH campus facilities were completed, as shown on Figure 1-3.

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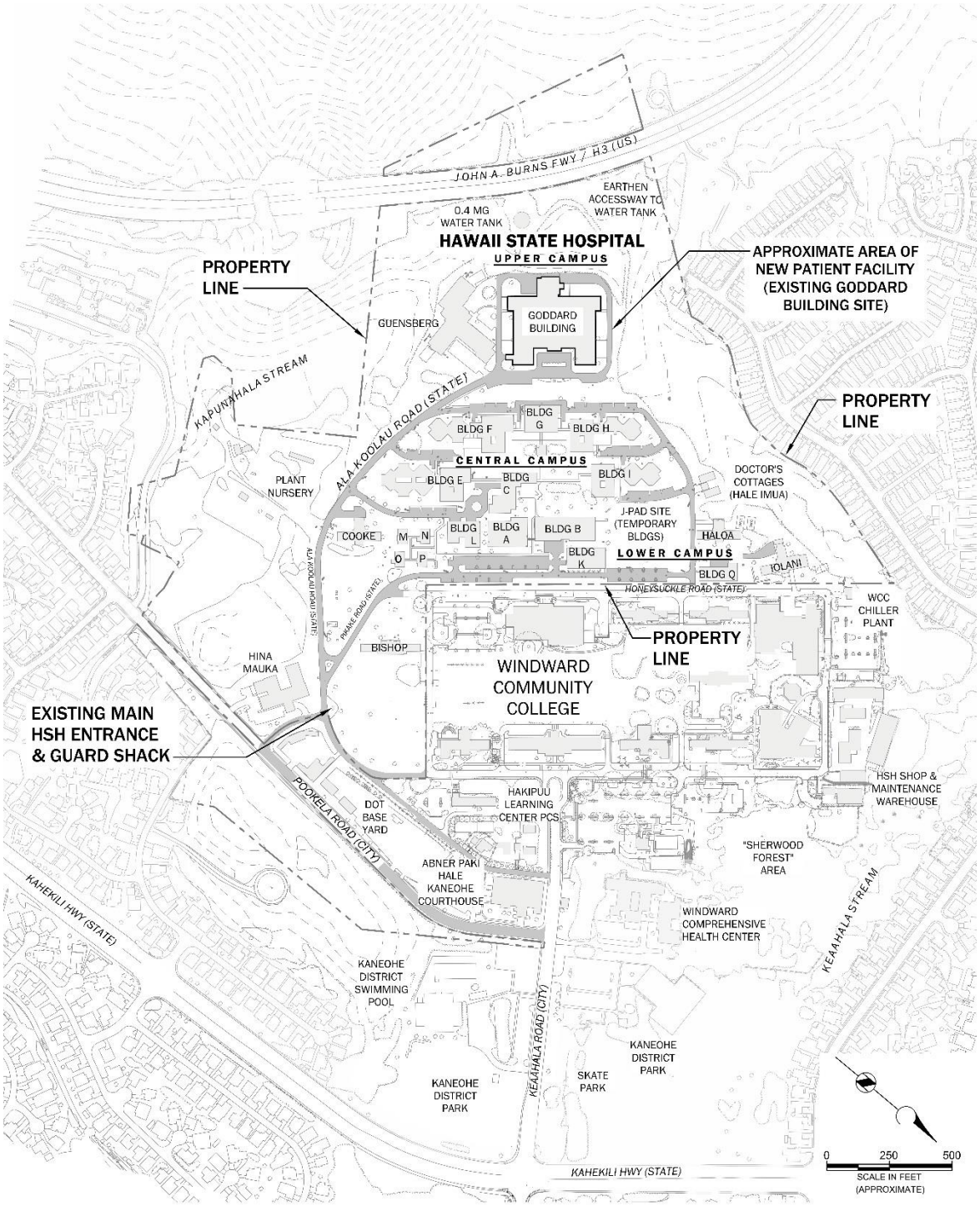

Figure 1-3. HSH campus layout map

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Since the late 1980s, several additional changes have been made at HSH to improve the campus, as outlined in Figures 1-4 and 1-5. HSH operates in its current location under an approved Plan Review Use (PRU) Permit 88/PRU-2, *Honolulu City Council Resolution 88-171*, approved June 8, 1988, under Chapter 21, *Land Use Ordinance* (LUO) of the *Revised Ordinances of Honolulu* (ROH), which permitted the expansion of HSH on general agricultural-zoned land (AG-2). Although zoned for agricultural use, the *de facto* use of the land has been historically for HSH's continuing institutional and essential community services, which are ABH-related services; therefore, major capital improvement undertakings at HSH are subject to PRU review by the City's Department of Planning and Permitting (DPP), which can be approved by DPP as a minor modification to the PRU, and has happened twice—in October 2008 and in 2015, as shown on Figure 1-4 and 1-5. If the capital improvement project is significant in conjunction with a new or significantly updatedmaster plan, as is the subject of this DEIS, a new PRU Application must be submitted and, again, approved by the Honolulu City Council following the completion of an EIS process. As described in Section 1.4, investment is being proposed to increase the capacity of HSH and improve the functionality of its facilities, which include patient care; public and HSH staff safety; and HSH campus infrastructure durability, reliability, and longevity. The previous and anticipated major milestones for the proposed action are shown in Figure 1-4 and 1-5.

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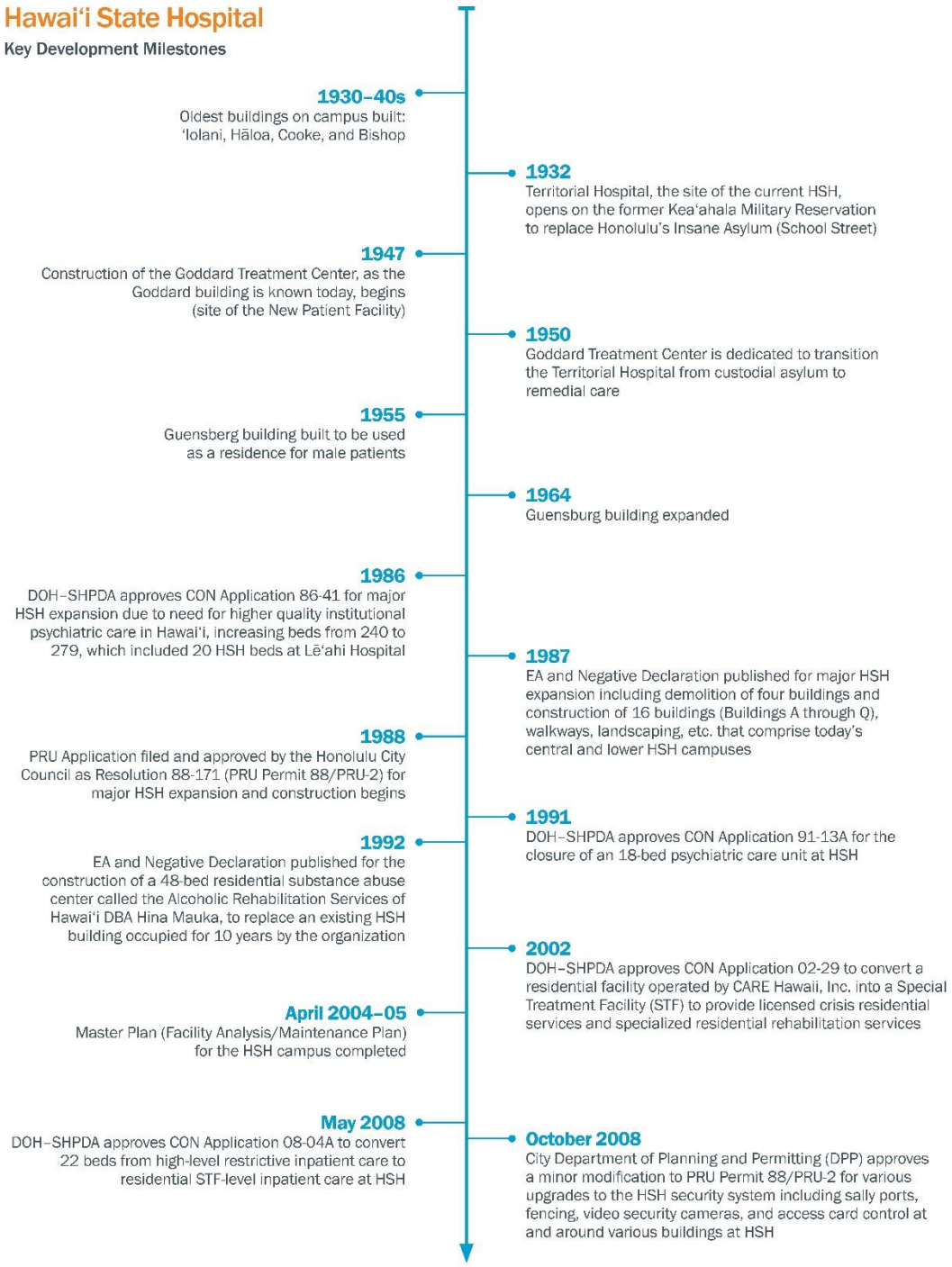

Figure 1-4. Hawai‘i State Hospital history

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December 2010
DOH–SHPDA approves CON Application 10-12 to build a new Skilled Nursing Facility/ Intermediate Care Facility (SNF/ICF) for long-term care to be operated by Avalon Health Care

September 2011
City DPP determines no need for a minor modification to PRU Permit 88/PRU-2 for construction of high-voltage cables and risers for Cooke and Guensberg buildings

July 2014
DOH–SHPDA approves CON Application 14-05A to add 16 STF beds to the Alcoholic Rehabilitation Services of Hawai‘i DBA Hina Mauka, through renovations and addition project

January 2015
City DPP approves a minor modification (2014/MOD-97) to PRU Permit 88/PRU-2 for construction of a new generator building to house a new centralized emergency generator and fuel tank to provide emergency power to the HSH campus

August 2015
2015 Master Plan Update to 2005 Master Plan for the HSH campus completed

March 2016
Preliminary Jurisdictional Determination (PJD) issued by U.S. Army Corps of Engineers, Honolulu District, Regulatory Office (USACE) for the proposed New Patient Facility (NPF) at the existing Goddard building site stating that the NPF is not subject to USACE permits, but for future overall campus buildout of improvements, nearby portion of Kapunahala Stream, and possible wetland may be considered waters of the United States

May 2016
EIS Preparation Notice (EISPN) completed and published for the NPF and Campus Master Plan Development at HSH

July 2016
Approved Jurisdictional Determination (AJD) and No Permit Required issued by USACE stating that no United States waters or United States navigable waters will be affected by the proposed renovation and addition project at the Alcoholic Rehabilitation Services of Hawai‘i DBA Hina Mauka

August 2016
DOH issued an HRS Chapter 343 EA Exemption Declaration for the proposed Alcoholic Rehabilitation Services of Hawai‘i DBA Hina Mauka renovation and addition project

September 2016
Draft EIS for NPF and Campus Master Plan Development at HSH presented to Kāne‘ohe Neighborhood Board (KNB): KNB Agenda Planning Meeting (9/6/2016) & KNB Meeting Presentation (9/15/2016)

November 2016
Draft EIS (this report) completed and published for the NPF and Campus Master Plan Development

December 2016
Anticipated completion of existing Goddard building demolition

Early 2017
Anticipated Final EIS completed and published for the NPF and Campus Master Plan Development at HSH, preceded by KNB Meeting Presentation after completion of the 60-day Draft EIS public comment period

Mid 2017
Anticipated completion and filing of PRU Application for NPF and Campus Master Plan Development at HSH with the City; development of NPF construction Request for Proposal (RFP) documents; procurement of Design-Build Construction Manager

Late 2017
Anticipated RFP for NPF construction issued

Mid 2018
NPF construction contract awarded

December 2020
Anticipated NPF construction completed and commencement of DOH move-in

Figure 1-5. Hawai‘i State Hospital history, continued

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1.4 Proposed Action Summary

This DEIS comprises two parts commensurate with the two separate proposed approaches to HSH campus improvement, as identified and outlined in the 2005 Master Plan (MP) and 2015 Master Plan Update (MPU). The first approach is at the project level, specific to the first phase of proposed improvements: the design and construction of the NPF and Rehabilitation Mall (144-bed patient facility and associated improvements), to be built on the site of the existing Goddard building. The second approach is programmatic and based on the remaining campus improvement planning zones of the long-term plan of the 2005 MP and 2015 MPU, which is further described in Section 2. The programmed future improvements will be completed on different schedules—undetermined at this time—based on their need and their appropriated and available budgets. This DEIS is planned to be updated or supplemented, if necessary, as the timing and extents/details of each long-term improvement are determined.

1.5 Project Schedule

Because of the urgent need for NPF, meeting its fast-tracked schedule is a primary driver for the project. The EISPN, the first step in notifying the public that an EIS is being prepared, was submitted to the State DOH Office of Environmental Quality Control (OEQC) and published in the May 8, 2016, edition of *The Environmental Notice*. This DEIS is being submitted for public comment in late 2016, and the FEIS is planned for publication in early 2017. The City PRU Application for the overall HSH campus and design for the first phase of construction will follow immediately thereafter. DOH anticipates evaluating the proposed buildout of the remaining improvements to the HSH campus at some point following the completion of this entitlement process. This EIS—in conjunction with the 2005 MP, 2015 MPU, and PRU Application for the HSH facility—is intended to provide guidance and a baseline for the long-term development of improvements of the HSH campus. Furthermore, as needed, this EIS and the PRU Application will be updated in the future with programmatic EAs and PRU modifications to accommodate and address any significant differences from the EIS and PRU Application attributed to the remaining campus improvements once the planning horizons, timings, appropriated and available budgets, and details of the proposed buildout components are better defined and established. Entirely new environmental documents, PRU Applications, and/or Certificates of Need (CONs) commensurate with these future construction phases may be needed depending on their timing with approval expirations and extents of work.

1.6 Project Funding

The entire first phase of the project—entitlement documents, design, and construction—is being funded by the State (General Obligation Bonds), with its budget appropriated by the 2016 Hawai‘i State Legislature. The 2015 MPU contains the estimate~~s~~ for the first phase of the project. In the future, as facility needs arise, it is anticipated that DOH and DAGS will identify the specific scopes and phase~~s~~ of facility improvements, and prepare estimates for the work once timing and details of the improvements are better defined and established, commensurate with the prevailing construction climate at the time of each phase. It is anticipated that the planning, design, and construction of NPF will cost approximately $160 million, and the costs for long-term programmatic improvements covered in the 2005 MP and 2015 MPU will be determined as those elements are better defined.

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1.7 Intergovernmental Coordination

This section describes intergovernmental coordination that was completed as part of the DEIS development. Efforts included coordination through the development of the EISPN, comments received during the 30-day EISPN public comment period, direct agency coordination, and the identification of potentially required project and programmatic permits.

1.7.1 Pre-Consultation Coordination Efforts

The following agencies were notified about the pre-consultation process and were coordinated with to develop the EISPN and the subsequent DEIS:

- Honolulu Board of Water Supply (HBWS)
- City DPP, Land Use Permit Division (LUPD), Zoning Regulations and Permits Branch (ZRPB)
- City DPP, Wastewater Branch
- Hawai‘i Gas
- Hawaiian Electric Company (HECO)
- Hawaiian Telecom
- Hina Mauka
- Kāne‘ohe Neighborhood Board, c/o Mr. Maurice “Mo” Radke (Chair)
- Oceanic Time Warner Cable
- State DAGS, Public Works Division
- State Office of Planning (OP)
- State DOH-AMHD
- State DOH, Environmental Management Division, Clean Water Branch (CWB)
- State DOH-OEQC
- State DOH, Solid and Hazardous Waste Branch
- State Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW)
- State DOT, Highways Division
- University of Hawai‘i (UH), Center for Conservation Research and Training (CCRT), Hawai‘i Biodiversity and Mapping Program (HBMP)
- UHCC
- WCC
- U.S. Army Corps of Engineers (USACE), Honolulu District
- U.S. Department of the Interior, Fish and Wildlife Service (USFWS), Pacific Island Fish and Wildlife Office

While most of the pre-consultation coordination was performed via direct telephone conversation or email correspondence with the agency, with the results of this coordination being this DEIS, pre-consultation letters that were sent to some of these agencies are provided in Appendix B. Only one formal letter was received during the pre-consultation process—from USFWS. This letter and the corresponding written response letter from DAGS are provided in Appendix B.

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1.7.2 EISPN Comments Coordination Efforts

The EISPN was published in the May 8, 2016, edition of OEQC's *The Environmental Notice* for public notification, review, and comment over a 30-day period. Overall, comments were received from the following 12 organizations:

- HBWS
- City DPP-LUPD-ZRPB
- HECO
- Oceanic Time Warner Cable
- State DOH-CWB
- State DOH Environmental Planning Office (EPO)
- State DLNR-DOFAW
- State DOT
- State OP
- UNITE HERE, Local 5
- USACE, Honolulu District
- WCC

Comments varied across resource area, as summarized in Table 1-1. Comments covered sustainability of the proposed facility and surrounding ecosystem, related mostly to water, air, electrical infrastructure, and traffic. Other of areas of general concern included environmental permitting and impacts to infrastructure and utilities servicing the project site. Comments about the Skilled Nursing Facility (SNF), which is a future improvement, were addressed in a programmatic way based on details provided in the MPs only. The correspondence received from these organizations with regard to the published EISPN and the corresponding written response letters to their comments by DAGS are provided in Appendix B.

Table 1-1. Summary of EISPN Comments Received (by Affected Environment Area)

Affected Environment Area	Resource Section	Comment
Permitting	Section 404/401 of Clean Water Act (CWA) (Section 1.7.3)	Determine if a Section 404 permit is required through USACE or any other effects on State/U.S. waters.
	General compliance (Section 1.7.4)	Review the State's e-permitting portal for permit requirements.
Proposed project description	Sustainable design practices (Section 2)	Provide how sustainable and healthy design will be included in the proposed project and use the standards provided on the EPO website.
	Section 401 of CWA (Section 1.7.3)	Determine if need for National Pollutant Discharge Elimination System (NPDES) permit for wastewater to a publicly owned treatment works (POTW) or stormwater to surface receiving streams.
	Skilled Nursing Facility (Section 2.2)	Full analysis of SNF, part of the Long-term Plan Implementation.
Natural environment	Surface water (Section 3.5)	Project improvements must not violate water quality standards, anti-degradation policy (HAR, Section 11-54-1-1), or designated uses of nearby water bodies.
		Include the State's position on water quality and the beneficial uses of State waters.
		USACE concurs no impacts will occur on the adjacent Aloha Gardens and Wetlands from NPF construction; however, DOH will coordinate with USACE in the

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Table 1-1. Summary of EISPN Comments Received (by Affected Environment Area)		
Affected Environment Area	Resource Section	Comment
		future on long-term implementation of the MP if impacts are expected on additional HSH improvements.
	Flora and fauna (Section 3.9)	Install measures to avoid introduction or spread of invasive plants or animals into the project or surrounding area.
		Contact DLNR immediately if listed plants or animals are discovered during the project.
Human environment	Vehicular traffic (Section 4.6)	Traffic Impact Analysis Report (TIAR) has been completed for NPF and no impacts have been determined by DOT. Additional studies will be warranted in the future, as needed for the long-term MP implementation.
		Assess impacts from traffic impacts on WCC.
	Open-space, recreation, and visual resources (Section 4.9)	Address not only the visual impacts from NPF but also the long-term MP implementation.
Infrastructure and utilities	Stormwater (Section 5.5)	Address potential impacts from stormwater runoff to surface receiving streams and mitigate if needed.
		Should identify best management practices (BMPs) for proper stormwater control, including use of green solutions.
		How could stormwater runoff affect the Coastal Zone Management (CZM)?
	Potable and fire water (Section 5.2)	HBWS states adequate supply for NPF but to continue to work with them as the design progresses.
		Coordinate with HBWS on construction schedule to minimize water interruptions.
		Coordinate with the Fire Prevention Bureau of the Honolulu Fire Department (HFD).
	Potable and fire water (Section 5.2), wastewater (Section 5.3), chilled water (Section 5.4), and stormwater (Section 5.5)	Evaluate the ability to reduce, reuse, and recycle water.
	Electrical power supply and lighting systems (Section 5.8)	Maintain existing power easements for future maintenance access.
	Communication, security, and alarm system (Section 5.9)	Coordinate on underground utilities during construction of NPF using the One Call process.
Socioeconomic environment	Land use (Section 6.3)	Review the requirements under the Hawai‘i State Plan under HAR 11-200-17(h).
		Continue to coordinate with City of Honolulu, Zoning Regulations and Permits Branch, DPP required use of AG-2 General Agricultural District zoned property.
	Environmental justice (EJ) (Section 6.1)	Use the EJSCREEN tool in the evaluation for EJ impacts

1.7.3 Agency Coordination

As part of the development of this DEIS, several coordination efforts were completed for regulatory compliance and permitting needs. These efforts are summarized below.

- **State DOH, Environmental Management Division, Clean Water Branch:** CWB was contacted on March 11, 2016, about the preparation of the EIS and a request for coordination on potential

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National Pollutant Discharge Elimination System (NPDES) (Clean Water Act [CWA], Section 402) and Section 401 (Water Quality Certification [WQC]) requirements for NPF. If a Department of Army Permit (Section 404/10) is not required for any improvement work, then a Section 401 WQC would not be needed; but, if it is, then a Section 401 WQC may be required (as well as a Coastal Zone Management [CZM] Federal Consistency determination through the State OP). If the total disturbed area for any improvement work is 1 acre or more, then an NPDES Notice of Intent (NOI) Form C permit for stormwater during construction activities would need to be applied for and Notice of General Permit Coverage (NGPC) would need to be obtained. If any new water lines are hydrotested and the effluent is discharged to any State receiving water, surface water, or municipal separate storm sewer system (MS4), then an NPDES NOI-F permit may be required.

- **State DOH, State Health Planning and Development Agency (SHPDA):** On April 8, 2016, a CON application was approved for NPF (see Appendix C). The CON determined that the project was eligible for administrative review, meets CON criteria, a public need exists, and the cost is not unreasonable given the benefits of the project. A maximum capital expenditure of $60.5 million was approved for NPF. This CON did not cover other future improvements to HSH.
- **State Office of Planning:** All State agencies, including the OP, are guided by the *Hawai‘i State Planning Act* (Act), which is a broad policy document that sets the table for all activities, programs, and decisions made by local and State agencies. The Act was signed into law in 1978 to “improve the planning process in this State, to increase the effectiveness of government and private actions, to improve coordination among different agencies and levels of government, to provide for wise use of Hawai‘i’s resources and to guide the future development of the State” (HRS Section 226-1). The Act is codified under HRS Chapter 226.

  The Act sets forth the *Hawai‘i State Plan*, which is a long-range comprehensive plan that includes an overall theme, goals, objectives, policies, priority guidelines, and implementation mechanisms. The *Hawai‘i State Plan* serves as a guide for the future long-range development of the State; identifies the goals, objectives, policies, and priorities for the State; provides a basis for determining priorities and allocating limited resources, such as public funds, services, human resources, land, energy, water, and other resources; improves coordination of federal, State, and County plans, policies, programs, projects, and regulatory activities; and establishes a system for plan formulation and program coordination to provide for an integration of all major State and County activities.

  The checklist provided under HRS 226, referred to as the *Hawai‘i State Plan*, was reviewed to determine which items were potentially applicable to the proposed HSH improvements. The *Hawai‘i State Plan* criteria possibly applicable to the project were collectively identified to determine the apparent extent of the proposed HSH improvements for consistency with the State’s environmental, social, and economic goals and land use policies.
- **USACE, Honolulu District:** DOH received a Preliminary Jurisdictional Determination (PJD) regarding Section 404/10 on March 18, 2016 (see Appendix D). This PJD showed that Kapunahala Stream and an unnamed wetland may be waters of the United States that are adjacent to HSH. A formal delineation was not completed, though based on input in the EISPN from USACE dated June 7, 2016, USACE did not believe NPF would impact these areas. However, future HSH improvements may have the potential to impact these areas; thus, a delineation of surface waters may be warranted at the time(s) that they are done.

1.7.4 Potential Project and Programmatic Permits

Several permits will likely be required for both the short- and long-term HSH improvements, as shown in Table 1-2. This DEIS satisfies the HEPA requirements for OEQC. The additional permits associated

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with each improvement will be applied for and agency-approved/issued prior to the commencement of construction work. Planning zones included in Table 1-2 for each project activity are shown on page 2-15 of the 2015 MPU and are described in Section 2.3.

Table 1-2. Potential Proposed Project and Programmatic Action Permits

Proposed Action	Planning Zone [a]	Activity	Potentially Required Agency Permits and Clearances
New Patient Facility	1	New 144-bed patient care facility	USACE: jurisdictional determination for USACE Permit (CWA Section 404 and Section 10) DOH-CWB: CWA Section 402, NPDES permit (NGPC via NOI-C and/or NOI-F), and/or CWA Section 401 WQC State OP: CZM federal consistency determination, if Section 401 WQC required DPP: PRU application, building permit, grading permit, MS4 and sewer connection permits OEQC: EIS (HRS Chapter 343 and HAR Title 11, Chapter 200) State DLNR, State Historic Preservation Division (SHPD): HRS Chapter 6E review State DOH, Disability and Communication Access Board (DCAB): HRS Chapter 103-50 review Proposed Project Action not located in SMA or conservation district
Overall campus buildout of improvements	2	New 144-bed patient facility on the existing Guensberg building site, and associated parking	USACE: jurisdictional determination for USACE Permit (CWA Section 404 and Section 10) DOH-CWB: CWA Section 402, NPDES permit (NGPC via NOI-C and/or NOI-F), and/or CWA Section 401 WQC State OP: CZM federal consistency determination, if Section 401 WQC required DPP: PRU minor modification; building permit; grading permit, MS4 and sewer connection permits OEQC: EA and/or EIS (HRS Chapter 343 and HAR Title 11, Chapter 200) State DLNR, SHPD: HRS Chapter 6E review State DOH, DCAB: HRS Chapter 103-50 review Proposed Programmatic Actions not located in SMA or conservation district
	3a	New 72-bed patient facility (J-Pad)	
	3b	New 72-bed patient facility (Building I)	
	4a	New Plant Operations and Warehouse Facility (Hāloa and ‘Iolani)	
	4b	Current hospital plant operations and warehouse (WCC)	
	5	New SNF (Bishop)	
	6	Main hospital entrance improvements	
	7	Behavioral Stability Facility (BSF), Transitional Care Cottages, parking, public education center/museum	
	8	New administration and parking (Cooke and Transitional Care Cottages)	
	9a	Aloha Gardens improvements	
	9b	Protection of watershed	
	10	Additional parking (Po‘okela Street)	
	11	Hina Mauka	
	12	Water tanks, access road, and emergency ingress/egress	
	13	Landscape buffer at hospital/WCC property line	
	14	Additional parking (Buildings H and I, Hale Imua)	
	15	Additional parking (Guensberg, Buildings E and F)	

a. Planning zones are established on pages 2-13 and 2-15 in the 2015 MPU.

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Section 2

Description of the Proposed Action

This section presents a description of the proposed action for HSH capital improvements, its purpose and need, and MP background and development. The proposed action is divided into two parts—Part I covers the nearer, short-term first phase of improvements, which is the design and construction of NPF; Part II covers the further, long-term programmatic implementation described in the MPs.

This DEIS (and subsequent PRU Application) will complement the 2005 HSH MP and short- and long-term plans contained within the 2015 MPU, which provide the framework for more detailed planning, development, and investment decisions by DOH. While these entitlement documents look forward over an indefinite timeline for the complete and overall campus buildout of improvements, actual implementation of these improvements is anticipated to proceed incrementally in phases in response to facility needs for more patient beds, treatment facilities, and staffing, as well as economic cycles and availability of funding. Implementation of the facility improvements shall be administered through the MP documents with specific work details materializing during the design phase of each increment. Any mitigation actions identified in this planning process via the EISPN, DEIS, and FEIS will be implemented as well.

The PRU Application will include specific provisions and criteria for the proposed campus improvement components, features, and approaches—some of which may deviate from established standards, criteria, and guidelines set forth by the City because of limiting site- or project-specific circumstances, constraints, and/or requirements. The PRU Application will be submitted to the City for review, acceptance, and approval by the Honolulu City Council following the completion of the EIS process to reflect specific anticipated features of improvement work, some of which may not conform to applicable and prevailing agency requirements (i.e., *LUO*).

2.1 Purpose and Need

The HSH provides inpatient ABH services for the entire state of Hawai‘i, complementing the State’s Regional Mental Health Centers and private mental health agencies and practitioners. While institutional support exists for the HSH campus, HSH is the only facility in the state that can be mandated to admit court-ordered patients according to the following criteria:

- Psychiatric illness
- Need for active hospital-level treatment, usually longer term
- No complicating or coexisting medical/surgical illness, which requires general hospital care
- Unavailable appropriate psychiatric treatment elsewhere, because of one or both of the following:
  - Lack of psychiatric bed space
  - Lack of available reimbursement for patient care
- Judicial commitment

Because HSH’s patients are committed and discharged according to judicial order, HSH has no control over its patient population, which occasionally has led to overcrowding and operational challenges. The HSH campus is currently able to house 178 patients in the Guensberg building, as

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well as Buildings E, F, H, and I. Because of the lack of bed capacity at HSH, 40 additional patients are housed at the independently operated Kāhi Mōhala Behavioral Health (Kāhi Mōhala) facility in ‘Ewa Beach, for a total of 218 beds—well below the 259-bed total during the 1988 expansion. From April 2010 to July 2015, the population of Hawai‘i grew from 1.36 million to 1.43 million residents—a 5.2 percent increase, which is representative of the probable increase in the number of patients requiring the services of HSH. However, since the 1988 HSH expansion, buildings have deteriorated to the point of being abandoned because of safety concerns. In addition, staffing shortages have put a strain on the existing operation and security of the HSH facilities, so the need for optimization of existing building use and the need for a new comprehensive patient facility are critical. This project will address these needs in the long term with a phased overall campus buildout of improvements, and in the short term with the construction of the proposed NPF and all associated supporting infrastructure and parking areas.

2.2 Proposed Project Action

As stated in Section 1.4, this DEIS covers two parts of improvements at HSH. The 2005 MP was established to implement the purposes and intent of the overall campus buildout of improvements, and the long-term plan of the 2015 MPU better defined these improvements. Part I involves design and construction of NPF where the existing Goddard building is being demolished. Part II covers the programmatic facility improvements identified in the 2015 MPU.

2.2.1 Part I: New Patient Facility

As identified in both the 2005 MP and 2015 MPU, the first phase of improvements of the HSH short-term plan includes the proposed NPF to be built in place of the existing Goddard building, currently under demolition under a separate project. This phase includes:

- NPF and Rehabilitation Mall construction on the demolished Goddard building site, which includes 144 new beds and the possibility of increased parking commensurate with increased anticipated staff and visitors proportional to the increase in patients
- Use of existing onsite parking and the possibility of the conversion of the neighboring DOT Baseyard to HSH parking lot via a property transfer
- Use of existing transportation for patients between facilities and possible re-routing of existing transportation of staff between existing onsite or newly acquired parking lots and facilities
- Associated infrastructure improvements associated with stormwater, water, wastewater, electrical, and waste
- Secure safety fencing, closed-circuit television (CCTV), security lighting, landscaping, and associated improvements required for an ABH facility treating court-appointed patients

The flagpole, parking, and lookout area at the front of the building shall remain. The demolition work of the existing Goddard building is expected to be completed by the end of 2016.

As part of this first phase, the proposed NPF’s associated supporting infrastructure will be identified and evaluated on a project level as part of this EIS process. The NPF will be designed to accommodate 144 patient beds in alignment with the goals of the MP documents by separating high-acuity patients from lower-acuity patients. While the facility is meant primarily to treat court-appointed and high-acuity patients, flexibility will be built into the facility by integrating a 24-bed medical unit that can be used as regular patient housing if medical needs are low.

Additionally, sustainable design measures being considered in the design of NPF will follow the 2012 International Building Code (IBC) and Leadership in Energy and Environmental Design (LEED) with the goal of becoming LEED Silver-accredited. Design elements will be included for the building

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construction and interior design, landscaping elements, water usage, and efficiencies in operations and maintenance (O&M). However, because of the security provisions required for public safety, these elements will have to be integrated without negative impact to safety. DOH will work closely with the City during the PRU approval process to maximize sustainable design elements to the extent practical.

For security purposes, lighting will be placed throughout NPF. The recreation yard and other patient access points will be well-lit and security lighting will be placed around the perimeter of the facility. In addition, the entrances will be properly secured with fencing and monitored via CCTV. Additional cameras will be placed in the main lobby, around the facility perimeter, and will have both stationary and pan, tilt, zoom (PTZ) cameras throughout.

2.2.2 Part II: Long-Term Plan Implementation

The NPF (short-term plan) is one of the 15 planning zones identified in the 2015 MPU that will compose the overall campus buildout of improvements to meet DOH goals. Refer to Section 2.3 below for 2015 MPU specific information regarding the established planning zones. The overall campus buildout of improvements will be identified and evaluated on a programmatic level as part of this DEIS process to serve as the basis for the future project-level EAs and/or EISs for identified long-term planning phases of the 2015 MPU. In addition, permitting and other approvals will be determined as those projects are better analyzed.

2.3 Hawai‘i State Hospital Master Plans

HSH’s last MP was completed in 2005, which recommended short-term and long-term capital improvement projects for the aging and insufficient facilities on the HSH campus. The intent of the MP was to implement or initiate the recommended improvement projects over the following decade and to address identified operational issues. However, the recommended improvement projects were never implemented and the identified operational issues were never addressed, prompting an update to the MP. The update to the 2005 MP was completed in 2015 to address the needs of HSH that had burgeoned over the past decade. The *Hawaii State Hospital—2015 Master Plan Update* final report, dated August 28, 2015, provides both a short- and long-term planning framework for future developments in response to the growing patient population and implementing needed HSH campus improvements. The 2015 MPU is included with this DEIS as Appendix E.

The 2015 MPU outlines the proposed development of the HSH campus, which is divided into multiple planning zones and development phases. For example, the Bishop building is planned for demolition to potentially make way for a new independently owned and operated SNF. The ‘Iolani and Hāloa buildings are planned for demolition to make way for a potential consolidated HSH Plant Operations and Warehouse Facility (existing HSH plant operations and activities are currently located within the lower northeast corner of the WCC campus). The Cooke building, currently occupied by HSH Security and Ground Maintenance, is also planned for demolition to accommodate either additional parking or an expansion of HSH administration. These proposed developments on the HSH campus are a few examples of the improvements identified for the campus according to the 2015 MPU. The short-term plan includes the proposed NPF, with Rehabilitation Mall and all associated supporting infrastructure and parking areas (collectively, NPF). NPF will care for and treat HSH’s court-ordered institutionalized patients and patients at high acuity for suicidal, homicidal, and elopement ideation and is intended to be an independent facility in terms of limiting the need for support services from the central and lower campus, which will separately care for and treat the lower-acuity patients.

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2.3.1 2005 Master Plan

The HSH MP was first completed in 2005 to address improvements and new facilities on the campus. It comprised several large documents, which are available to the public if requested through DOH. These documents included:

- Facility Analysis and Maintenance Plan
- Functional Space Program Analysis
- Master Site and Facility Development Plan
- Planning and Design Guidelines for the Master Site and Facility Development Plan

The 2005 HSH MP was developed with close coordination with internal HSH stakeholders. Through this coordination, the following goals were developed for the MP:

- Create an environment that is a secure, comfortable, patient-/family-friendly health care facility
- Develop a facility plan that will improve operational and staff efficiency and effectiveness through functional zoning based on clinical and nonclinical functions, and high-acuity and lower-acuity patients
- Allow for flexibility in spaces for multi-purpose use, technology changes, patient census changes, and future expansion
- Build a civic identity in the community
- Create a well-defined campus boundary through visual and physical separation of surrounding properties
- Develop a circulation pattern that is simple and logical that separates public, service, and patient circulation
- Provide secondary access for emergencies and build redundancies for emergency situations

By 2015, because of funding and legislation setbacks, the recommendations outlined in the 2005 MP were not acted on and no improvements or additions were made. The MP was considered obsolete in many ways, so an update was completed. Key features were not considered obsolete and were carried forward into the 2015 MPU, which included:

- Provide additional short-term bed capacity at the HSH campus (244 total beds in 2005; 252 total beds in 2015)
- Construct an NPF on the existing Goddard building site (first phase development project)
- Build until DOH receives appropriation for reconstruction of an NPF at the Guensberg site
- Continue using Buildings E, F, H, and I for lower-risk patients
- Move Plant Operations and Warehouse Facility from the WCC campus to the HSH campus
- Develop a new HSH campus main entrance on Po‘okela Street

2.3.2 2015 Master Plan Update

There are several key differences between the 2005 MP and 2015 MPU. These included changed goals, different size facilities, and operational planning. These included the following:

- The 2015 MPU defines the goal of HSH to retain control of the land development on or near the campus to allow for future development
- The 2015 MPU provides a long-term development plan to as many as 516 beds on the HSH campus, while the 2005 MP was limited to 244 beds
- The 2015 MPU plans to use the J-Pad site for another patient care facility, while the 2005 MP identified the J-Pad site for the relocation of HSH Plant Operations and Warehouse Facility

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- A Preliminary Parking Study was performed as part of the 2015 MPU to increase parking to accommodate the growth of HSH’s patient bed total, while the 2005 MP did not address parking expansion
- The 2015 MPU incorporates the “2-Hospital” concept, separating the high-risk patients from the lower-risk patients in two separate zones with separate redundant services, while the 2005 MP was focused on the “1-Hospital” concept, which consolidated all services for all of the patients.

In addition, the 2015 MPU included several needed facility improvements that were not included in the 2005 MP. The key elements of the 2015 MPU long-term plan were (numbering corresponds to designated planning zones identified by the plan) as follows:

1. Future 144-bed patient care facility (eastern portion of campus): new 144-bed Guensberg patient care facility, rehabilitation mall, and parking in the same location as the existing Guensberg building
2. Future two 72-bed patient care facilities (northern portion of campus): two new 72-bed patient care facility each (144 beds total) in the existing J-Pad and Building I patient care facility locations, respectively
3. Plant Operations and Warehouse Facility (northern portion of campus): new facility in the same location as the existing Hāloa and ‘Iolani buildings with subsequent turnover of the existing Plant Operations and Warehouse Facility on the northern portion of the WCC campus to the WCC
4. SNF, eastern portion of campus: new facility by others and independently operated in the same location as the existing Bishop building
5. Main entrance improvements (eastern portion of campus): new prominent campus entrance off of Po‘okela Street with median-separated in and out lanes and guard shack located within the landscaped median in the existing location of part of the DOT Baseyard
6. Behavioral Stability Facility (BSF) relocated Transitional Care Cottages, or additional parking (eastern portion of campus): new BSF, cottages, parking, or public education center/museum in the same location as the existing DOT Baseyard (occupied via Executive Order)
7. Administration expansion or additional parking (south-central portion of campus): new facility for administration or parking in the same location as the existing Cooke building and Transitional Care Cottages
8. Aloha Gardens improvements and watershed (southern portion of campus): location of facility landscaping nursery and preservation and protection of existing undeveloped and natural area, respectively
9. Additional parking (eastern portion of campus): new parking area in undeveloped area across Po‘okela Street to accommodate required spaces commensurate with campus improvements
10. Hina Mauka (southeastern portion of campus): area for continued use by existing private, independently operated drug and alcohol rehabilitation treatment facility (The Alcoholic Rehabilitation Services of Hawai‘i dba Hina Mauka)
11. Water tanks, access road, and emergency ingress/egress (western portion of site): area for existing water tank and possibly an added tank if future site developments warrant it, access road, and emergency site ingress/egress
12. Landscape buffer (northeastern portion of site): new landscaped strip between the HSH and WCC campuses to delineate and possibly visually buffer one from the other
13. Additional parking (northwestern portion of site): new parking area in undeveloped area near existing Buildings H and I, and Hale Imua to accommodate required spaces commensurate with campus improvements

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14. Additional parking (southwestern portion of site): new parking area in undeveloped area near the existing Guensberg building and Buildings E and F to accommodate required spaces commensurate with campus improvements

2.3.3 Deviations from Master Plans

Developments in the project since the 2015 MPU finalization in August 2015, have resulted in several deviations in project components, which are summarized here:

- Continued use and operation of the Guensberg building after the completion of NPF, rather than its demolition.
- Deletion of pedestrian bridge from Building G to the second floor of NPF.
- Floor-to-floor heights of 17 feet for NPF, instead of 14 feet (as shown in the 2015 MPU).
- Installation of a standalone chiller plant for NPF that would be expandable to accommodate a future patient facility at the existing Guensberg building site (planning zone 2), instead of an improved/expanded centralized chilled water system for the entire HSH campus (for which 3 options were presented in the 2005 MP).

These project changes are summarized over two DOH memorandums dated 7/12/16, and 10/20/2016, which are included in Appendix F.

2.4 Kāne‘ohe Neighborhood Board Presentations

Two project presentations to the public at regular monthly Kāne‘ohe Neighborhood Board (KNB) meetings, including question and answer sessions, will be conducted as part of this EIS process. The first presentation was completed at the Thursday, 9/15/16, monthly KNB meeting with its pre-planning coordination done beforehand with the KNB members on Tuesday, 9/6/16. The project fact sheet made available at this meeting, presentation slides, KNB agenda of the meeting, and KNB minutes of the meeting are provided in Appendix G.

A second project presentation at the KNB is tentatively planned for about January or February 2017—after the 60-day public comment period on the DEIS concludes—and, prior to the FEIS that is planned for completion in about April 2017. This second KNB meeting presentation will discuss project developments and review comments received on the DEIS. Any materials distributed at this meeting, the presentation slides, KNB meeting agenda, and KNB meeting minutes will be included in the FEIS.

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Section 3

Natural Environment: Description of Affected Environment, Potential Impacts, and Mitigation Measures

HSH is located in a diverse area of Kāneʻohe and is bounded by residential suburban neighborhoods, WCC, the Kāneʻohe District Courthouse, DOT Baseyard, an elevated portion of Interstate H-3, the Kāneʻohe Forest Reserve (Koʻolau Mountains beyond), Kapunahala and Keaʻahala Streams (ravines), and nearby Kāneʻohe District Park. The proposed NPF will be located at the western (*mauka*) top of the HSH grounds, overlooking the rest of the campus.

This section describes the affected natural environmental resources, and the potential impacts of and mitigation measures for the proposed work on these resources. The natural environment resources covered in this section include climate; topography and geology; soil; hydrogeology; surface water including streams, flood hazards, and shoreline; tsunami; hurricane; earthquake; and flora and fauna.

3.1 Climate

This section describes the climate of the project area, including the affected environment and potential impacts and mitigation measures.

3.1.1 Affected Environment

The climate at HSH is typical for the base of the Koʻolau mountains on windward Oʻahu. It is characterized by frequently cloudy skies, northeasterly trade wind showers, moderate to heavy rainfall during the winter, moderate rainfall during the summer, and temperatures that range from an average of 65 to 85 degrees Fahrenheit (°F). The average annual precipitation in the *mauka* area of Kāneʻohe is approximately 76 inches and about 54 inches for the overall general Kāneʻohe area.

The climate in Hawaiʻi can be generally characterized by two seasons—summer and winter. According to the Western Regional Climate Center (WRCC) climate data for the Kāneʻohe *mauka* area collected from October 1949 through June 1998, the summer months from June to November—which coincide with the Central Pacific hurricane season—have had an average high temperature of 82°F and average low of 71°F. Climate data for the general Kāneʻohe area—which includes more recently compiled data by WRCC from 1905 through May 2016—indicate that the summer months from June to November have an average high temperature of 85°F and average low of 73°F. During these summer months, typical trade winds from the northeast are often disrupted, and prevailing winds tend to shift and blow from the south/southeast over the Koʻolau mountains, which creates a drier, leeward orographic condition for the Kāneʻohe *mauka* and general Kāneʻohe areas. According to WRCC, these areas have average summer precipitations of 33 and 24 inches, respectively.

According to WRCC data from October 1949 through June 1998 for the Kāneʻohe *mauka* area, winter months from November through May have had an average high temperature of 78°F and average low of 67°F. For the general Kāneʻohe area, from 1905 through May 2016, the winter

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months from November through May have an average high temperature of 81°F and average low of 69°F. During the winter months, trade winds from the northeast typically dominate the season creating wetter, windward orographic conditions for the Kāne‘ohe *mauka* and general Kāne‘ohe areas, which, according to WRCC, have average winter precipitations of 43 and 30 inches, respectively.

3.1.2 Potential Impacts and Mitigation Measures

As the footprint area of NPF will be similar to that of the existing Goddard building, the first phase of improvements is not anticipated to create a significant net change in concrete, asphalt concrete, or other impermeable surfaces, which can absorb solar energy in the form of infrared and radiant heat that can result in slightly higher air temperatures in their immediate vicinity. Therefore, the proposed work is not anticipated to have any short- or long-term adverse effects on the climate resource of the HSH project area or its surrounding community because of the limitations of the effect to the immediate vicinity of the structures and surfaces. Therefore, no mitigation measures are proposed.

Similarly, adverse project impacts associated with the overall campus buildout of improvements at HSH on the local climate are not anticipated for the same factors described above for the NPF work. Nonetheless, possible short-term, long-term, and cumulative adverse effects on the local climate for the overall campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known.

3.2 Topography and Geology

This section describes the topography and geology of the project area, including the affected environment and potential impacts and mitigation measures.

3.2.1 Affected Environment

The HSH site generally slopes downward from southwest (*mauka*) to northeast (*makai*). Slopes range from approximately 6 percent near Kea‘ahala Road, increasing to roughly 8 to 10 percent farther southwest, and are about 15 percent in the areas of the existing Goddard and Guensberg buildings near the top of the campus. There is a general overall grade differential of approximately 180 feet from the site’s entrance at Kea‘ahala Road (ground surface elevation of approximately 190 feet above mean sea level [AMSL]) to the existing Goddard building site (ground surface elevation of roughly 370 feet AMSL).

As indicated in the HBWS document *Final Environmental Impact Statement for Windward O‘ahu Regional Water System Improvements*, dated August 1988, and 1998 reference, *Atlas of Hawai‘i, Third Edition*, published by the Department of Geography at UH at Hilo, the project site is located at the base of the eroded northern half remnants of the extinct Ko‘olau shield volcano, which compose the windward side of O‘ahu. The Ko‘olau volcano consists of the eruptive products of the shield and rejuvenated stages; no post-shield stage lavas are known. Rejuvenated-stage lava mainly erupted on the southeast side of the Ko‘olau shield, and are identified as the Honolulu Volcanic Series lavas, which overlie minor portions of windward O‘ahu. These Honolulu lavas include alkalic basalt, basanite, nephelinite, and melilitite, which have been dated to exceed 100,000 years old. On the north side of the Ko‘olau shield, a caldera complex in the Kailua region on the northeast shore of O‘ahu was bisected by the catastrophic Nu‘uanu landslide. During glacial and interglacial phases, O‘ahu underwent a series of submergences and emergences because of ocean level changes, which may have resulted in substantial subsidence of the island. The combined effects of fluvial erosion and wave erosion of cliffs may have caused the reduction of the height of the Ko‘olau volcano by as much as 1,000 feet.

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3.2.2 Potential Impacts and Mitigation Measures

Although construction work will involve some clearing and grubbing, utility trenching, and earthwork (with no anticipated imported fill/embankment material), the construction of NPF will be in the same location as that of the existing Goddard building, which is currently under demolition under a separate project. During the City Building Permit plan approval process, proposed erosion control plans and best management practices (BMPs) will be reviewed for compliance with governing ordinances and requirements. Finish grades are anticipated to be similar to existing grades established after the demolition of the existing Goddard building; therefore, no long-term effects on the topography and geology conditions at the site by the first phase of HSH site improvements are anticipated. Thus, no mitigative measures are proposed.

Similarly, adverse project impacts associated with the overall campus buildout of improvements at HSH on local topography and geology are not anticipated for the same factors described above for the NPF work. Nonetheless, possible short-term, long-term, and cumulative adverse effects on site topography and geology for the overall campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known.

3.3 Soils

This section describes the soils of the project area, including the affected environment and potential impacts and mitigation measures.

3.3.1 Affected Environment

The HSH site is primarily on agriculturally zoned land, classified by the National Resources Conservation Service (NRCS) as Loleka‘a Silty Clay (LoB) with typical slopes from 3 to 8 percent. Figure 3-1 shows a snapshot of the Web Soil Survey for the site, as provided by NRCS. Loleka‘a Silty Clays are characterized by older sediments typically found on slopes and areas at higher elevations, which are good for farming and cultivation. The soil is generally well-drained, so frequency of flooding or ponding is minimal.

According to the *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, dated August 1972, by the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS), Loleka‘a series soils (unified soil classification: ML–MH) consist of well-drained soils on fans and terraces on the windward side of the island of O‘ahu. These soils developed in old, gravelly colluvium and alluvium. They are gently sloping to very steep. Elevations range from nearly sea level to 500 feet AMSL. The annual rainfall amounts to 70 to 90 inches and is well distributed throughout the year. The mean annual soil temperature is 71°F. Loleka‘a soils are geographically associated with ‘Alaeloa and Waikāne soils. These soils are used for pasture, home sites, orchards, truck crops, bananas, and papaya. The natural vegetation consists of guava, Christmas berry, California grass, hilograss, and ricegrass. In a representative profile, the surface layer is dark brown silty clay about 10 inches thick. The subsoil is 46 to more than 70 inches thick. The upper part is dark brown silty clay that has a subangular blocky structure, and the lower part is dark yellowish-brown loam that has a subangular blocky structure. The substratum is strongly weathered gravel. The soil is strongly acidic in the surface layer and strongly acidic to extremely acidic in the subsoil. Permeability is moderately rapid (2.0–6.3 inches per hour). Runoff is slow, and the erosion hazard is slight. The available water capacity is about 1.3 inches per foot of soil. Soft, weathered gravel is common in the subsoil but does not affect use and management of the soil for farming. In places roots penetrate to a depth of 5 feet or more. Depth to bedrock exceeds 5 feet and depth to the seasonal high water table is also greater than 5 feet. Soil reaction ranges from 4.0 to 5.5 in pH value, shrink-swell

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potential is low to moderate, corrosivity to uncoated steel is high, and corrosivity to concrete is moderate to high.

The NPF, while upon Loleka‘a Silty Clay soil according to available NRCS soil information, is located adjacent to an area with a soil classification of ‘Alaeloa Silty Clay—Older Substrate, 15 to 35 percent Slopes (AeE). The ‘Alaeloa Silty Clay consists of well-drained, deeply layered silty clay that is typically red to reddish brown in color. This type of land is not well cultivated.

According to the 1972 USDA SCS Soil Survey, ‘Alaeloa series soils (unified soil classification: MH) consist of well-drained soils on uplands on the islands of Maui, Moloka‘i, and O‘ahu. These soils developed in material weathered from basic igneous rock. They are gently sloping to very steep. Elevations range from 100 to 1,500 feet AMSL. The annual rainfall amounts to 35 to 60 inches, and it is well distributed throughout the year. The mean annual soil temperature is 72°F. ‘Alaeloa soils are geographically associated with Kāne‘ohe, Loleka‘a, Pāpa‘a, Waikāne, Honolua, and Kahana soils. These soils are used for pineapple, pasture, wildlife habitat, home sites, and water supply. Small acreages are used for truck crops, orchards, and sugarcane. The natural vegetation consists of guava, Java plum, Christmas berry, Japanese tea, and hilograss. This soil occurs on smooth side slopes and toe slopes in the uplands. In a representative profile the surface layer is dark reddish-brown silty clay about 10 inches thick. The subsoil, about 48 inches thick, is dark-red and red silty clay that has a subangular blocky structure. The substratum is soft, weathered basic igneous rock. The soil is medium acidic in the surface layer and strongly acidic in the subsoil. Permeability is moderately rapid (2.0–6.3 inches per hour). Runoff is medium, and the erosion hazard is moderate. The available water capacity is about 1.2 inches per foot in the surface layer and 1.6 inches per foot in the subsoil. Roots penetrate to a depth of 5 feet or more in places. Workability is difficult because of the slope. Depth to bedrock exceeds 5 feet and depth to the seasonal high water table is also greater than 5 feet. Soil reaction ranges from 5.1 to 6.0 in pH value, shrink-swell potential is moderate, corrosivity to uncoated steel is high, and corrosivity to concrete is moderate.

3.3.2 Potential Impacts and Mitigation Measures

No imported fill or borrow embankment material is anticipated for the construction of NPF, and industry-standard, locally accepted effective and appropriate erosion and sediment control measures and BMPs will be implemented to minimize any significant loss of existing soils. Similar protective measures and practices will also be employed on steeper slopes, which may be potentially affected by the work. Thus, no short-term, long-term, or cumulative adverse effects on soil conditions at the project site by NPF are anticipated. Therefore, no mitigative measures are proposed.

Similarly, adverse project impacts associated with the overall campus buildout of improvements at HSH on in situ site soils are not anticipated for the same factors described above for the NPF work. Nonetheless, possible short-term, long-term, and cumulative adverse effects on site soils for the long-term, overall campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known.

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Figure 3-1. Natural Resources Conservation Service, Web Soil Survey for HSH site

Source: Natural Resources Conservation Service, USDA, Web Soil Survey.

3.4 Hydrogeology

This section describes the hydrogeology of the project area, including the affected environment and potential impacts and mitigation measures.

3.4.1 Affected Environment

Windward O'ahu, which encompasses the project site, is underlain by Ko'olau basalt saturated with groundwater. This basal water originates as inland rainfall that flows seaward from its *mauka* origins by seeping through the Ko'olau basalt under artesian pressure. At low elevations, a coastal plain consisting of alluvial and marine sediments behaves as a leaky caprock and covers the basal aquifer below a surface elevation of about 10 feet. The basal aquifer, under artesian pressure, discharges into the sediments, preferentially flowing through porous fossil coral strata, and ultimately drains into the Pacific Ocean. In the absence of coral, the artesian leakage saturates clayey sediments up to the ground surface.

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According to the UH Water Resources Research Center, *Technical Report 179—Aquifer Identification and Classification for O‘ahu: Groundwater Protection Strategy for Hawai‘i* (November 1987, revised 1990) by Mink and Lau, the hydrogeology at the site consists of a dual aquifer-type formation that conforms to the information contained in Table 3-1.

Table 3-1. Hydrogeology at the Site

Aquifer	Island	Aquifer Sector	Aquifer System	Aquifer Type	Aquifer Code	Status Code	Quadrangle Number
Upper	3 (O‘ahu)	06 (Windward)	03 (Ko‘olaupoko)	116	30603116	12211	12
Lower	3 (O‘ahu)	06 (Windward)	03 (Ko‘olaupoko)	122	30603122	11122	12

Source: Technical Report 179, “Aquifer Identification and Classification for O‘ahu: Groundwater Protection Strategy for Hawai‘i,” John F. Mink and L. Stephen Lau, November 1987 (Revised 1990).

The two aquifers are very different in detail. The upper aquifer consists of unconfined basal water in sedimentary, nonvolcanic lithology. It is currently used (development stage), is an ecologically important utility, has low salinity of 250–1,000 milligrams per liter (mg/L) of chloride (Cl^-) content, is of irreplaceable uniqueness, and has high vulnerability to contamination. The lower aquifer consists of confined basal water in geological dikes—aquifers in dike compartments. It is currently used (development stage) for drinking utility purposes, has fresh salinity of <250 mg/L Cl^-, is of replaceable uniqueness, and has moderate vulnerability to contamination. Basal water is fresh water in contact with seawater and an unconfined aquifer is defined where the water table is the upper surface of the saturated aquifer. A confined aquifer is defined where the aquifer is bounded by impermeable or poorly permeable formations, and the top of the saturated aquifer is below the groundwater surface. The aquifer classification map for the hydrogeological region that encompasses the project site is provided as Figure 3-2.

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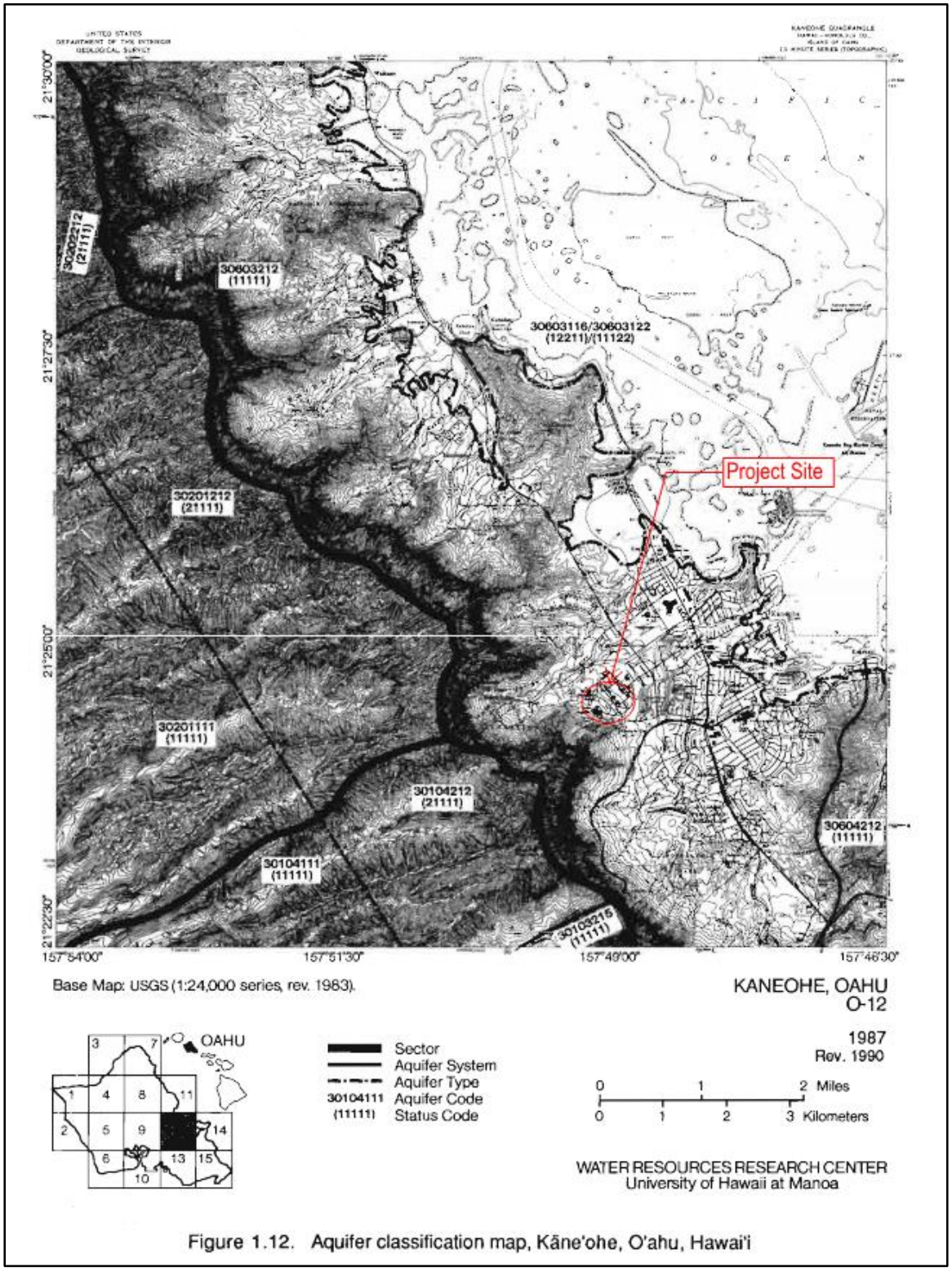

Figure 3-2. Aquifer classification map, Kāne‘ohe, O‘ahu, Hawai‘i

Source: Figure 1.12 “Aquifer classification map, Kāne‘ohe, O‘ahu, Hawai‘i” of Technical Report 179, “Aquifer Identification and Classification for O‘ahu: Groundwater Protection Strategy for Hawai‘i,” John F. Mink and L. Stephen Lau, November 1987 (Revised 1990).

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The groundwater of the island of O‘ahu has a total yield of approximately 407 million gallons per day (mgd), of which about 91 mgd is located in windward O‘ahu (Aquifer Code: 306) and roughly 30 mgd is situated in the Ko‘olaupoko District. According to DLNR, the sustainable yield for the Ko‘olaupoko Aquifer (aquifer code: 30603) is 30 mgd. A hydrologic unit map for the island of O‘ahu is provided as Figure 3-3.

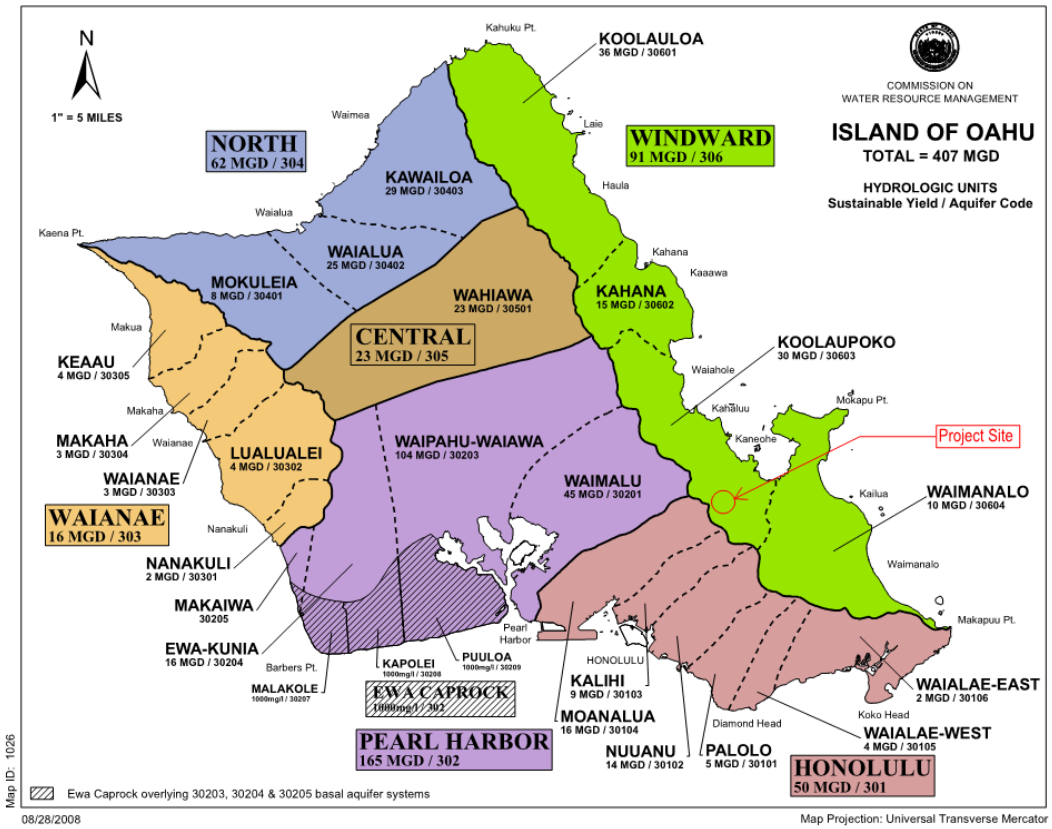

Figure 3-3. Hydrologic unit map, O‘ahu, Hawai‘i

Source: “Ground Water Hydrologic Unit Map, Island of Oahu,” Commission on Water Resource Management, Department of Land and Natural Resources, State of Hawai‘i, August 28, 2008.

The *Ko‘olaupoko Watershed Management Plan* (KWMP), published in September 2012 by Townscape, Inc., meets the requirements of preparing a County water use and development plan under the *State of Hawai‘i Water Code* and City ROH. HBWS is expanding the KWMP to include a management plan for watershed protection that identifies critical watersheds and develops a list of watershed protection strategies and projects for those watersheds because fresh water is not an infinite resource; its high quality, quantity, and sustainability are essentially linked to the existence of healthy watersheds.

The overall goal of the KWMP is to formulate an environmentally holistic, community-based, and economically viable watershed management plan that will provide a balance between (1) the preservation and management of O‘ahu’s watersheds and (2) sustainable groundwater and surface water use and development to serve present users and future generations. The plan has five objectives:

- Promote sustainable watersheds
- Protect and enhance water quality and quantity

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- Protect Native Hawaiian rights and traditional customary practices
- Facilitate public participation, education, and project implementation
- Meet future water demands at reasonable costs

According to the KWMP, the permitted HBWS groundwater use for the Ko‘olaupoko watershed area is 16.595 mgd for the years 2000 through 2030, while state and private permitted use of the same groundwater area increases from 0.936 to 3.942, 4.077, 4.147, 4.222, and 4.537 mgd over the years 2000, 2010, 2015, 2020, 2025, and 2030, respectively. Groundwater import amounts from the adjacent Ko‘olau Loa area are 8.838, 7.000, 6.900, 6.800, 6.700, and 6.600 mgd over this same quinquennial time frame.

The projected quinquennial potable water demands for the Ko‘olaupoko area (including 0.5 mgd exported to East Honolulu) from 2000 through 2030 are 18.060, 17.695, 17.977, 17.972, 17.789, and 17.575 mgd, while the nonpotable water demands for the same area over the same time frame are 11.434, 11.629, 11.973, 12.286, 13.785, and 14.271 mgd, respectively.

The water demand for the Ko‘olaupoko Development Plan area was 19.84 mgd in 2000 for a HBWS-served population of 113,256 (175.14 gallons per capita demand). Thus, most of the water drawn from the Ko‘olaupoko area is used within the same plan area rather than being exported away. Furthermore, the HBWS existing potable water sources and systems for the district are adequate to meet the current and future projected potable water demand. A map of the island of O‘ahu, planning districts, estimated population distribution, and HBWS pumpage and water demand as of calendar year 2000, and the Ko‘olaupoko watersheds, is provided in Figure 3-4.

The projected HBWS-served population in the Ko‘olaupoko Development Plan area for 2030 is 112,048 with a predicted demand of approximately 19.62 mgd (175.14 gallons per capita demand). This represents the only projected decrease in 2030 water demand for the eight BWS development plan areas that compose the island of O‘ahu from 2000—down 0.22 mgd for an estimated population decrease of 1,208 from 113,256 in 2000 to 112,048 projected in 2030.

HBWS has identified the Ko‘olaupoko aquifer system area to have a recoverable yield (an estimate of the amount of groundwater that could feasibly be developed for an aquifer system area—a concept that allows HBWS to plan and respond to uncertainties) that is less than or equal to its sustainable yield.

Additionally, the HBWS 2016 *Draft Water Master Plan*, forecasts a BWS demand for the Ko‘olaupoko Land Use District to follow its downward trend since 2000, for an average (-)1 percent over the next 30 years.

3.4.2 Potential Impacts and Mitigation Measures

No adverse impacts on local hydrogeology, groundwater elevation, available aquifer yield, or water supply by NPF are anticipated because of anticipated overall steady-state or possibly declining population and corresponding projected water demand in the area. Additionally, increased application of sustainable development and improvements, as well as expanding statutory and policy requirements for the implementation of LEED and water reuse, conservation, and use minimization in facilities, are anticipated to further limit the potential for adverse project impacts on these resources. Furthermore, any project earthwork will be performed within the area of the existing site approximately 190 to 370 feet AMSL and at relatively shallow-depth excavations and elevations similar to the bottom of the existing Goddard building foundation (less than 15 feet below ground surface), so no short-term, long-term, or cumulative adverse effects on the hydrogeology and groundwater at the project site are anticipated. Therefore, no mitigative measures are proposed.

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Similarly, adverse project impacts associated with the overall campus buildout of improvements at HSH on local hydrogeology are not anticipated for the same factors described above for the NPF work. Nonetheless, possible short-term, long-term, and cumulative adverse effects on site hydrogeology for the campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known.

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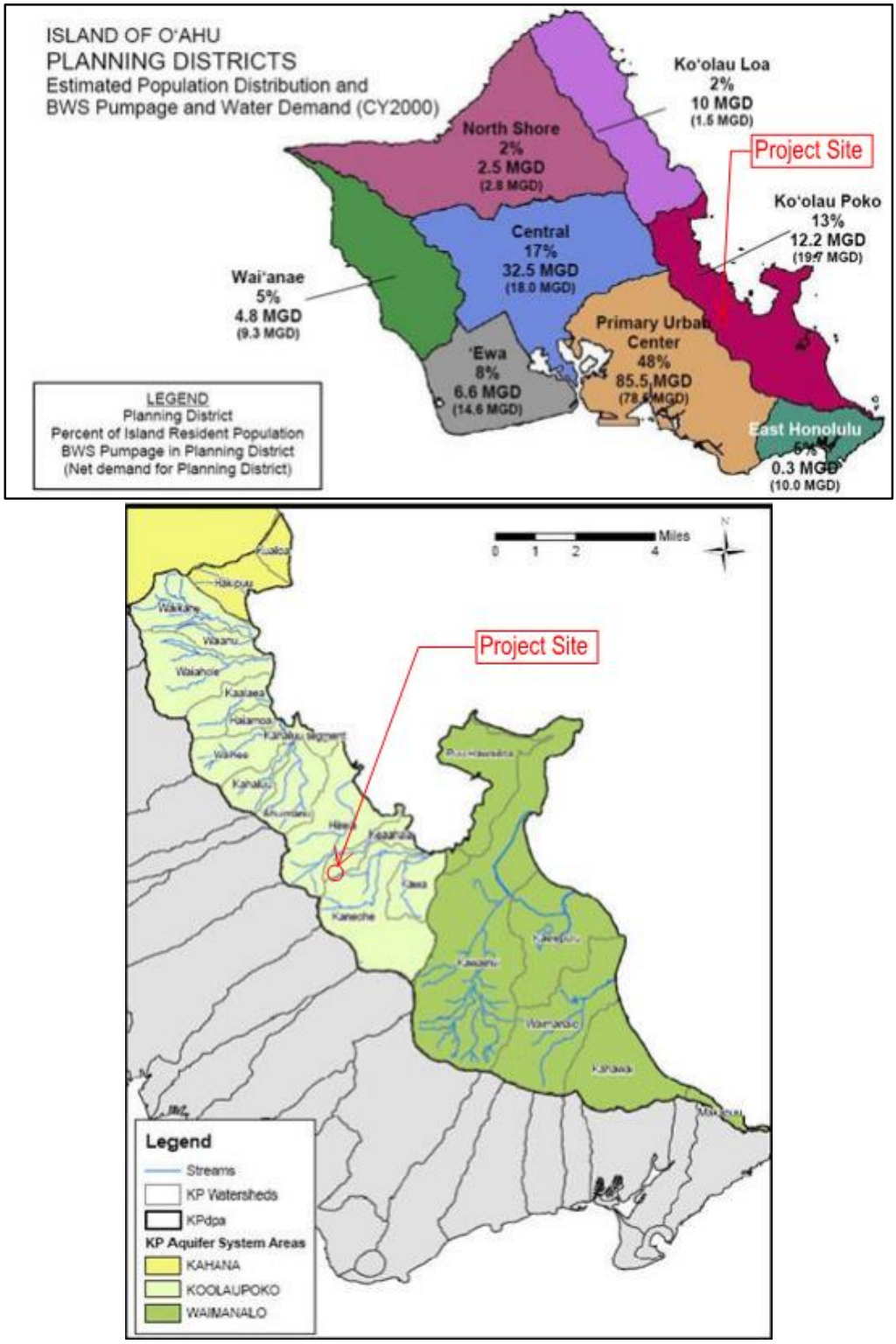

Figure 3-4. HBWS island of O'ahu planning districts, estimated population distribution, and HBWS pumpage and water demand (calendar year 2000) and Ko'olaupoko watersheds

Source: Honolulu Board of Water Supply, 2016.

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3.5 Surface Water

This section describes the surface water of the project area, including the affected environment and potential impacts and mitigation measures.

3.5.1 Affected Environment

This section describes the affected surface water environment of the project area, including streams, wetlands, flood hazards, shoreline, and water quality.

3.5.1.1 Streams

The HSH campus is located between Kea‘ahala Stream to its north and Kapunahala Stream to its south as shown in Figure 3-5.

Kea‘ahala Stream runs *makai* in a general west-to-east alignment and at its closest point is about 1,200 feet (0.2 mile) north of the northeasternmost portion of the HSH campus. The stream meanders eastward from this point for about 10,400 feet (2.0 miles) via open natural channels, segments of ditch linings/hardening, and road culverts/bridges until it discharges to Kāne‘ohe Bay (Pacific Ocean) at the Makani Kai Marina (45-995 Wailele Road, Kāne‘ohe, HI 96744). A reconnaissance of Kea‘ahala Stream on March 3, 2016, at its nearest points to the HSH campus along Kahuhipa Street, Kahekili Highway, Kea‘ahala Road, and Kāmau Place, revealed that the stream bed was dry and heavily overgrown with vegetation and grass. It was roughly 10 to 15 feet wide and naturally unlined with exposed rocks and sediment. No animals were observed inhabiting the stream bed area.

Kapunahala Stream, via open natural channels, segments of ditch linings/hardening, and road culverts/bridges, runs *makai*, primarily easterly along the southern portion of the HSH property to a confluence with Kamo‘oali‘i Stream (lower reach) approximately 2,500 feet (0.5 mile) east of the site that turns northeast and runs for about 3,600 feet (0.7 mile) before joining with Kāne‘ohe Stream, which runs easterly for about 6,700 feet (1.3 miles) before emptying into Kāne‘ohe Bay (Pacific Ocean). Thus, the total approximate distance along Kapunahala Stream and downstream segments from the HSH site to its outlet at Kāne‘ohe Bay is about 2.5 miles. Stormwater runoff within the area of the existing Goddard building site is collected primarily via a local storm drainage system of catch basins that discharges (surface sheet flow) to a wide grassy area southeast of the Guensberg building. This grass area slopes southward toward Kapunahala Stream. A reconnaissance of Kapunahala Stream on March 3, 2016, along the southern portion of the HSH campus near the existing Guensberg building, Aloha Gardens, Po‘okela Street, and Hope Chapel driveway, revealed that the relatively shallow stream was flowing and appeared to be approximately several inches deep and roughly 10 to 15 feet wide. The stream bed was heavily overgrown with vegetation and naturally unlined with exposed rocks and sediment. No stream life or animals were observed inhabiting the stream and its bed area.

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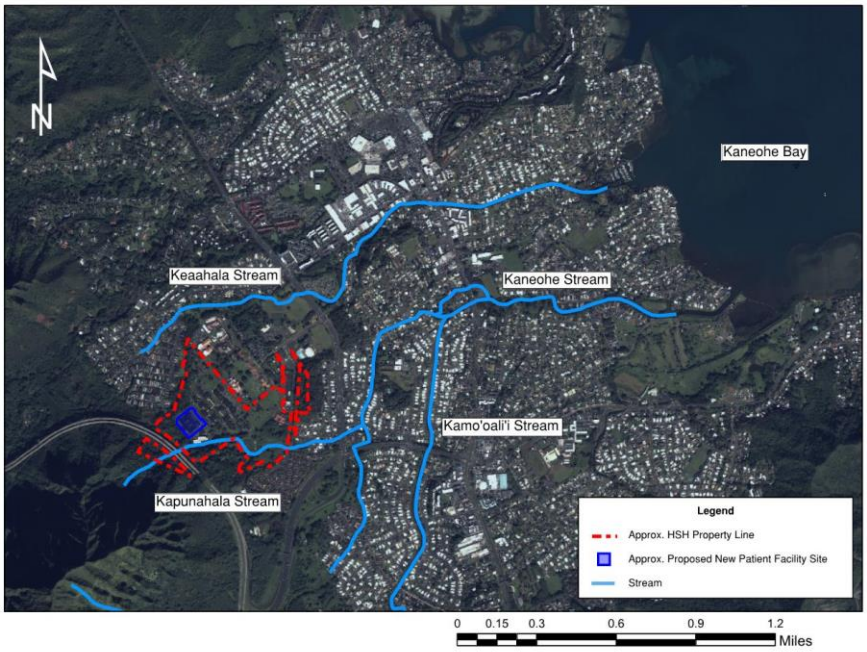

Figure 3-5. Location of HSH between Kea‘ahala and Kapunahala Streams

Source: EPO, Total Maximum Daily Loads (TMDLs) for Total Suspended Solids, Nitrogen, and Phosphorus in Kāne‘ohe Stream, 2009.

Based on the DOH *Water Quality Standards Map* published in June 2014 (see Figure 3-6) Kea‘ahala, Kapunahala, Kamo‘oali‘i, and Kāne‘ohe streams are considered Class 2 Inland Waters. Based on Figure 3-5, both Kea‘ahala and Kāne‘ohe streams end up discharging their flows to Kāne‘ohe Bay, which is a Class AA Marine Water bounded by the 100-fathom (600-foot depth) contour.

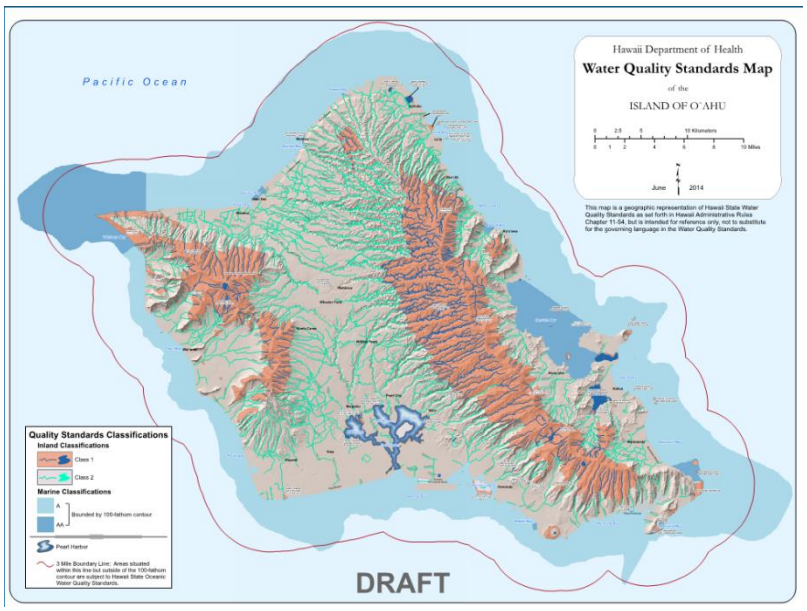

Figure 3-6. DOH Water Quality Standards Map

Source: Hawai‘i State Department of Health, Water Quality Standards Map, 2014.

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According to HAR, Title 11, Chapter 54, *Water Quality Standards*, the objective of Class 2 inland waters is to protect their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation. Uses to be protected are all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge that has not received the best degree of treatment or control compatible with the criteria established for this class. No new treated sewage discharges shall be permitted within estuaries. No new industrial discharges shall be permitted within estuaries, with a few exceptions.

According to HAR Chapter 11-54, the objective of Class AA marine waters is that these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practicable, the wilderness character of these areas shall be protected and no zones of mixing shall be permitted. Uses to be protected are oceanographic research, support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment. The classification of any water area as “Class AA” shall not preclude other uses of the waters compatible with these objectives and in conformance with the criteria applicable to them.

DAGS accepted a PJD (POH-2016-00070) from USACE on March 28, 2016, which stated that Kapunahala Stream and a potential wetland on the HSH campus (near the Aloha Gardens area) may be waters of the United States under regulatory jurisdiction of USACE; however, no U.S. *navigable* waters appear to be located on the site. If campus improvements were to occur in or potentially affecting Kapunahala Stream or the possible wetland, DAGS has the option to complete a delineation of the prospective surface waters that possibly comprise U.S. waters and coordinate with USACE for an Approved Jurisdictional Determination (AJD). After discussion with USACE, all of the work associated with the proposed NPF and most of the work anticipated for the overall campus buildout of improvements appears to be outside of, and significantly distant from, these potential U.S. waters. Thus, neither a CWA Section 404 Permit for U.S. navigable waters nor Rivers and Harbor Act (RHA) Section 10 Permit for U.S. waters is anticipated for the first phase of work. Should plans change and any project work or future improvements potentially encroach upon, or involve work within, these potential U.S. waters, the possibility of coordinating for an AJD would be investigated to officially identify and delineate any such waters so that the associated extents of the project work can be determined to be outside, possibly affecting or within them. If the project work is determined to be within or possibly affecting a U.S. water, an RHA Section 10 U.S. Department of the Army permit would be applied for and coordinated with USACE at that time (when timing, details and extents are known). A copy of the PJD is attached in Appendix D.

3.5.1.2 Wetlands

A number of sources were investigated for the presence of wetlands that could be affected by improvements made at HSH. One source was the DOH *Water Quality Standards Map*, which provided no indication of wetlands in the Kāneʻohe region. A second source was a September 2009 report published by EPO, titled *Total Maximum Daily Loads (TMDLs) for Total Suspended Solids, Nitrogen and Phosphorus in the Kaneohe Stream*, which noted that any wetland areas within the Kāneʻohe Bay watershed, including the project site (see Figure 3-7), have been destroyed or damaged by heavy sediment loading, exotic vegetation, lowered water tables, and construction activities.

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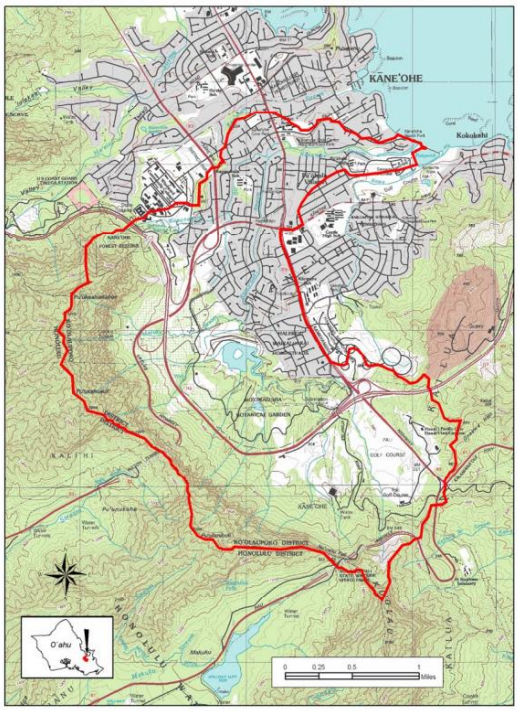

Figure 3-7. Kāne‘ohe watershed location map

Source: EPO, Total Maximum Daily Loads (TMDLs) for Total Suspended Solids, Nitrogen, and Phosphorus in Kāne‘ohe Stream, 2009.

However, based on a March 28, 2016 USACE PJD, it was noted that the area identified on HSH as the Aloha Gardens may contain aquatic features that could be considered waters of the United States. The area in question can be distinguished as a low-point, potential surface water. If construction of NPF or the overall campus buildout of improvements could potentially affect these aquatic features, USACE CWA Section 404 and Section 10 RHA permits could be required and will be incorporated during the planning and design phase of each improvement prior to construction.

3.5.1.3 Flood Hazard

According to the FEMA FIRM, Community Panel 270 of 395, Map 15003C0270J (effective November 5, 2014) (Figure 3-8), the HSH campus is in Zone D (an area in which flood hazards are undetermined, but possible), and Zone X (an area determined to be outside the 0.2 percent annual chance floodplain). The existing Goddard building site and the area most likely encompassing the associated supporting infrastructure for the proposed NPF are located completely in Zone D.

3.5.1.4 Shoreline

The project site is located roughly 2.5 miles *mauka* and west of the shoreline of Kāne‘ohe Bay. The shoreline of Kāne‘ohe Bay at Kāne‘ohe is mostly developed with residential property. There are two public points of access to the shoreline via Kāne‘ohe Bay Beach Park and He‘eia State Park. Other uses for the shoreline include He‘eia Kea Boat Harbor, a public boat harbor located adjacent He‘eia State Park, two native Hawaiian fishponds (He‘eia Fishpond and Waikalua Loko Fishpond), and the Hawai‘i Institute of Marine Biology on Coconut Island a short boat ride off of Lilipuna Road.

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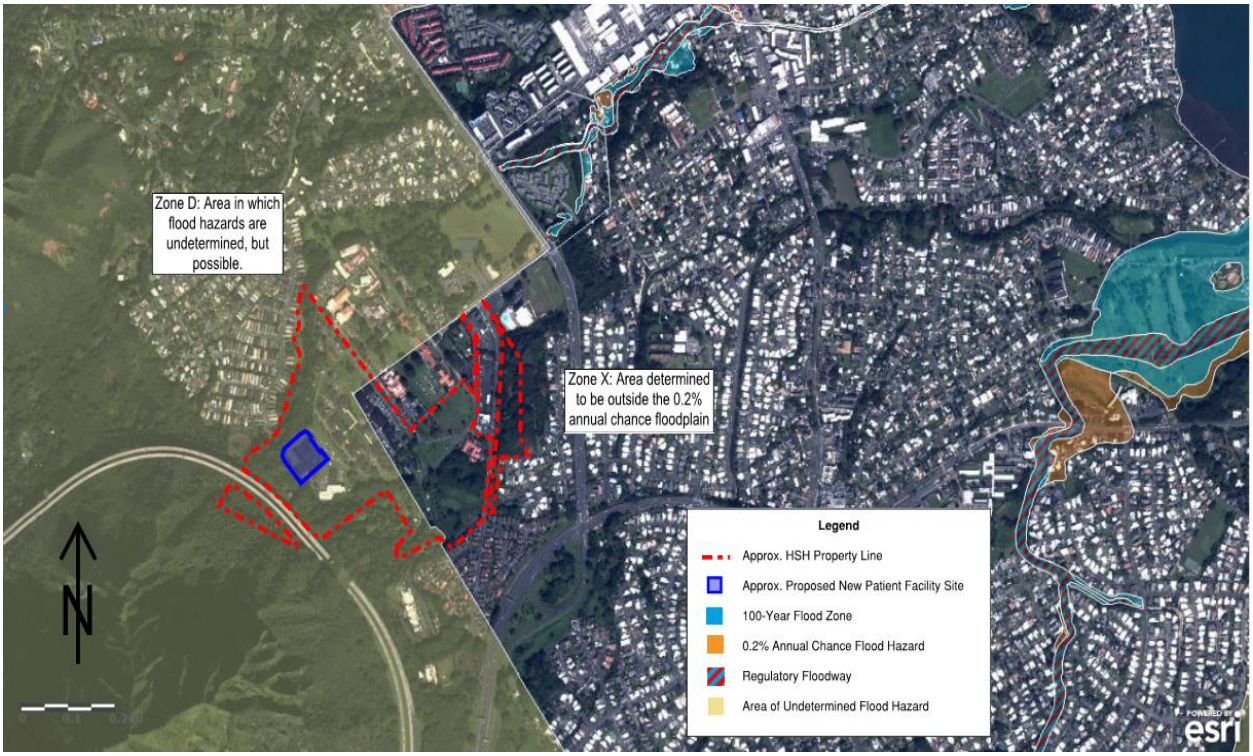

Figure 3-8. Flood Insurance Rate Map for HSH site

Source: Federal Emergency Management Agency, FEMA Flood Map Service Center, FEMA's National Flood Hazard Layer (Official).

3.5.1.5 Water Quality

The *2014 State of Hawaii Water Quality Report Monitoring and Assessment Report*, created by the DOH, follows CWA Sections 303(d) and 305(b) to report the State's water quality and occurs every 2 years. The assessment report lists which water bodies are impaired and are in need of a water pollution reduction plan. Water pollution reduction plans are based off of the TMDL priority level to ensure that State water quality standards are met. According to the DOH-CWB website for integrated report and TMDLs, on October 22, 2014, the U.S. Environmental Protection Agency (EPA) approved the *2014 State of Hawai‘i Water Quality Monitoring and Assessment Report*. This report provides a single, integrated submittal for fulfilling federal requirements under Sections 303(d) and 305(b) of the CWA. With this approval, the 2014 303(d) List of Impaired Waters (represented by those water bodies assigned to categories 4 and 5 in Chapter 3, 2014 Sections 303(d) and 305(b) Water Body Assessments for Hawai‘i), is now in effect. Kea‘ahala, Kamo‘oali‘i, and Kāne‘ohe Streams, and Kāne‘ohe Bay (southern region) and Kāne‘ohe Bay nearshore waters at the mouths of Kāne‘ohe and Kawa Streams are included on the 303(d) list.

Kea‘ahala Stream is identified by the State DOH-CWB as having a low priority for initiating a TMDL development within the monitoring and assessment cycle. Kapunahala Stream was not listed in this study, but looking slightly downstream Kāne‘ohe Stream is similarly identified as having a low priority for initiating a TMDL development. Table 3-2 shows the different water characteristics attained in the study. The constituents in the different water bodies that have insufficient data or no information attained should be monitored, as needed and applicable during construction activities to minimize potential impact. In addition, the constituents listed in Kāne‘ohe Stream should be monitored for as needed and applicable during construction activities to ensure compliance with the TMDL. Kāne‘ohe Stream created a TMDL for total nitrogen, total phosphorus, turbidity, and total suspended solids.

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EPO’s 2009 *Total Maximum Daily Loads (TMDLs) for Total Suspended Solids, Nitrogen, and Phosphorus in Kāne‘ohe Stream* described allocations and required load reductions. Initially, HSH had an NPDES Phase 2 (Small) Municipal Separate Storm Sewer System (MS4) and related NPDES Permit pending for approval by the DOH-CWB; however, the DOH-CWB ultimately determined that the storm drain system at the HSH site is not an identified MS4 (see Appendix F for a copy of this memorandum). The two pollutants dieldrin and trash found in the two streams are related to human activities; therefore, streams should be monitored, as needed and applicable during project construction, to ensure these pollutant conditions do not worsen from any potentially related site activities.

Table 3-2. 2014 Status of Assessed State Water Bodies near Proposed New Patient Facility

Assessed Water Body	Season	Enterococci	TN	NO_3+NO_2	NH_4	TP	Turbidity	TSS	Chlorophyll *a*	Other Pollutants
Kāne‘ohe Stream	Dry		✓ (TMDL)	✓ (TMDL)	-	✓ (TMDL)	(TMDL)	(TMDL)	-	Dieldrin
	Wet		✓ (TMDL)	✓ (TMDL)	-	✓ (TMDL)	(TMDL)	(TMDL)	-	Dieldrin
Kea‘ahala Stream	Dry				-			✓	-	Trash
	Wet				-	✓	✓	✓	-	Trash
Kāne‘ohe Bay (Beach Park and southern region)	Wet							-		-
Kāne‘ohe Bay: nearshore waters at mouths of Kāne‘ohe and Kawa Streams	Wet		✓	✓		✓		-		TSS

Source: State DOH-CWB, 2014 State of Hawaii Water Quality Monitoring and Assessment Report, 2014.
✓ = Attained or visual listing from 2001–04 or previous listing form 1998 or earlier.
None = insufficient data or not attained.
TMDL = TMDL approved for parameter.

3.5.2 Potential Impacts and Mitigation Measures

The proposed NPF is not anticipated to increase the amount of impervious surface at the site. The proposed NPF will have a footprint similar in size to that of the existing Goddard building and no new site roads are proposed. Positive grading of finish surfaces will be used to avoid any localized ponding and flooding.

To mitigate possible undesired runoff during construction erosion control plans and BMPs will be employed and maintained as required and approved by regulating agencies. These measures would apply for both the short-term temporary condition during construction and the long-term permanent condition, if any, and as applicable and needed. Any requirements for project compliance with DOH’s NPDES program (authorized discharge of stormwater associated with construction activities if the total project-disturbed area is 1 acre or more, hydrotesting effluent from any proposed water lines, etc.) will be addressed and met through consultation and coordination with DOH-CWB.

Because of the construction associated with NPF and overall campus buildout of improvements, water quality standards will be addressed. Both the existing water quality of the area and guidelines

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to minimize construction and expansion impacts are described. The four areas of concern that could potentially affect water quality are construction, changes in landscape footprint, maintenance of the grounds, and HSH waste.

DPP’s Rules Relating to Soil Erosion Standards and Guidelines outline the control of erosion for construction activities. The document addresses the following criteria:

- Compliance with the City’s NPDES permit requirements
- Erosion control measures, grading permit requirements, and point of discharge based on size of the project
- Minimum BMP checklist
- NRCS allowable soil loss rates used for erosion control plans
- DOH water quality standards for O‘ahu
- Guidelines for temporary and permanent erosion control measures

HSH’s first phase and overall campus buildout of improvements is classified as a large Category 5 project.

A Category 5 project of this acreage has the following requirements:

- Grading permit
- Grading/drainage plan
- Erosion control plan
- Coverage under State’s NPDES General Permit for Construction Activities and meet all requirements set by the conditions of the general permit, and incorporate temporary and permanent erosion control measures

The temporary erosion and sediment control measures must ensure that soil loss during construction is less than the allowable soil loss rate based off of area; soil loss during construction shall be determined using the universal soil loss equation.

Because this project area is greater than 10 acres, sediment basins providing 3,600 cubic feet of storage per acre, or equivalent measures, are required for all projects that discharge storm runoff to the MS4 or state waters. Many of these calculations and determinations of sediment basins will be addressed in the planning phase.

Because Kāne‘ohe Bay is a Class AA water, consideration for BMPs should be taken to reduce or eliminate the impacts of any discharge. The minimum BMP Checklist for Large Projects can be found in DPP’s *Rules Relating to Soil Erosion Standards and Guidelines*. For additional stormwater BMPs, contractors will refer to the City’s Department of Environmental Services *Storm Water Best Management Practices Manual for Construction* (November 2011), DPP’s *Storm Water Best Management Practices Guide* (December 2012), and DOT’s *Section 209 Temporary Water Pollution, Dust, and Erosion Control* of the *Hawai‘i Standard Specifications for Road and Bridge Construction* (2005).

The NPF is planned to occupy a similar footprint to the existing Goddard building with no drastic changes in impervious materials. This will result in similar stormwater runoff flow rates, which will lead to similar loading rates and constituents. Addressing the overall campus buildout of improvements, the landscaping footprint could potentially increase stormwater runoff rates because of urban runoff from the long-term plan. These would increase flow rates and cause downstream erosion in streams. These flow rate impacts could be monitored and mitigated by minimizing the amount of impervious material used in construction and using other erosion and sediment control approaches.

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Another area of concern is the routine landscaping maintenance occurring at HSH. With the use of fertilizers and generation of lawn maintenance waste, these products could potentially contribute to increased nutrients, like nitrogen and phosphorus, concentrations in the streams found near the HSH. The DOH maintenance staff or contracted landscape firm will apply these products in a safe manner and follow manufacturers' application instructions.

Kea‘ahala Stream has a TMDL for trash, so there is concern to not allow trash from NPF or long-term MP improvements to travel offsite and into the creeks. In order to minimize the amount of waste found in streams, additional waste disposal containers are included in the proposed NPF and for the long-term MP implementation. In addition, routine good housekeeping will be conducted to collect and properly dispose of trash found throughout the facility.

These coordinated efforts, along with reference to BMPs, will minimize the amount of sediment and pollutants being loaded into stormwater runoff that find their way into Kapunahala and Kea‘ahala streams and eventually Kāne‘ohe Bay. These precautions and measures will ensure that there is minimal or no impact to water quality in the area during NPF construction.

Possible short-term, long-term, and cumulative adverse effects on site surface waters for the overall campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known. Mitigation measures are anticipated to be similar to those described above for the NPF work.

3.6 Tsunamis

This section describes tsunami activity in the project area, including the affected environment and potential impacts and mitigation measures.

3.6.1 Affected Environment

Tsunami waves are capable of traversing the ocean for relatively long distances and can cause severe damage to property, injury, and even casualty in coastal communities once land is reached.

Almost all coastal areas on O‘ahu are within tsunami zones, and should a tsunami, or any other storm-generated event, hit the shoreline, flow would generally be in the *mauka* direction. The project site is not considered to be within a coastal area. As shown in Figure 3-9, the project site lies outside of the designated tsunami inundation/evacuation zone.

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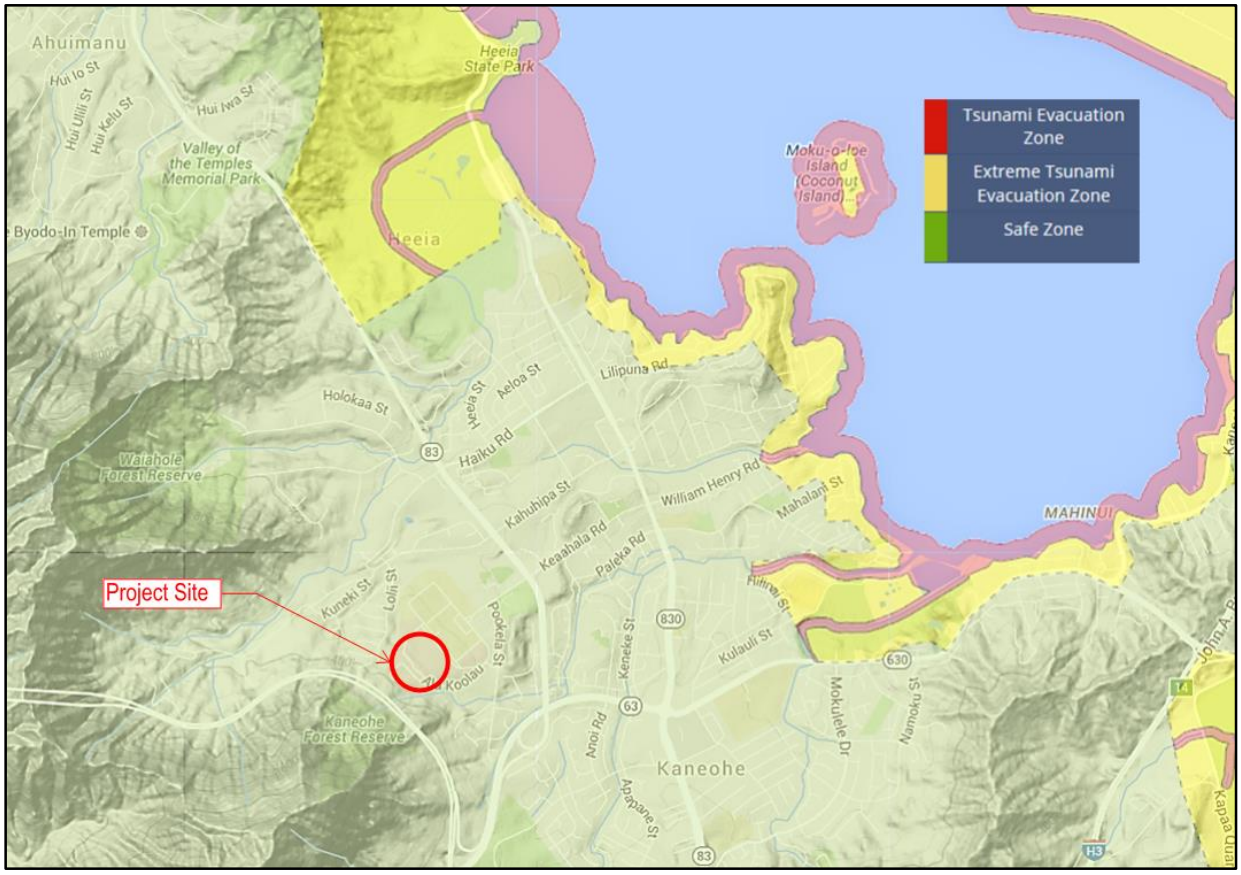

Figure 3-9. Tsunami evacuation map

Source: National Oceanic and Atmospheric Administration and the State of Hawai‘i, Hawai‘i Emergency Management Agency, NOAA Tsunami Zone Evacuation Map, Tsunami Hazard Zone.

3.6.2 Potential Impacts and Mitigation Measures

No special design considerations will be used for the project structures to withstand tsunami events because the site is outside the identified tsunami hazard zone. No adverse effects are anticipated on the potential of tsunami at or near the HSH site caused by the proposed project; therefore, no mitigative measures are proposed.

Similarly, adverse project impacts associated with the overall campus buildout of improvements at HSH on the potential of tsunamis at or near the HSH site are not anticipated for the same factors described above for the NPF work. Nonetheless, possible short-term, long-term, and cumulative adverse effects on the potential of tsunami at or near the HSH site for the long-term, overall campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known.

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3.7 Hurricanes

This section describes hurricane activity in the project area, including the affected environment and potential impacts and mitigation measures.

3.7.1 Affected Environment

Hurricanes form in areas of enhanced thunderstorms over warm, tropical oceans and create a combination of high winds, heavy rains, and abnormally high waves and storm tides. Hurricanes do not often make landfall on the Hawaiian Islands; however, records show that strong windstorms have struck all major islands a number of times over the past century (see Figure 3-10). Typically, hurricane season in the Hawaiian Islands begins in June and lasts through November. These storms bring large amounts of rain with high winds to all islands. Heavy rain, high wind, and storm surge could cause flooding in the Kāne‘ohe area, which encompasses the project site.

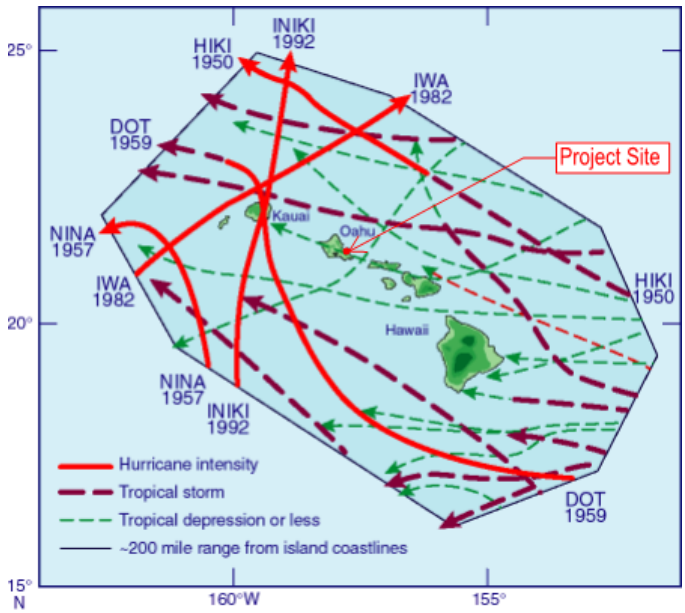

Figure 3-10. Major hurricane paths affecting Hawai‘i

Source: School of Ocean and Earth Science and Technology, Hurricanes in Hawaii

3.7.2 Potential Impacts and Mitigation Measures

The project is not anticipated to impact or alter the frequency of occurrence or impact of hurricanes at the site. Anticipated wind loads will be accommodated in the design of NPF according to the City *Building Code* (*IBC*, 2006 edition with local amendments, as adopted by the City, or updated edition as adopted during filing of the Building Permit Application). No adverse effects are anticipated on the potential of hurricanes at or near the HSH site caused by the proposed project; therefore, no mitigative measures are proposed.

Similarly, adverse project impacts associated with the long-term, overall campus buildout of improvements at HSH on the potential of hurricanes at or near the HSH site are not anticipated for the same factors described above for the NPF work. Nonetheless, possible short-term, long-term, and cumulative adverse effects on the potential of hurricanes at or near the HSH site for overall campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known.

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3.8 Earthquakes

This section describes earthquake activity in the project area, including the affected environment and potential impacts and mitigation measures.

3.8.1 Affected Environment

Earthquakes in Hawai‘i are closely linked to volcanism. They are an important part of the island building processes that have shaped the Hawaiian islands. Thousands of earthquakes occur every year beneath the island of Hawai‘i. However, O‘ahu (and the project site) is designated to be in Seismic Zone 2A, which indicates the second-lowest potential of ground motion caused by seismic activity in the state of Hawai‘i. The seismic zoning for the Hawaiian islands are Zone 4—Hawai‘i; Zone 2B—Maui, Kaho‘olawe, Lana‘i; Zone 2A—O‘ahu; and Zone 1—Kaua‘i (Figure 3-11). Structures within the different seismic zonings are to be designed to withstand different intensities of seismic activity, with Zone 1 areas designated as being prone to lower-intensity activities and Zone 4 being prone to higher-intensity activities.

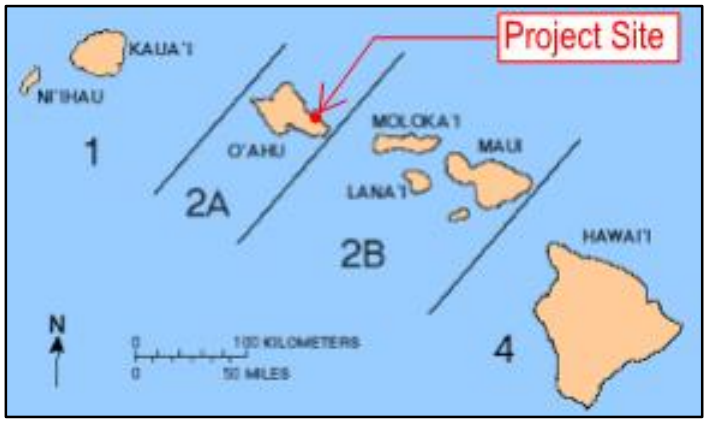

Figure 3-11. Seismic zoning of Hawaiian islands

Source: United States Geological Service, Hazards in Hawai‘i, Map of the 1997 Hawai‘i Seismic Zone Assignments.

3.8.2 Potential Impacts and Mitigation Measures

The project is not anticipated to impact or alter the frequency of occurrence or impact of earthquakes at the site. Anticipated seismic loading and events will be considered in the design of NPF according to the City *Building Code*. No adverse effects are anticipated on the potential of earthquakes at or near the HSH site caused by the proposed project; therefore, no mitigative measures are proposed.

Similarly, adverse project impacts associated with the overall campus buildout of improvements at HSH on the potential of earthquakes at or near the HSH site are not anticipated for the same factors described above for the NPF work. Nonetheless, possible short-term, long-term, and cumulative adverse effects on the potential of earthquakes at or near the HSH site for the overall campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known.

3.9 Flora and Fauna

This section describes the flora and fauna in the project area, including the affected environment and potential impacts and mitigation measures.

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3.9.1 Affected Environment

This section describes general flora and typical fauna found in the area of the project site. Flora and fauna surveys of the HSH campus were completed by LeGrande Biological Surveys, Inc. and Phil Bruner, respectively, along with consultation with USFWS, DLNR DOFAW, and UH CCRT HBMP, to determine if any potentially threatened or endangered plant or animal species or habitats were observed and known to exist in the project area. A summary of the flora and fauna findings is provided in Sections 3.9.1.1 and 3.9.1.2, respectively. The project flora and fauna surveys of the HSH site are attached in Appendices H and I.

3.9.1.1 Flora

The flora assessment conducted by LeGrande Biological Surveys Inc. on May 5 and 11, 2016 inventoried the flora, provided descriptions of vegetation, identified threatened and endangered species, and provided recommendations for potential impacts on the proposed project site. The three TMKs surveyed were 4-5-023:002, 4-5-023:17, and 4-5-023:016. Of the 123 plant species identified by the survey, the amount of alien, indigenous, and endemic plants are 116, 5, and 2, respectively. The types of tree and shrub species found on the HSH campus include ulu (*Artocarpus altilis*), kukui (*Aleurites moluccana*), coconut (*Cocos nucifera*), hala (*Pandanus tectorius*), monkeypod (*Samanea saman*), mango (*Mangifera indica*), shower trees (*Cassia sps.*), milo (*Thespesia populnea*), paperbark (*Melaleuca quinquenervia*), hibiscus cultivars, ti (*Cordyline fruticosa*), wedelia (*Sphagneticola trilobata*), and ginger.

The species grown in the plant nursery include lettuce, tomatoes, bananas, papaya (*Carica papaya*), citrus, ti (*Cordyline fruticosa*), noni (*Morinda cirtrifolia*), kalo (*Alocasia esculenta*), avocado (*Persea americana*), molasses grass (*Melinis minutiflora*), hau (*Hibiscus tiliaceus*), java plum (*Syzygium cuminii*), African tulip (*Spathodea campanulata*), mango (*Mangifera indica*), little bell (*Ipomoea triloba*), gunpowder tree (*Trema orientalis*), and albizia (*Falcataria moluccana*).

The species of plants found around Kapunahala Stream include African tulip (*Spathodea campanulata*), hau (*Hibiscus tiliaceus*), Octopus tree (*Schefflera actinophylla*), bingabing (*Macaranga mappa*), Guinea grass (*Panicum maximum*), honohono (*Commelina diffusa*), wedelia (*Sphagneticola trilobata*), Job’s tears (*Coix lachrymajobi*), moonflower (*Ipomoea alba*), molasses grass (*Melinis minutiflora*), napier grass (*Pennisetum purpureum*), umbrella sage (*Cyperus involucratus*), and the native bracken fern kilau (*Pteridium aquilinium* var. *decompositum*).

The types of plants found on the upper campus and western boundary of the campus include Java plum (*Syzygium cuminii*), Octopus tree (*Schefflera actinophylla*), Chinese banyan (*Ficus microcarpa*), African tulip (*Spathodea campanulata*), Christmas berry (*Schinus terebinthifolius*), albizia (*Falcataria moluccana*), koa haole (*Leucaena leucocephala*), maile pilau (*Paederia foetida*), mysore thorn (*Caesalpinia decapetala*), pothos vine (*Epipremnum pinnatum*), Koster’s curse (*Cidemia hirta*), Hilo holly (*Ardisia crenata*), basket grass (*Oplismenus hirtellus* subsp. *Hirtellus*), uluhe (*Dicranopteris lineris* f. *emarginata*), and laua’e (*Phynatosorus grossus*).

The plant species found in the Po‘okela Road area include swamp mahogany (*Eucalyptus robusta*), fern tree (*Felicium decipiens*), Java plum (*Syzygium cuminii*), gunpowder tree (*Trema orientalis*), albizia (*Falcataria moluccana*), koa haole (*Leucaena leucocephala*), Guinea grass (*Panicum maximum*), castor bean (*Ricinus communis*), spiny amaranthus (*Amaranthus spinosus*), owi (*Stachytarpheta australis*), slender mimosa (*Desmanthus pernambucanus*), sourbush (*Pluchea carolinensis*), and Indian fleabane (*pluchea indica*).

Based on the surveys of these three TMKs, none of the plant species observed were on the threatened or endangered species list. The five indigenous plant species observed during the survey

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were popolo (*Solanum americanum*), milo (*Thespesia populnea*), hau (*Hibiscus tiliaceus*), hala (*Panadanus tectorius*), and pala‘a (*Sphenomeris chinensis*). The two endemic plants found on the survey were Uluhe (*Dicranopteris linearis* f. *emarginata*) and kilau (*Pteridium aquilinium* var. *decompositum*).

3.9.1.2 Fauna

According to the previous HSH EA (May 1987), it was determined that HSH could provide habitats for, or be frequented by, a variety of mammals known to exist in the region, which include feral cats, feral dogs, mongoose, rats, and house mice.

Birds in the HSH area include the cardinal, barred and spotted doves, pueo, ricebird, and white-eye, which are typical to the Kāne‘ohe guava mixed forests and urban areas. The ‘elepaio and ‘i‘iwi may be found in the guava mixed forest, beyond the property line of HSH. Because of the proximity of Kāne‘ohe town to the project site, birds common to major urban areas also may be spotted, which include the mockingbird, myna, golden plover, and house sparrow.

In preparation for this DEIS, Faunal (Bird & Mammal) Surveys created a report documenting species of birds and mammals observed on the HSH campus site, indicating if any of the species are listed as threatened or endangered, and making recommendations to minimize impact to fauna. The report was created off of surveys taken on May 5 and 11, 2016.

During the survey no native land birds were observed. The only species that may occur is the pueo (*Asio flammeus sandwichensis*), which is listed by the State as endangered on O‘ahu.

The three native water birds observed during the survey were the black-crowned night heron, koloa (*Anas wyvilliana*), and ‘alae ‘ula. The koloa and ‘alae ‘ula are both on the endangered species list. Another species that may be found on occasion is the ae’o (*Himantopus mexicanus knudseni),* which is also on the endangered species list.

Because of timing of the survey, no migratory shorebirds were observed. But the species expected to be at the project site are the kolea (*Pluvialis fulva*) and akekeke (*Arenaria interpres*). Neither of these two species is on the threatened or endangered species list.

The feral mammals observed during the survey included the small Indian mongoose (*Herpestes javanicus*), feral pigs (*Sus scrofa*), feral cats (*Felis catus*) rats (*Ratus spp.*) and mice (*Mus muscullus*).

Two recommendations were made based off of USFWS concerns. The two issues include seabirds being attracted to artificially lighted areas and human disturbance of trees taller than 15 feet used by the endangered Hawaiian hoary bat as nursery trees.

3.9.2 Potential Impacts and Mitigation Measures

The construction of NPF will have a similar footprint as the existing Goddard building; therefore, no long-term or cumulative effects are anticipated on any threatened or endangered plants, animals, or habitats in the project area. The only recommendation for the proposed project is to minimize modification of the low-lying area in the southeast corner of the main parcel because this area serves as a water catchment before continuing on under Po‘okela Road. Therefore, no mitigative measures are proposed.

Similarly, adverse project impacts associated with the overall campus buildout of improvements at HSH on local flora and fauna are not anticipated for the same factors described above for the NPF work. Nonetheless, possible short-term, long-term, and cumulative adverse effects on site flora and fauna for the overall campus buildout of improvements at HSH may be evaluated when more information is available and the timing and details of future phases are known.

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Section 4

Human Environment: Description of Affected Environment, Potential Impacts, and Mitigation Measures

This section describes potential impacts of this project to the human environment surrounding HSH, including archaeological and historic resources; cultural practices and traditions; noise; light emissions; air quality; land transportation; and open-space, recreational, and visual resources, and also describes potential mitigation measures.

4.1 Archaeological and Historic Resources

This section describes the archaeological and historic resources in the project area, including the affected environment and potential impacts and mitigation measures.

4.1.1 Affected Environment

In the 1920s, the Territorial Hospital at Kāneʻohe, later renamed the Hawaiʻi State Mental Hospital (before eventually becoming the Hawaiʻi State Hospital, as it is known today), was planned to replace the Oʻahu Insane Asylum, located on School Street in Honolulu. The buildings at the Hawaiʻi State Mental Hospital were built in three increments between 1929 and 1935. The buildings were built in a Spanish mission revival style. The first set of 10 buildings (including the dining/kitchen, Damien, ʻIolani, laundry/boiler, ʻAkahi, Judd, Kanaloa, Lono, Mahi, and Bishop buildings) was completely constructed in late 1929. The patients from the Oʻahu Insane Asylum were moved into these new facilities in January 1930. The second set of construction includes two buildings (Eckerdt and Hāloa buildings), which were constructed in 1931–33. The final increment of construction was three additional buildings including the Cooke, Lokai, and Waipā buildings), which were built in 1935.

A National Register nomination form for these 15 buildings and a hospital historic district was prepared in 1984, and was reviewed by the Hawaiʻi Historic Places Review Board on November 5, 1984, but these buildings were not nominated to the Hawaiʻi Register of Historic Places.

In 1948, the construction of the Goddard building, located at the upper campus, was begun and it was officially opened for service on January 3, 1951. The Goddard building was defined as a unit for recoverable patients. This reflected a new idea in the treatment of the mentally ill that they could be cured and returned to society. In May 1956, the first part of the construction for the Guensberg building, located next to the Goddard building, was completed. It was used for patients who had tuberculosis. In 1963, a medical surgical section was added to the Guensberg building and the construction of this building was completed. The rest of the buildings of the current HSH were built at a site *makai* of the Goddard and Guensberg buildings, between these 2 buildings and the 15 buildings mentioned earlier.

The likelihood of any historic architectural or archaeological properties being present on site and potentially impacted by the project will be determined through a records search of past surveys performed at or near the HSH campus and through consultation with the State DLNR-State Historic

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Preservation Division (SHPD), Archaeology Branch. The potential for any archaeological sites or burials at the site is low because the campus is completely developed and already disturbed.

No listed or nominated historic site is located at or near the HSH property—TMKs (1)4-5-023:002, (1)4-5-023:016, and (1)4-5-023:017 on the State and National Registers of Historic Places are summarized in the inventory database (March 17, 2016), available from the SHPD. However, as the facility buildings are more than 50 years old and considered to be historic properties, consultation with the SHPD, Archaeology Branch and Architectural Branch, will be conducted.

An archaeological evaluation (AE) of the project site was developed by Scientific Consultant Services Inc. in October 2016. This AE, attached in Appendix J, includes legendary accounts, early historical journals and narratives, historic maps, land records (such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records), historic accounts, and previous archaeological reports. The AE also provided a historical review of previous archaeological evaluations done in the vicinity of HSH. Figure 4-1 illustrates the locations around and within the project site for which an AE was completed. Only two reports have occurred within the project area, Takemoto’s report from 1991 and Dockall’s report from 2003. These two reports confirmed that in November 1914, when Hawaii was still a territory and not a state of the United States, the land for the project site was set aside by the federal government with the intention of creating the Kea‘ahala Military Reservation, owned by the U.S. armed forces. However, in 1924, all but 74 acres of the land was returned back to the Territory. The remaining 74 acres was used for the Territorial Mental Hospital. The previous Territorial Mental Hospital is the site of the present HSH.

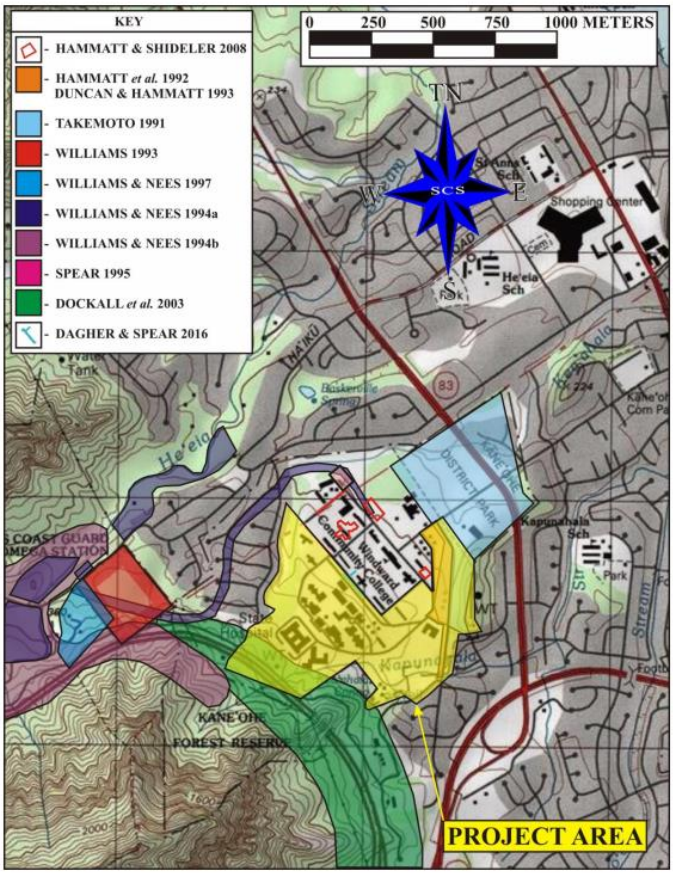

Figure 4-1. Map showing previous archaeology report in Kāne‘ohe

Source: United States Geological Service Quadrangle (Kaneohe 1998; 1:24,000)

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During the field inspection conducted by Scientific Consultant Services Inc. in June 2016, both interviews of HSH staff members and a survey of four HSH buildings (Goddard, Bishop, ‘Iolani, and Hāloa) were taken. Based on this inspection, the surface architecture of the four HSH buildings was noted to be historic.

4.1.2 Potential Impacts and Mitigation Measures

Based on the AE, it is recommended that an archaeological inventory survey (AIS) with a subsurface component be conducted for NPF and overall campus buildout of improvements. SHPD should be contacted regarding any requirements for Historic American Buildings Survey (HABS) and/or the Historic American Engineering Record (HAER) architectural documentation for the historic buildings prior to planned renovations or demolitions associated with NPF and improvements associated with the long-term plan.

Following the recommendation for subsurface testing, there is currently an agreement between DOH and SHPD for the demolition and construction of NPF. This agreement requires archaeological monitoring of any subsurface work done on the existing Goddard site.

Addressing the potential archeological impact for the long-term plan, DOH will conduct an AIS, including subsurface investigation, for the entire HSH site. Conducting an AIS for the entire HSH site will decrease overall review time by SHPD for each subsequent phase. Otherwise, if each future phase is permitted individually, there is the potential that construction may be delayed.

In the event that any unanticipated archaeological materials or iwi (bones/remains) are encountered during construction, activities in the immediate area will be immediately stopped, materials/remains shall be left undisturbed, and both SHPD and HPD will be contacted and consulted with appropriate, further action.

4.2 Cultural Practices and Traditions

This section describes cultural practices and traditions in the project area, including the affected environment and potential impacts and mitigation measures.

4.2.1 Affected Environment

According to *Cultural Impact Assessment for the Hawai‘i State Hospital Improvements Project*, June 2005, Cultural Surveys Hawai‘i Inc. (CSH) contacted and consulted with Hawaiian cultural organizations, government agencies, and individuals who might have knowledge of and/or concerns about traditional cultural practices specifically related to the project area.

CSH also contacted a group of people, which included Winston Kong, Andy Mānoa, and Tommy Young, who are involved in the traditional cultural practice of growing *kalo* within the project area. This place, called Kihe Pua Lo‘i Kalo, is a nonprofit learning center for the people in the community to get involved in perpetuating Hawaiian culture. HSH is also perpetuating this traditional cultural practice of growing kalo on the property, as some of the patients are involved in outside activities, such as planting and growing kalo. The main concern that emerged from the contacts was that this traditional cultural practice be protected within the project area. It was found that the area that was planned for demolition had no ongoing traditional cultural practices.

The 2005 Cultural Impact Assessment (CIA) found that in the area of the proposed redevelopment there was an extremely low probability of encountering any significant Hawaiian sites because of years of pineapple cultivation followed by development (circa 1930s) and subsequent building phases (e.g., circa 1950) of HSH.

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In July 2016, CSH investigated existing current cultural practices and traditions associated with the general area of the project site. The revised cultural survey was to address the potential impacts to Native Hawaiian practices, culture, and traditions. The survey was to also include people who may use the general area of the project to conduct traditional cultural practices for subsistence and religious purposes.

4.2.2 Potential Impacts and Mitigation Measures

Based on the 2005 CIA, subsurface properties associated with former traditional Hawaiian activities, such as artifacts, cultural layers, and burials, may be present despite decades of modern activities. As a precautionary measure, personnel involved in the project should contact Kihe Pua Lo‘i Kalo and the Kāne‘ohe Hawaiian Civic Club. Additionally, construction crews should be informed of the possibility of inadvertent cultural finds, and should be made aware of the appropriate notification measures to follow and provide updates on the status of the proposed redevelopment.

A *Cultural Impact Assessment for the Department of Health Hawai‘i State Hospital Project* (CIA) draft was received in October 2016 from Scientific Consultant Services Inc. (see Appendix K) The draft CIA for the project site was performed as follows:

1. Perform archival/background research, focusing on traditions and legends
2. Perform limited historic research
3. Review previous oral histories conducted in the general area of the project (if known)
4. Conduct a search for persons/organizations knowledgeable of the project area
5. Interview identified informants
6. Prepare a report detailing findings

The draft report indicates the multiple groups that were contacted alongside the publishing of a CIA notice in the *Honolulu Star-Advertiser* in July 2016 and the Office of Hawaiian Affairs newspaper, *Ka Wai Ola,* in August 2016. From the responses received, no preliminary concerns were raised. Preliminary contacts also provided additional contacts that could provide additional cultural understanding.

The consultation process for the CIA report is still ongoing and three potential interviews are scheduled to be conducted. A final CIA report will be issued in the final EIS, along with a discussion of the potential impacts from NPF on the cultural practices and traditions will be evaluated. If any potential impacts are identified, a list of recommended mitigation measures will be developed. Similar to the effort for historic architecture and archaeological coordination for the overall campus buildout of improvements at HSH, additional potential impacts and mitigation measures will be identified and addressed commensurate with the timing and extents of the future work.

4.3 Noise

This section describes noise sources and impacts in the project area, including the affected environment and potential impacts and mitigation measures.

4.3.1 Affected Environment

HSH encompasses a single land use—General Agriculture—and is surrounded by light commercial uses, residential developments, and park and open spaces. Thus, it appears that the three main sources of noise for the project area include traffic, industrial equipment, and aircraft.

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4.3.1.1 Noise Metrics

According to HAR Title 11 Chapter 46, *Community Noise Control*, “noise” means any sound that may produce adverse physiological effects or interfere with individual or group activities, including, but not limited to, communication, work, rest, recreation, or sleep. “Noise pollution” means noise emitted from any excessive noise source in excess of the maximum permissible sound levels. The accepted unit of measure for noise levels is the decibel (dB) because it reflects the way humans perceive changes in sound amplitude. Sound levels are easily measured, but human response and perception of the wide variability in sound amplitude is subjective.

4.3.1.2 Applicable Noise Limits

DOH monitors noise issues in accordance with HRS 19-342F and the DOH director issues noise permits only when excessive noise levels are expected. The Occupational Safety and Health Act (OSHA) of 1970 was established to “assure the safe and healthy working conditions for working men and women.” The OSHA regulations established a maximum noise level of 90 A-weighted decibels (dBA) for a continuous 8-hour exposure (typical work day), with higher maximum noise levels for shorter periods. Table 4-1 summarizes the maximum permissible sound levels for various noise durations.

Table 4-1. Permissible Noise Exposures

Duration (Hours/Day)	Permissible Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
1/2	110
1/4 or less	115

Source: CFR, Title 29, Section 1910.95, “Occupational Noise Exposure,” 2016.

4.3.1.3 Existing Ambient Sound Levels

Existing noise that may affect HSH includes aircraft noise from planes traveling to/from the Honolulu International Airport and Marine Corps Base Hawai‘i, traffic noise, construction noise, and industrial uses.

4.3.2 Potential Impacts and Mitigation Measures

One of the impacts from NPF and overall campus buildout of improvements will be elevated noise levels resulting from construction activities. Earthmoving equipment, such as bulldozers and diesel-powered trucks, is anticipated to be the loudest equipment used during construction. As noise levels generated by construction-related activities are anticipated to exceed allowable limits, a permit must be obtained from the DOH Indoor and Radiological Health Branch (IRHB) in compliance with Title 11, HAR, DOH, Chapter 46, *Community Noise Control*. DOH may grant permits to operate vehicles, construction equipment, and power tools that emit noise levels in excess of allowable limits. In

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addition, the relatively elevated campus terrain and dense vegetation lining the site from adjacent neighborhoods will aid in buffering noise nuisance to potential receivers in the community.

Intermittent elevated noise levels from certain types of construction activities are inevitable; however, they are expected to be short-term and minor. Typical heavy construction equipment noise levels are listed in Table 4-2. The noise generated from the construction equipment that is anticipated to be used for both NPF and overall campus buildout of improvements at HSH are lower than the permissible sound levels; therefore, no significant noise effects are expected from the proposed project. No mitigative measures are proposed because the types of equipment that will be used, as shown in Table 4-2, will not exceed the permissible noise exposures shown in Table 4-1. All construction work will be scheduled during the daytime in accordance with HRS-342-F-1.

Table 4-2. Heavy Construction Equipment Noise Levels at 50 Feet

Equipment Type	Generated Noise Level (dBA)			
	USACE	RCNM	FTA	Average
Air compressor	-	80	81	81
Asphalt spreader	80	85	89	85
Backhoe (rubber tire)	80	80	80	80
Bulldozer	88	85	85	86
Compactor	-	80	82	81
Concrete finisher	80	80	76	79
Concrete truck	75	85	88	83
Crane	75	85	83	81
Dump truck	75	84	88	82
Front loader (rubber tire)	80	80	85	82
Flatbed truck (18-wheel)	75	84	88	82
Generator	-	82	81	82
Grader	-	85	85	85
Jackhammer	-	85	88	87
Pneumatic tool	-	85	85	85
Roller	80	85	74	80
Saw	-	85	76	81
Scraper	89	85	89	88
Trenching machine	85	85	82	84

RCNM: Roadway Construction Noise Model (U.S. DOT Federal Highway Administration, FHWA).

FTA: Federal Transit Administration (Transit Noise and Vibration Guidance Handbook).

Source: USACE, Construction Engineering Research Labs, 1978; and U.S. Department of Transportation, Federal Highway Administration, OP, Environment, and Realty (HEP), Highway Traffic Noise.

4.4 Light Emissions

This section describes light emissions in the project area, including the affected environment and potential impacts and mitigation measures.

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4.4.1 Affected Environment

Light emissions at HSH can be attributed largely to exterior site lighting as described in Section 5.8.1.3, Site Lighting System. The purpose of existing site lighting is to provide sufficient illumination of the premises for security, safety, and nighttime operations. The nearest residential properties are located to the west of the HSH grounds; however, the west edge of the property is lined by dense vegetation, which generally shields neighboring lots from inadvertent illumination. WCC is located to the north of HSH and employs site lighting to a similar degree as the project site. HSH has not received any public complaints from neighbors about light emissions with its current level of site lighting.

4.4.2 Potential Impacts and Mitigation Measures

Additional site lighting will be provided for NPF as described in Section 5.8.2.3. While additional lighting will increase light emissions in the area of the proposed building and proposed parking area(s), which may be constructed simultaneously, the impacts of proposed site lighting should be mitigated by the building’s location in the most remote portion of the campus and the dense surrounding vegetation that provides a natural barrier between the building and the nearest residential lots located to the northwest of the site. The City has established basic regulations for outdoor lighting for new general development in *ROH*, Chapter 21, Article 4, Section 100, which require the use of shielded full-cutoff light fixtures to limit illumination of neighboring properties and the night sky. While these regulations may not apply directly to this facility, use of full-cutoff and shielded fixtures is a good practice to minimize nuisance lighting of adjacent lots and excess glare and light pollution. In addition, the American Medical Association (AMA) has released new recommendations regarding the use of light-emitting diode (LED) lamps for outdoor installation. While the AMA recognizes that LED lights are more energy-efficient than alternative commercial lamp technologies, the large amount of blue light that is emitted from high color temperature lamps marketed as cool or bright white can lead to detrimental health and environmental effects. Therefore, the AMA recommends that outdoor LED lighting have a color temperature no greater than 3000K, which is typically described as a warm or soft white lamp. Careful consideration will be given to such design features to provide the minimum required level of site lighting for safety, security, and operations while limiting unnecessary or harmful light emissions.

As noted in Section 5.8.2.3, lighting requirements for the overall campus buildout of improvements at HSH may vary considerably. However, it is expected that mitigation measures used to limit light emissions for the first phase of improvements will be largely applicable to subsequent phases of construction.

4.5 Air Quality

This section describes air quality in the project area, including the affected environment and potential impacts and mitigation measures.

4.5.1 Affected Environment

Air pollution is caused by many human-induced and natural sources. The following are some example sources of air pollution within the vicinity of the HSH:

- Industrial sources of pollution, such as power plants and refineries
- Mobile sources, such as cars, trucks, and buses
- Agricultural sources, such as cane burning
- Natural sources, such as windblown dust and volcanic activity

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Most commercial, industrial, and transportation activities and their associated air quality effects occur on O‘ahu, where 4 of the 14 total air quality monitoring stations in the state are located.

4.5.1.1 Applicable Air Quality Standards

State and federal air quality and pollution control in Hawai‘i are governed by the following regulations:

- HAR, Title 11
- DOH, Chapter 59, *Ambient Air Quality Standards*
- DOH, Chapter 60.1, *Air Pollution Control*
- HRS, Chapter 342, *Air Pollution Control*
- CFR, Title 40, Parts 50, 51, 52.21, 53, 58, 60, 61, 63, and 70

The DOH Clean Air Branch (CAB) is responsible for air pollution control in the state, and its primary services are provided by its three sections: Engineering, Monitoring, and Enforcement. These sections conduct engineering analysis and permitting, perform monitoring and investigations, and enforce the state and federal air pollution control laws and regulations.

EPA sets National Ambient Air Quality Standards (NAAQS) to protect public health and welfare from harmful effects of certain commonly occurring pollutants, known as “criteria” pollutants. EPA requires that states monitor the ambient air to determine attainment of NAAQS and regulate industries that emit these and other pollutants.

Two types of air quality standards have been established—primary and secondary (Table 4-3). Primary standards set limits to protect public health, including the health of sensitive populations, such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, which includes protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Table 4-3. State and National Ambient Air Quality Standards

Air Pollutant	Hawai‘i State Standard	Federal Primary Standard	Federal Secondary Standard
Carbon monoxide (CO)			
1-hour average	9 ppm	35 ppm	None
8-hour average	4.4 ppm	9 ppm	None
Lead (Pb)			
3-month average	1.5 µg/m^3 (calendar quarter)	0.15 µg/m^3 (running 3-month)	Same as primary
Nitrogen dioxide (NO_2)			
1-hour average	None	100 ppb	None
Annual average	0.04 ppm	53 ppb	Same as primary
Particulate matter (PM_{10})			
24-hour block average	150 µg/m^3	150 µg/m^3	Same as primary
Annual average	50 µg/m^3	None	None
Particulate matter ($PM_{2.5}$)			
24-hour block average	None	35 µg/m^3	Same as primary
Annual average	None	12 µg/m^3	15 µg/m^3

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Table 4-3. State and National Ambient Air Quality Standards			
Air Pollutant	Hawai‘i State Standard	Federal Primary Standard	Federal Secondary Standard
Ozone (O_3)			
8-hour rolling average	0.08 ppm	0.070 ppm	Same as primary
Sulfur dioxide (SO_2)			
1-hour average	None	75 ppb	None
3-hour block average	0.5 ppm	-	0.5 ppm
24-hour block average	0.14 ppm	None	-
Annual average	0.03 ppm	None	-
Hydrogen sulfide (H_2S)			
1-hour average	25 ppb	None	None

Source: State of Hawai‘i, Department of Health, Clean Air Branch (11/19/2015).

4.5.1.2 Existing Air Quality

At present, 14 air quality monitoring stations are located in the state: one on Kaua‘i, two on Maui, four on O‘ahu, and seven on Hawai‘i island. Three of the O‘ahu stations are roughly the same regional straight-line distance and over the Ko‘olau mountain range from the project site (Figure 4-2):

- Honolulu (approximately 7.5 miles away to the south from HSH): located at 1250 Punchbowl Street in downtown Honolulu on the roof of the DOH building at Kinau Hale, across from the Queen’s Medical Center, in a busy commercial, business, and government district
- Sand Island (approximately 8 miles away to the southwest from HSH): located at 1039 Sand Island Parkway at UH’s Anuenue Fisheries in a light industrial, commercial, and recreational area approximately 2 miles downwind of downtown Honolulu near the entrance to the Sand Island State Recreation Area
- Pearl City (approximately 10 miles to the west from HSH): located at 860 4th Street on the roof of the Leeward Health Center in a commercial, residential, and light industrial area approximately 1.5 miles northwest of the Waiau power plant and near the Pearl Harbor Naval Complex

All sites contain a National Air Monitoring Station (NAMS) as well as a State and Local Air Monitoring Stations (SLAMS). The Honolulu SLAMS measures population exposure to carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter with diameters of 2.5 micrometers or less and 10 micrometers or less ($PM_{2.5}$ and PM_{10}, respectively). The Sand Island SLAMS measures population exposure to ozone (O_3) and $PM_{2.5}$. The Pearl City SLAMS measures population exposure to $PM_{2.5}$ and PM_{10}. All sites are within urban and city-center location settings.

Generally speaking, air quality in the state of Hawai‘i is one of the best in the nation, and criteria pollutant levels remain well below state and federal ambient air quality standards. According to the DOH *State of Hawai‘i Annual Summary 2014 Air Quality Data* (September 2015), the pollutants measured between 2012 and 2014 at the Honolulu, Sand Island, and Pearl City SLAMSs are below state and federal standards (in parentheses):

- CO—Honolulu: 0.4 parts per million (ppm) (state standard: 4.4 ppm and federal standard: 9 ppm) all hours annual mean for 2014 8-hour CO average with no exceedances in 2012–14; in 2014, Hawai‘i was in attainment with both the 1-hour and 8-hour CO NAAQSs.

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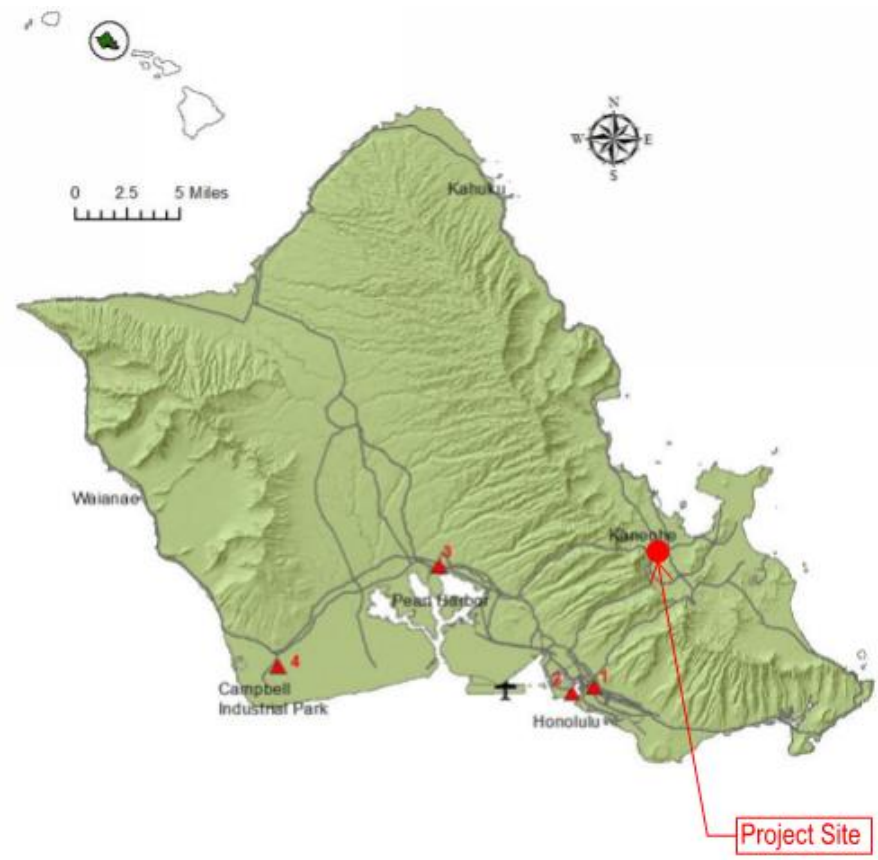
- PM_{10}—Honolulu: 13.1 micrograms per cubic meter (µg/m³) and Pearl City: 19.4 µg/m³ (50 µg/m³) all hours annual mean for 2014 24-hour PM_{10} average with no exceedances in 2012–14 and no site violation of NAAQS; in 2014, Hawai‘i was in attainment with the 24-hour PM_{10} NAAQS.
- $PM_{2.5}$—Honolulu: 4.4 µg/m³, Sand Island: 4.5 µg/m³ and Pearl City: 3.9 µg/m³ (federal primary standard: 12 µg/m³ and federal secondary standard: 15 µg/m³) all hours annual mean for 2014 24-hour $PM_{2.5}$ average with no exceedances in 2012–14 and no site violation of NAAQS; in 2014, Hawai‘i was in attainment with both the 24-hour and annual $PM_{2.5}$ NAAQSs.
- O_3—Sand Island: 0.022 ppm (state standard: 0.08 ppm and federal standard: 0.070 ppm) all hours annual mean for 2014 8-hour O_3 average with no exceedances in 2012–14 and no site violation of NAAQS; in 2014, Hawai‘i was in attainment with the 8-hour O_3 NAAQS.
- SO_2—Honolulu: 0.001 ppm (0.03 ppm) all hours annual mean for 2014 24-hour SO_2 average with no exceedances in 2012–14 and no site violation of NAAQS; in 2014, Hawai‘i was in attainment with both the 1-hour and 3-hour SO_2 NAAQS, as well as both the state 24-hour and annual SO_2 standards.



Station	Name	Location	Pollutants Monitored
1	Honolulu	1250 Punchbowl St.	PM_{10}, $PM_{2.5}$, CO, SO_2
2	Sand Island	1039 Sand Island Pkwy	O_3, $PM_{2.5}$
3	Pearl City	860 4th St.	PM_{10}, $PM_{2.5}$
4	Kapolei	2052 Lauwiliwili St.	PM_{10}, $PM_{2.5}$, CO, SO_2, NO_2
	Kapolei NCore	2052 Lauwiliwili St.	$PM_{10-2.5}$, $SO_{2\ trace}$, NO/NO_y, CO, O_3, Pb, $PM_{2.5}$ speciation, WS/WD

Figure 4-2. Island air quality monitoring map, O‘ahu, Hawai‘i

Source: State DOH-CAB State of Hawai‘i, Annual Summary 2014 Air Quality Data, September 2015.

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4.5.2 Potential Impacts and Mitigation Measures

Any impacts on air quality associated with the proposed HSH improvements would likely be related to construction and automobile-induced traffic. Traffic emissions may contribute to elevated pollutant levels along major neighborhood corridors and thoroughfares of the community. Because all of Honolulu County is within a single MSA—Urban Honolulu (Core Based Statistical Area: 46520)—according to the U.S. Census Bureau (February 2013), the anticipated impact to air quality by the proposed HSH improvements is anticipated to be similar to, or in some instances less intense than, those cited in previously accepted EAs, EISs, and/or studies of the site and surrounding areas.

Any impacts to air quality stemming from construction-related activities are expected to be short-term during construction of NPF and construction of elements in the overall campus buildout of improvements. Impacts from fugitive dust would be mitigated by complying with the provisions of the State DOH, HAR, Chapter 11-60.1, *Air Pollution Control*. Possible mitigative measures include erecting dust screens, watering down exposed and loose soil, and establishing temporary groundcover or similar stabilization. In addition, all construction equipment must meet the requirements of State emission control laws to mitigate the effects of construction air quality. Upon completion of construction of NPF, the air quality at the project site will return to its existing condition.

No overall long-term air quality effects are anticipated from NPF or the overall campus buildout of improvements at HSH. Additional short-term, long-term, and cumulative adverse effects to the air quality for the long-term, overall campus buildout of improvements at HSH will need to be evaluated when more information is available and the timing and details of future phases are known.

4.6 Vehicular Traffic

This section describes vehicular traffic in the project area, including the affected environment and potential impacts and mitigation measures.

4.6.1 Affected Environment

The first phase of the project will consist of erecting an NPF and its supporting infrastructure and will be the primary focus of the Traffic Impact Analysis Report (TIAR), found in Appendix L. The TIAR was developed by Austin, Tsutsumi & Associates, Inc., in October 2016.

According to the TIAR study, the current HSH generates about 150 (145) trips, approximately 24 percent of the traffic on Kea‘ahala Road during the morning (afternoon) peak traffic hours. In addition to HSH, the traffic on Kea‘ahala Road is generated by WCC, Kāne‘ohe District Courthouse, Hawai‘i DOT Kāne‘ohe Baseyard, Windward Comprehensive Health Center (WCHC), Kea‘ahala District Park, and residents of the neighborhood.

To analyze the traffic in the site proposed area, a level-of-service (LOS) qualitative measurement was used. The measurement ranges from LOS A, free-flowing conditions, to LOS F, congested conditions. Multiple scenarios were projected off of the 2016 existing conditions including Base Year 2021 without the Project, Base Year 2021 with Mitigation, Future Year 2021 with the Project, and the HSH Master Plan Development (Full Buildout).

The 2016 existing conditions, according to the TIAR, during the morning peak hour of traffic (7:30–8:30 a.m.), Kahekili operated at LOS D or better and Kea‘ahala Road did not experience any congestion. While during afternoon peak hour of traffic (3:15–4:15 p.m.), LOS F and overcapacity conditions were observed at the Kahekili Highway’s northbound intersection with Likelike Highway. It was noted by the study that an area of concern for both morning (afternoon) traffic is the Kahekili

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Highway/ Ha‘ikū Road intersection where three lanes narrow to one lane north of the intersection. This change in number of lanes results in long queues during peak traffic times.

4.6.2 Potential Impacts and Mitigation Measures

The following are potential impacts and mitigation measures for the Base Year 2021 without Project traffic scenario. This scenario estimates the traffic patterns for 2021 based off of the DOT count data. The assumption is that each year there is approximately 1.2 percent growth. With these conditions, the LOS projections would be similar to existing conditions.

The following are potential impacts and mitigation measures for the Base Year 2021 with Mitigation traffic scenario. The mitigation discussed in the report addresses the long queues experienced at the Kahekili Highway/ Ha‘ikū Road intersection. The recommendation was to include a split-phase signal timing during the morning and afternoon peak hours to traffic. This mitigation will improve overall operations during the peak hours of traffic.

The following are potential impacts and mitigation measures for the Future Year 2021 with Project traffic scenario. The Future Year 2021 includes the traffic projections once NPF is complete. The estimated morning and afternoon peak hour trips for NPF are 107 and 101, respectively. Based on these numbers, minimal impacts are generated, resulting in conditions similar to Base Year 2021. Therefore, no additional mitigation actions need to be taken.

The following are potential impacts and mitigation measures for the long-term improvements traffic scenario. Based on the long-term improvements, the report estimated trips during the morning and afternoon peak hours to be 238 and 230, respectively. The recommendation for the overall campus buildout of improvements include a second northbound left-turn lane (and additional receiving lane), a northbound right-turn lane, and signal optimization for the Kahekili Highway/Kea‘ahala Road intersection. As HSH continues with the overall campus buildout of improvements, the Kahekili Highway/Kea‘ahala Road intersection should be monitored and evaluated for improvements.

The following are potential impacts and mitigation measures for the Incentivized Traffic Mitigation traffic scenario. As HSH develops and traffic continues to increase throughout the state, there are potential alternatives to minimize traffic within and around the HSH campus. Possibilities include bicycle parking, financial incentives, preferential parking for carpoolers, employee support, and/or special events or promotions.

To mitigate the impact of NPF, potential improvements as determined in the TIAR could involve intersection lane modifications, as well as traffic demand management (TDM) measures. TDM measures are methods to reduce vehicular trips. As part of the TIAR, TDM measures will be discussed to provide potential trip-reducing methods based on data and observations collected. TDM measures consist of predictable alterations to traffic behavior/organization via non-roadway-related improvements. For example, demand management may include adjusting employee work schedules to shift existing traffic patterns away from peak periods.

4.7 HSH Campus Vehicular Traffic

This section describes vehicular traffic on the HSH campus, including the affected environment and potential impacts and mitigation measures.

4.7.1 Affected Environment

The existing vehicular traffic circulation condition at the HSH campus was documented as part of preparing this DEIS. Figure 4-3 shows that all main roads (including Kea‘ahala Road, Po‘okela Street, Pikake Road, and Ala Ko‘olau Road) and minor roads (accessway to each building) that provide

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access to all existing buildings are two-way except for the one-way access road to the site that is directly off of Kea‘ahala Road and runs parallel to and west of Po‘okela Street and the one-way access road around the existing Goddard building. Vehicles can access the HSH campus by the three site entrances as shown on Figure 4-3.

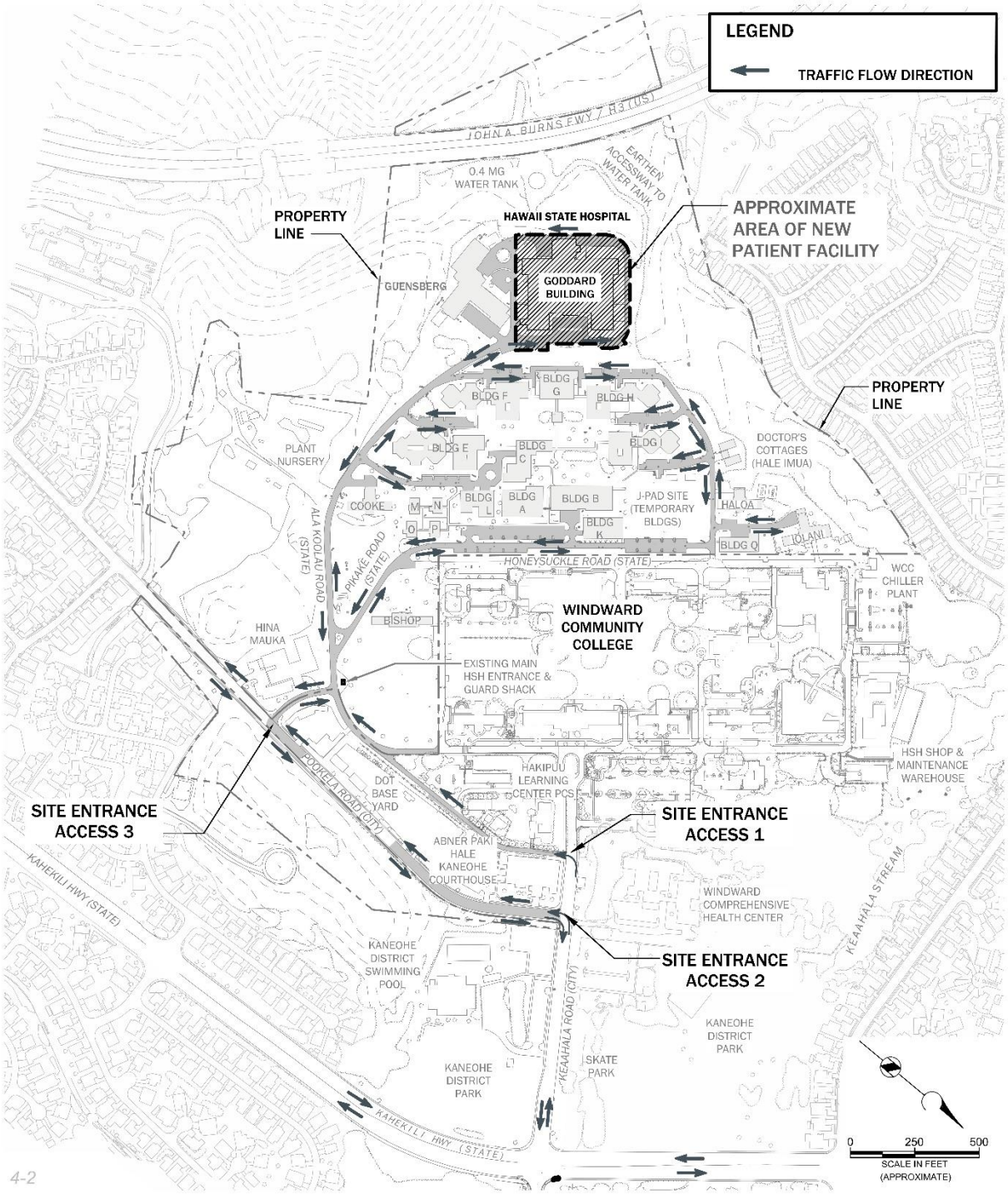

Figure 4-3. Existing site access and vehicular traffic circulation

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4.7.2 Potential Impacts and Mitigation Measures

With the anticipated increase in patient care and staffing from NPF and the overall campus buildout of improvements, it is likely that traffic will increase within and around HSH. To mitigate the anticipated increase in traffic, proposed roadway improvements are planned as part of the supporting infrastructure. Figures 4-4 and 4-5 show the site entrance accesses and vehicular traffic circulation for the first phase and overall campus buildout of improvements. For the first phase, the existing one-way access roads at NPF will be widened to become a two-way road on the southeast side of the building in order to create more traffic flow directions and allow vehicles to have more ways of travel around NPF and at the new parking lot area located adjacent to the building. The roadway on the *mauka*, *makai*, and northwest sides of the building will still be one-way road.

For overall campus buildout of improvements, an access road around the proposed NPF and Guensberg facility will be a counterclockwise one-way road. Further investigation should be performed to identify the need of two-way road during the time when the plan to construct the new Guensberg building is begun.

The existing access roads will be re-routed to match the layout of the driveway to the new buildings for both the first phase and overall campus buildout of improvements. See Figures 4-4 and 4-5 for road improvements.

It is anticipated that no significant adverse impact to the existing vehicular traffic circulation because of NPF and overall campus buildout of improvements at HSH due to the proposed mitigation measure. However, a traffic circulation study should be conducted to evaluate any areas where the traffic circulation may not be safe for pedestrians and bicyclists.

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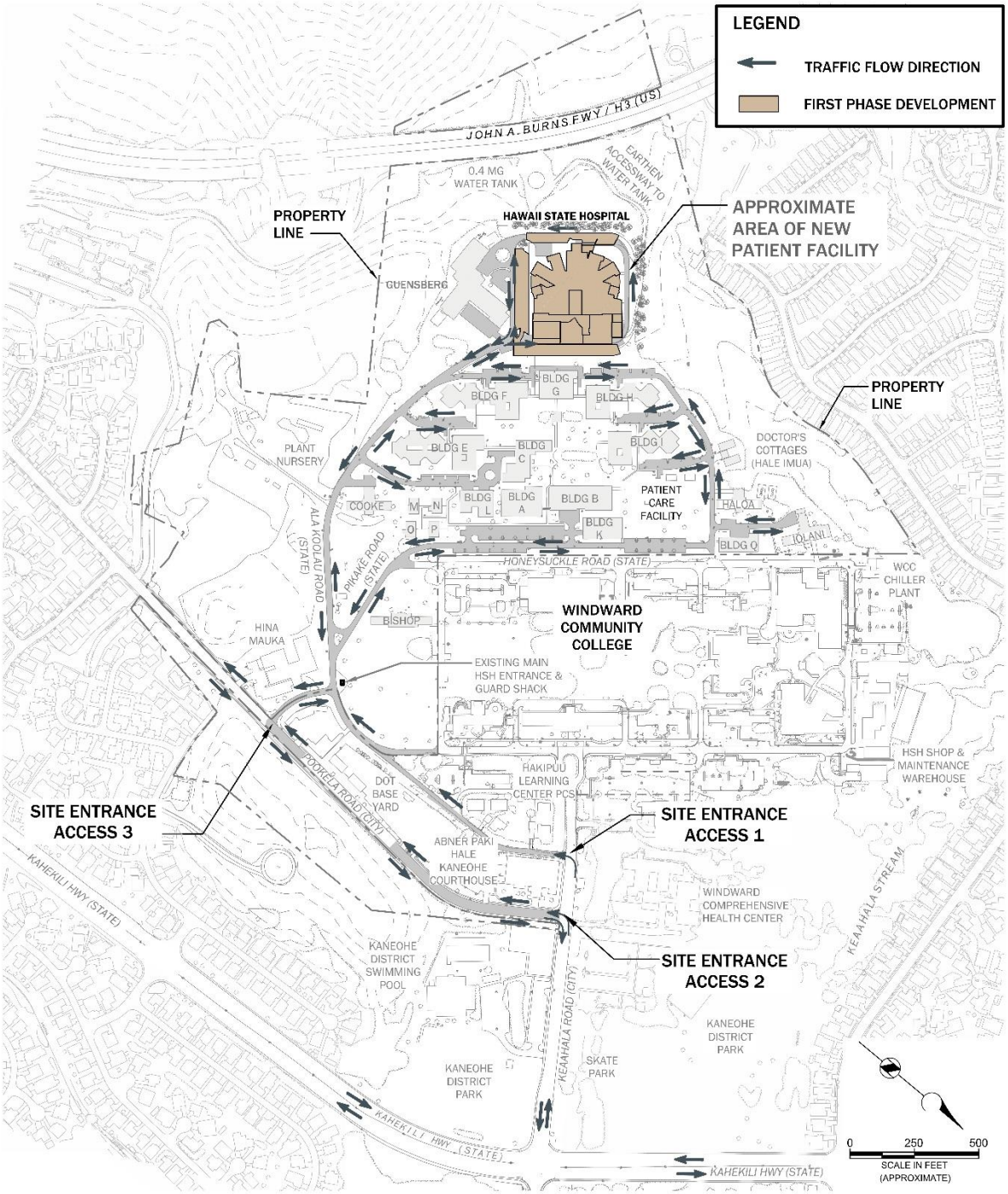

Figure 4-4. Site access and vehicular traffic circulation for first phase

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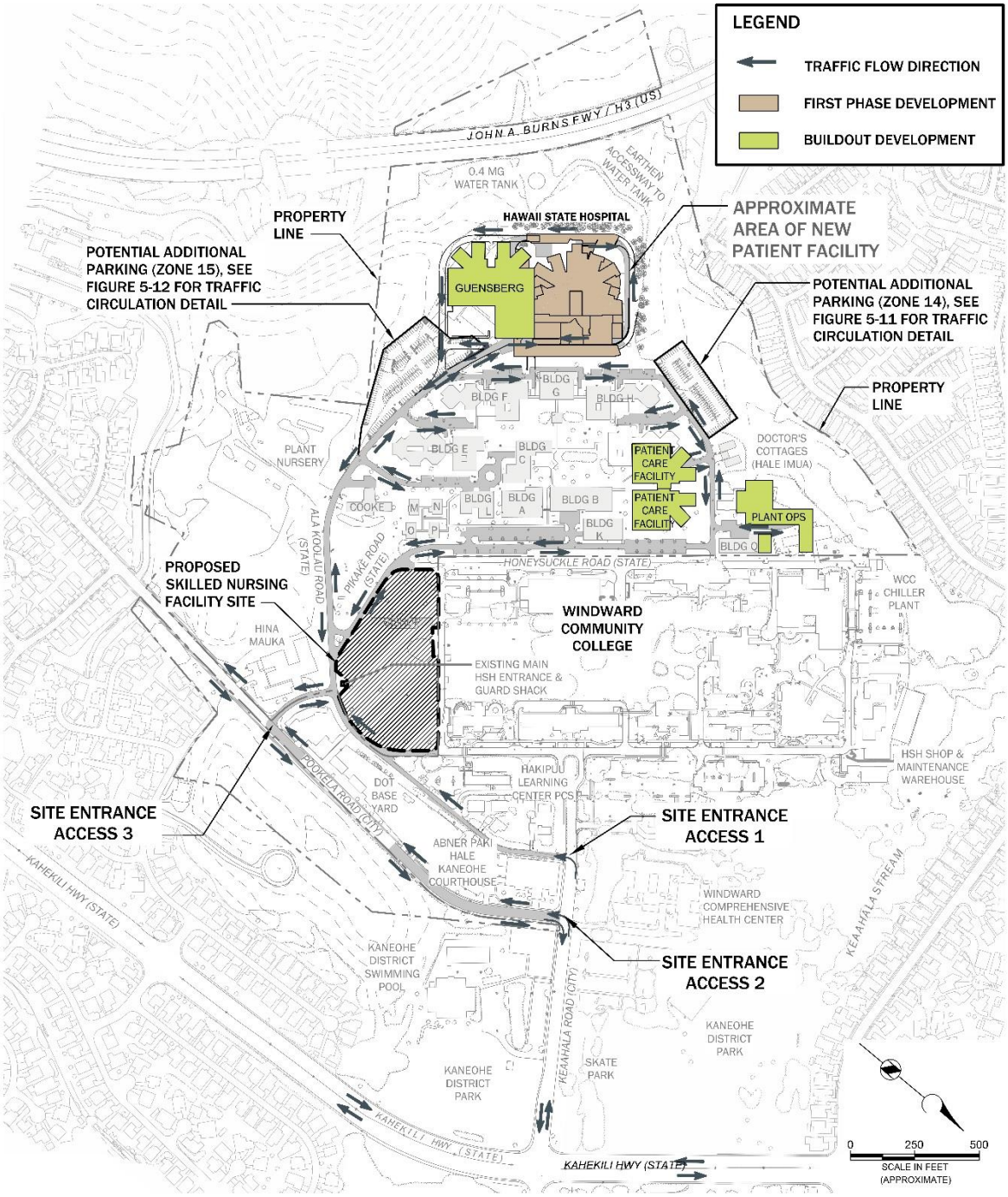

Figure 4-5. Site access and vehicular traffic circulation for overall campus buildout of improvements

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4.8 Pedestrian and Bicycle Access

This section describes pedestrian and bicycle access in the project area, including the affected environment and potential impacts and mitigation measures.

4.8.1 Affected Environment

There is no pedestrian access from the lower campus to the upper campus. The existing pedestrian walkways for some areas in the lower campus and along Po‘okela Street and Kea‘ahala Road are shown on Figure 4-6. There are no existing bike routes or pathways at HSH.

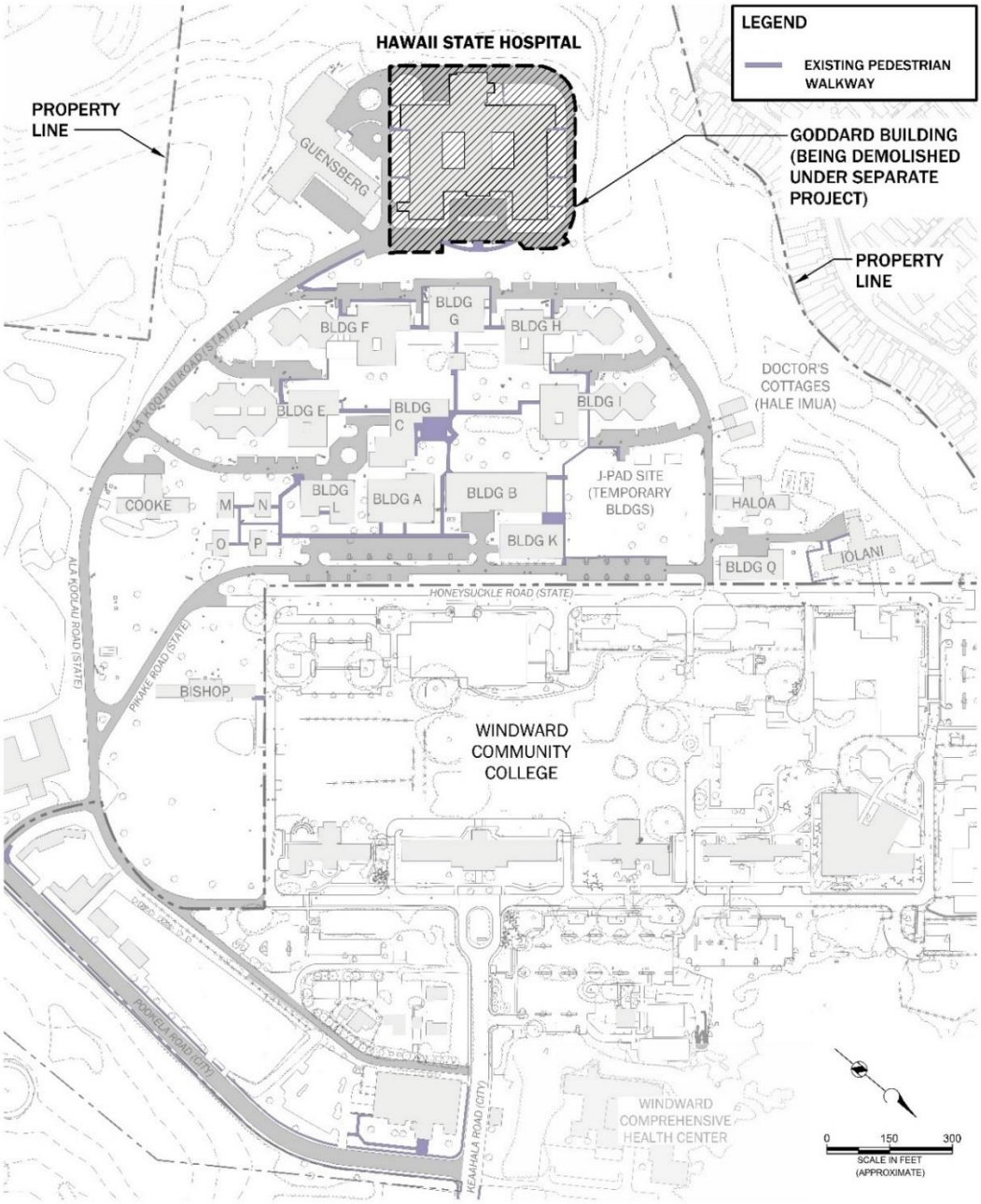

Figure 4-6. Existing pedestrian circulation

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4.8.2 Potential Impacts and Mitigation Measures

The pedestrian experience is an important aspect of the HSH campus. As noted by the 2005 MP, the HSH campus is intended to be pedestrian-friendly, with convenient and accessible means to all parts of the campus. Walkways should serve multiple purposes. They should be aesthetically pleasing and inviting, connecting landscaping and architecture together and matching their surrounding settings. For example, walkway widths should vary to match the surrounding architecture or meandering in curve-like paths when in garden settings to promote an informal and relaxed environment. The walkways should also be functional, connecting buildings with designated outdoor and recreational areas, and shall comply with the 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design. Options for outdoor paving to meet these requirements include reinforced concrete or stone pavers.

The sloped conditions for pedestrian access from parking to adjacent buildings will require transition elements such as stairs, ramps, and elevator to address pedestrian movement from parking areas to building entrances. Minimum elevation changes between them are recommended.

Because of limited public access, bicycle circulation will be limited primary to HSH employees. Bicycle circulation shall be accommodated by bike lanes (striped or signed) within the HSH campus roadway and widened pedestrian walkways to accommodate limited bicycle use. Joint-use pathways for pedestrian and bicycle use shall be a minimum of 8 feet wide.

Paved parking areas for bicycles shall be provided at strategic locations, e.g., major building entries. Bicycle parking areas shall be equipped with bike racks for storage.

A proposed pedestrian and bike circulation plan for NPF and the overall campus buildout of improvements is shown on Figures 4-7 and 4-8, respectively. This proposed plan includes an accessible pedestrian walkway connection for all of HSH’s existing and new buildings, and between the upper and lower campus.

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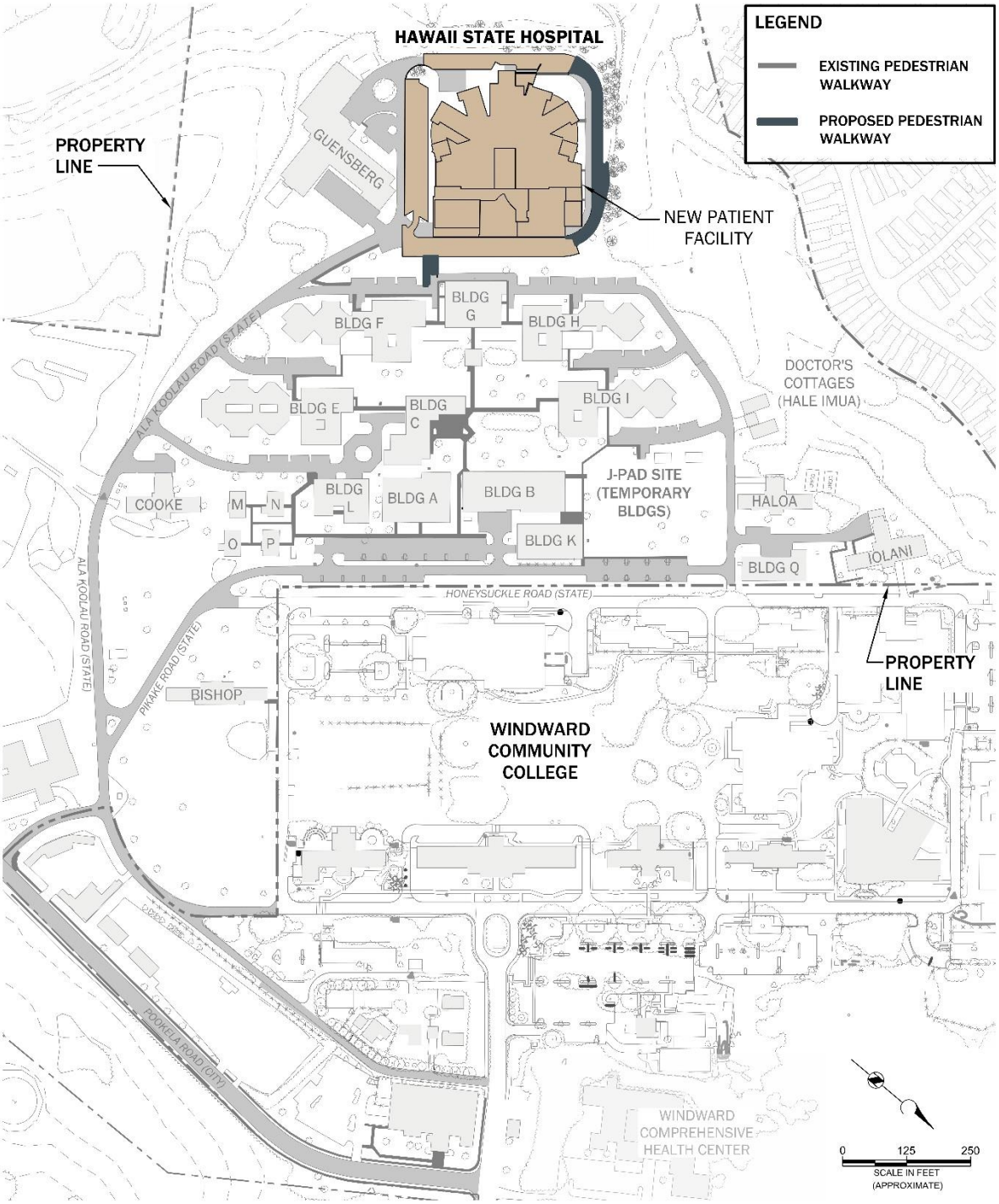

Figure 4.7. Proposed pedestrian and bike plan for NPF

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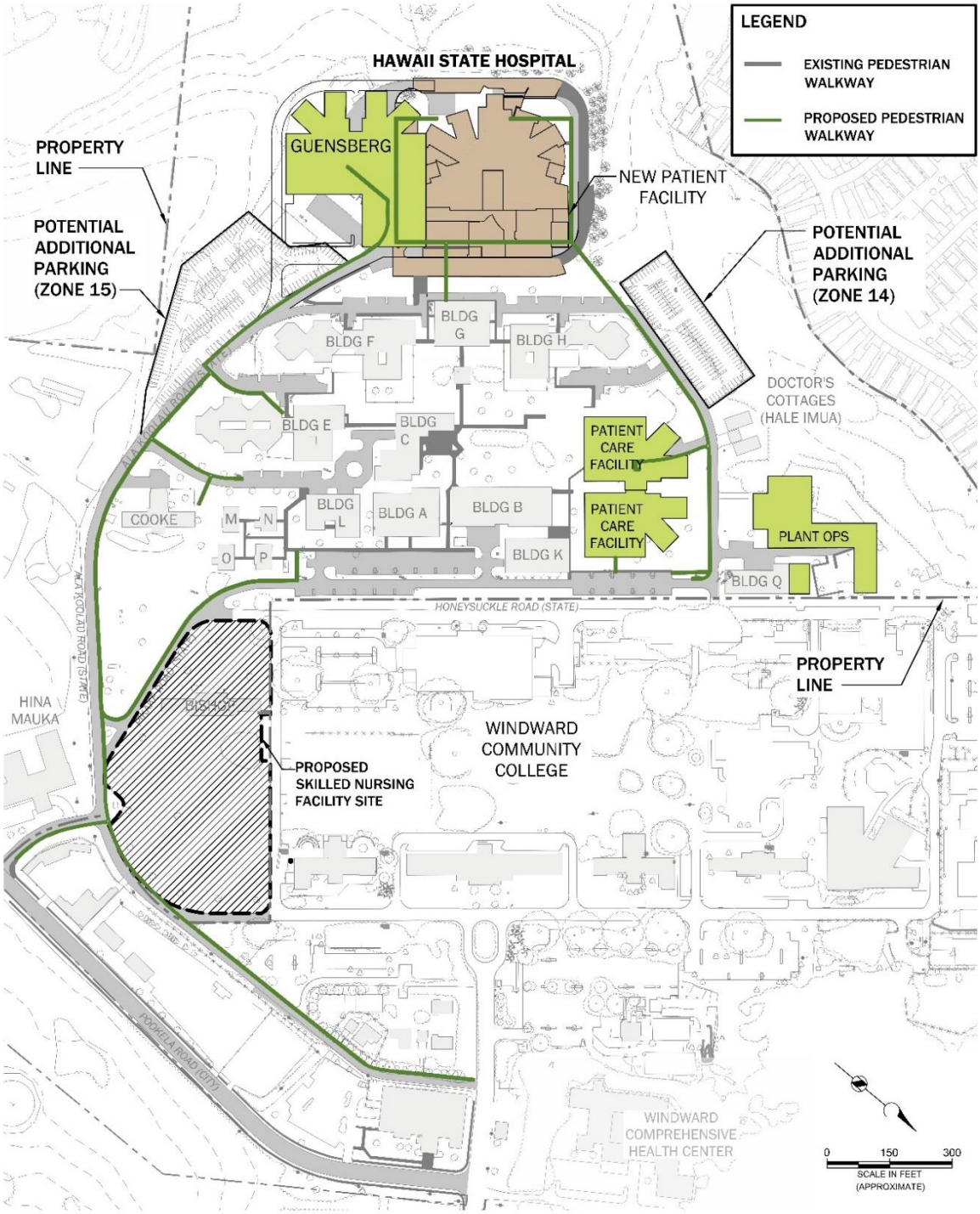

Figure 4-8. Proposed pedestrian and bike plan for overall campus buildout of improvements

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4.9 Visual Resources

An assessment of the current visual resources and the potential impacts on these resources by NPF and overall campus buildout of improvements was determined by DAGS and DOH to be of critical importance. Therefore, Section 4.9 provides a detailed discussion of the visual resources in the project area, including the affected environment and potential impacts and mitigation measures

4.9.1 Affected Environment

HSH is located in the city of Kāne‘ohe, between two natural ravines on gently sloping topography on the northwestern slope of Pu‘ukeahiakahoe—a peak of the Ko‘olau Mountain range on the windward side of the island of O‘ahu. From the upper HSH campus, which includes the location of NPF (existing Guensberg building site), Kāne‘ohe Bay, Kāne‘ohe town, and Olomana Ridge are visible. From the lower HSH campus and WCC, the Ko‘olau Mountains rise sharply above the buildings of both campuses. When viewing HSH from Kāne‘ohe town, the views from the southwest appear to be obscured by tall forest and Interstate H-3, but the Ko‘olau Mountains are still clearly visible. From the southeast, the heavily vegetated Kapunahala Stream and a forested hill along the northeast of Po‘okela Road provide a visual buffer between HSH and its nearest neighbors. Similar conditions exist on the west side of the HSH campus, where tall forest and a heavily vegetated ravine hinder views of HSH. A description of the environment surrounding HSH and possible key vantage points within the Kāne‘ohe area of HSH and its surrounding visual resources is provided below.

4.9.1.1 Scenic Resources

Scenic resources within and around HSH include landmarks, significant vistas, and view corridors. The Ko‘olau Mountains, Kāne‘ohe Bay, and large tracts of green open spaces are considered to be significant scenic resources for the Ko‘olaupoko district based on their scale and prominence within the visual environment. As noted by the *Ko‘olaupoko Sustainable Communities Plan* (KSCP) set forth by the City DPP (XXX reference):

> Ko‘olau Poko’s open space consists of lush forested valleys, sharply eroded ridges which extend from the interior valley floors to the summit of the Ko‘olau Mountains… This sharply contrasts with the Mokapu Peninsula whose dry climate and parched terrain is surrounded by the seashore, accompanying white sand beaches and the Kāne‘ohe Bay marine environments, all of which contribute to the region’s unique and intrinsic beauty. This natural beauty attracts residents and visitors to the area as well as the film industry…. Long-term protection and preservation of scenic resources, agricultural areas, natural areas, and recreational areas are important to maintaining the character and attractiveness of Ko‘olau Poko for both residents and visitors.

Kāne‘ohe is arguably at the heart of Ko‘olaupoko’s significant view corridors. There, the Ko‘olau Mountains rise sharply to their highest elevations, with a maximum elevation of approximately 3,100 feet at Pu‘u Konahuanui peak. Open space is prevalent and predominantly defined by agricultural and aquacultural areas and practices (both traditional and modern), forest reserves, protected marshlands, preservation zones, public parks, and golf courses. Kāne‘ohe is also adjacent to Kāne‘ohe Bay, which is regarded for its beauty; protected marine environment; sand bars; and community ties including cultural, historic, recreational, and educational value. Therefore, it is important to assess any impact that NPF and the overall campus buildout of improvements may have on the views of the Ko‘olau Mountains, Kāne‘ohe Bay, and open spaces and to mitigate any potentially adverse effects on these views.

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4.9.1.2 Key Vantage Points

To determine the potential visual impact of NPF and overall campus buildout of improvements of HSH on Kāne‘ohe’s scenic resources, potential representative key vantage points from within the Kāne‘ohe area were determined from Google Earth Pro and field investigations. These key vantage points are illustrated in Figures 4-9 and 4-10 and listed in Table 4-4.

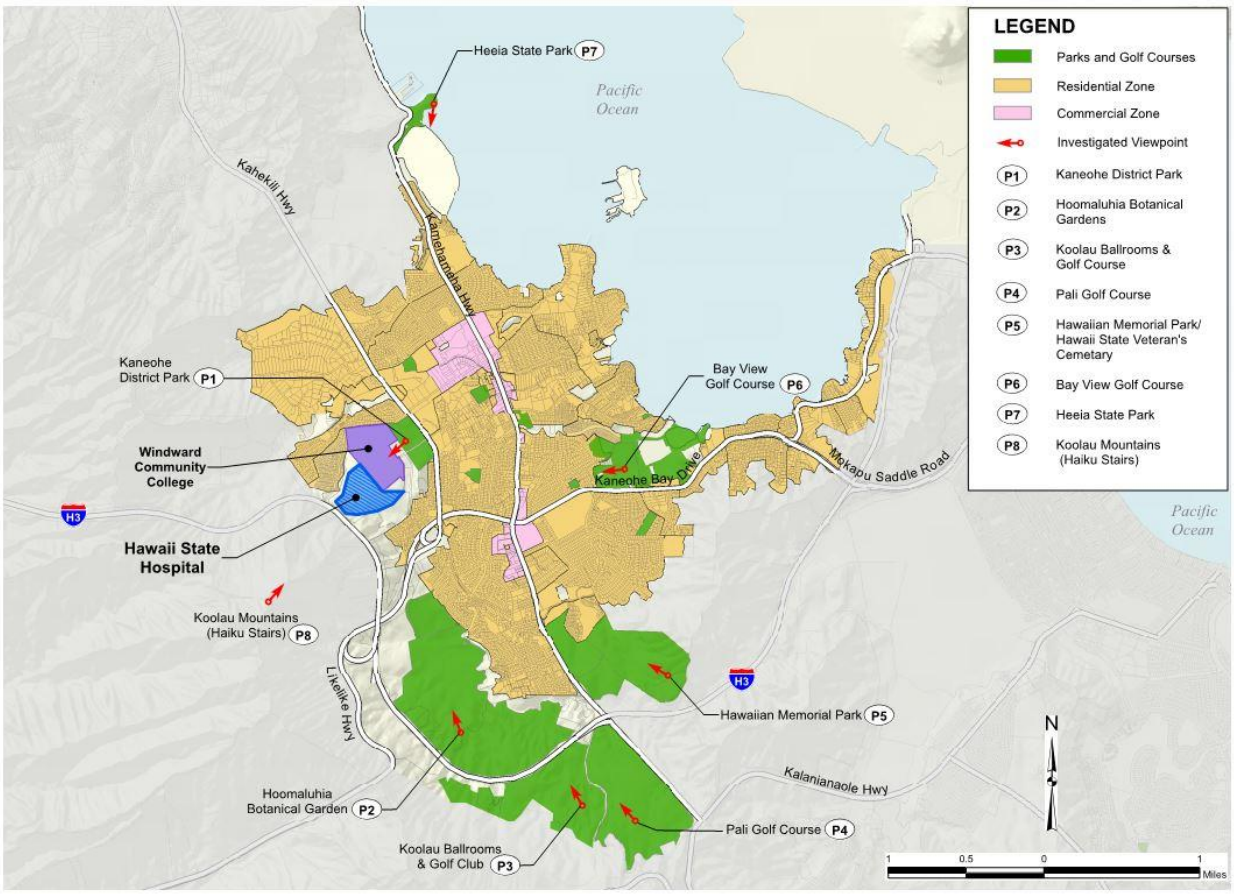

Figure 4-9. Key vantage points from popular parks and golf courses surrounding HSH.

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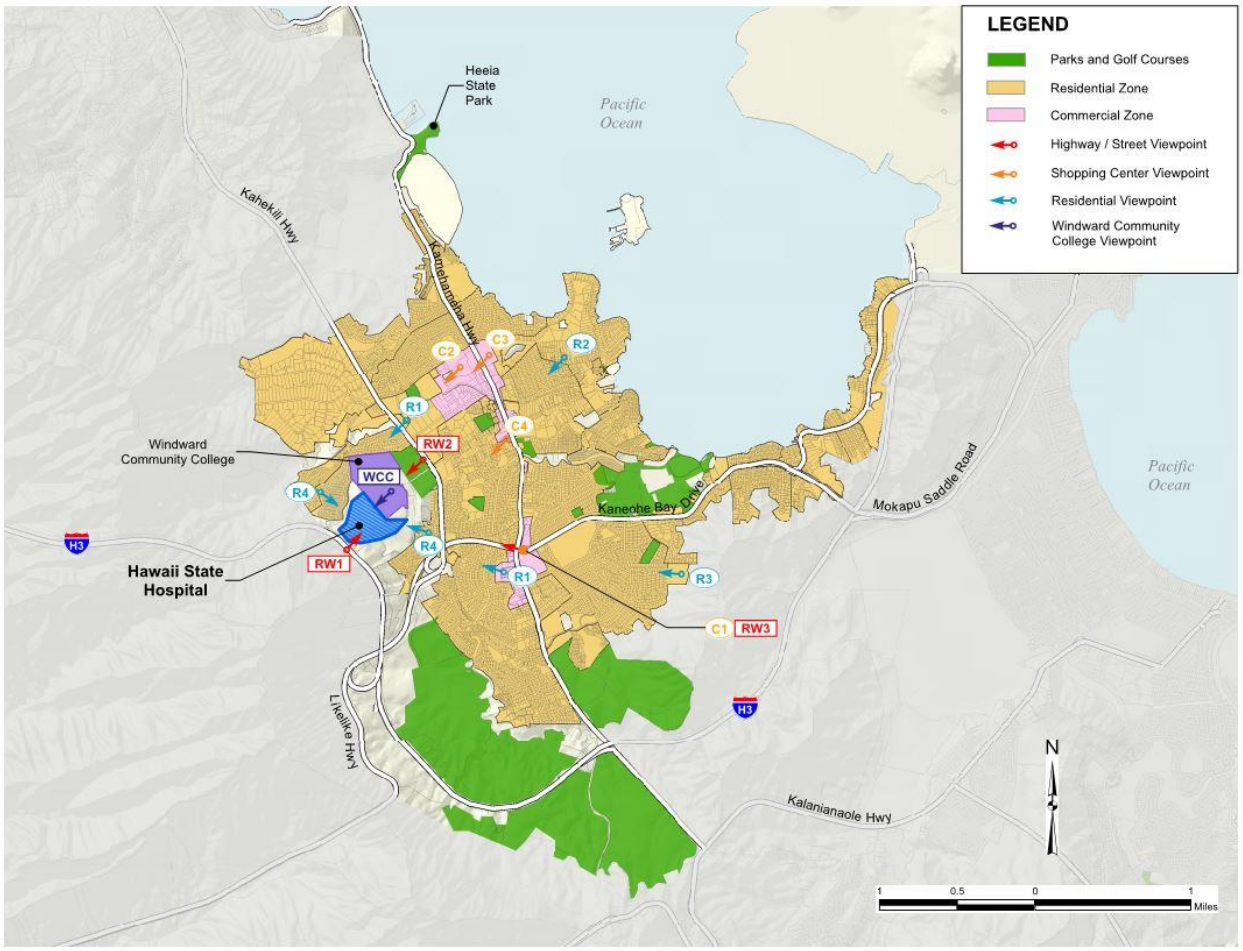

Figure 4-10. Key vantage points from surrounding urban areas near HSH.

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Table 4-4. List of Key Vantage Points	
Vantage Points	Key Note Designation for Figures 4.9 through 4.9-20
Parks and Open Spaces	
Kāne‘ohe District Park	P1
Ho‘omaluhia Botanical Garden	P2
Ko‘olau Golf Club	P3
Pali Golf Course	P4
Hawaiian Memorial Park	P5
Bay View Golf Course	P6
He‘eia State Park	P7
Ko‘olau Mountains	P8
Commercial Areas	
Windward City	C1
Windward Mall	C2
Kāne‘ohe Bay Shopping Center	C3
Kāne‘ohe Shopping Center	C4
Residential	
Medium Density Apartments (2x)	R1
Residential neighborhood on Lilipuna Road	R2
Good Samaritan Pohai Nani	R3
Residential neighborhoods adjacent to HSH	R4
Institutions	
Windward Community College	WCC
Roadways	
Interstate H3	RW1
Kahekili Highway and Kea‘ahala Road	RW2
Likelike Highway and Kamehameha Highway	RW3

A description of these key vantage points is provided in Sections 4.9.1.2.1 and 4.9.1.2.2.

4.9.1.2.1 Key Vantage Points: Parks and Open Spaces

Parks and open spaces are typical defining features of Kāne‘ohe and are appreciated for their recreational uses, visual aesthetics, and views of the surrounding environment. Several popular parks and open spaces are situated within a couple of miles of HSH, as shown in Figure 4-9. These parks are visited by a substantial number of residents, tourists, and cultural practitioners, all of whom could be affected by a change in the views of the surrounding environment.

- Kāne‘ohe District Park is adjacent to the *makai* side of WCC along Kahekili Highway. The park is a mixture of open grassy fields and built facilities totaling approximately 31 acres. Three fields are commonly used for football, softball, soccer, and baseball. The park facilities include a

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gymnasium; swimming pool; meeting rooms; boxing gym; racquetball room; universal gym; skate park; outdoor playground; and outdoor courts for volleyball, basketball, and tennis.

- **He‘eia State Park** is located along Kamehameha Highway approximately 2.5 miles to the northeast of HSH. He‘eia State Park is an 18.5-acre waterfront park that presents views of Kāne‘ohe Bay, the Kāne‘ohe Bay sand bar, and the Ko‘olau Mountains. The park is bordered by He‘eia Kea Boat Harbor, He‘eia Marsh, He‘eia Fishpond, and Kāne‘ohe Bay. The park is managed by Kama‘āina Kids, which strives to restore the park to its native beauty and offer cultural, environmental, and waterfront programs to local residents and visitors. Programs include interactive classes on Native Hawaiian cultural practices, a summer camp for children, snorkeling tours, and kayak eco-tours. Upwards of 7,000 people participate in the park’s structured programs each year.
- **Hawaiian Memorial Park** is located adjacent to the **Hawai‘i State Veterans Cemetery** along Kamehameha Highway, approximately 2 miles to the southeast of HSH. The memorial park has approximately 165 acres of manicured grassy space and contains graves for veterans and commemorative monuments. The park also has stunning views of the Ko‘olau Mountains.
- **Ho‘omaluhia Botanical Gardens** borders the Ko‘olau Mountains between Interstate H-3 and Kamehameha Highway, approximately 1 mile southeast of the HSH campus. At approximately 400 acres, Ho‘omaluhia is O‘ahu’s largest botanical garden, containing a variety of plants from around the world, with an emphasis on Polynesian plants and palms. The park is free to visitors and offers classes and workshops, hiking, biking, fishing, horseback riding, and camping.
- **Golf courses:** Three major golf courses are located in Kāne‘ohe: Ko‘olau Golf Club, Pali Golf Course, and Bay View Golf Course. Ko‘olau Golf Club is adjacent to Pali Golf Course and situated between Kailua and Kāne‘ohe town. Bay View Golf Course is located adjacent to the Kāne‘ohe Wastewater Pretreatment Facility in close proximity to Kāne‘ohe Bay. Pali Golf Course and Bay View Golf Course are used almost exclusively for golfing. However, the Ko‘olau Golf Club, which has views of the Ko‘olau Mountains and Kāne‘ohe Bay, includes the Ko‘olau Ballrooms & Conference Center, a popular venue for a variety of functions, including meetings, conferences, social events, and weddings.

  Ko‘olau Mountains: Most of the land *mauka* of HSH is in the State Conservation District and is mostly overseen by the State Board of Land and Natural Resources, with some sections privately owned and managed. The Ko‘olau Mountains as a whole have a large network of access trails over the entire length of the range and is a popular area for hiking, hunting, and mountain biking. Directly behind HSH is a popular hiking trail called Ha‘ikū Stairs, also known as Stairway to Heaven, which is owned and managed by HBWS. The summit of the trail is known for its views of the Ko‘olau Mountains, windward Oahu, and the Pacific Ocean, including Kāne‘ohe Bay. The trailhead near HSH is officially closed but portions of the trail are still trekked regularly by residents and tourists through separate, intersecting trails.

4.9.1.2.2 Key Vantage Points: Urban Environment

The urban area of Kāne‘ohe is composed primarily of low-density and medium-density residential units, interspersed with a couple of business zones and schools. As there are few high-rise buildings in Kāne‘ohe, at least one or more visual resource can be seen from almost all urbanized areas. The users of these urban areas, who include residents, visitors, and cultural practitioners, can all be affected by a change in the views of the surrounding area. The makeup of the affected urban area is described below:

- **Residential communities:** Residential communities compose the majority of the Kāne‘ohe area and include single-family homes, private townhouse communities, and a few low- to medium-

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density apartment complexes. A map of the residential areas of Kāne‘ohe is shown in Figure 4-10. HSH and WCC campuses are bordered by residential neighborhoods composed primarily of single-family homes along the north to west sides and along the east to southeast side of the campuses. More low-density and medium-density residential areas are located across Kahekili Highway from the HSH campus.

- **Commercial districts:** As noted by the KSCP, most of the commercial businesses in the Ko‘olaupoko District are shopping centers, as shown in Figure 4-10. Kāne‘ohe Shopping Center, Kāne‘ohe Bay Shopping Center, and Windward Mall are all located within Kāne‘ohe’s central business district while Windward City is located at the intersection of two major highways in Kāne‘ohe (Kamehameha and Likelike highways). These shopping centers are the primary urban destination for residents and visitors within Kāne‘ohe.
- **Institutions:** Besides HSH, WCC is the only other major institution within Kāne‘ohe. As mentioned in Section 1.3 of this DEIS, WCC is on land previously owned by DOH but currently managed by UHCC and is adjacent to HSH along its eastern edge. The campus is characterized, in general, by older buildings interspaced by large tracts of green space and views of the Ko‘olau Mountains. Approximately 2,600 students are actively enrolled at WCC.
- **Major roadways:** Four major highways run through Kāne‘ohe: Interstate H-3, Likelike Highway, Kahekili Highway, and Kamehameha Highway. Interstate H-3 directly *mauka* of HSH runs in a northwest–southeast direction and is a couple hundred linear feet from the HSH campus. Likelike Highway to the south of the campus runs in an east–west direction and is located on the other side of the residential community bordering HSH. Kahekili Highway is east of the campus by approximately 0.5 mile along the border of Kāne‘ohe District Park and provides direct access to HSH. Kamehameha Highway runs parallel to Kahekili Highway but is about 1 mile east of HSH. The locations of these four major roadways with respect to HSH are shown in Figure 4-10. All four thoroughfares have views of the Ko‘olau Mountains, open spaces, and Kāne‘ohe Bay.

4.9.2 Potential Impacts and Mitigation Measures

HSH is generally out of public viewplanes because of the topography of the surrounding land, bordering forested areas, offset location from major highways, and low profile of the existing buildings. This includes the existing Goddard building, which is one of the tallest buildings on the campus with a height of 15 to 20 feet and is located at the highest topographical point of the campus. For areas around Kāne‘ohe that can see the existing Goddard and Guensberg buildings, the buildings have minimal visual impact because of their architecture, low profile, and open landscaping. If anything, Interstate H-3, located within a couple hundred feet behind and above the Goddard and Guensberg buildings, has a greater visual impact on Kāne‘ohe’s scenic resources.

NPF will be located within a similar footprint as the existing Goddard building and will have no impact to the open-space feel of HSH or the rest of Kāne‘ohe. However, NPF is estimated to be approximately 80 feet tall, roughly four times the height of the current building, and will potentially have a greater impact on the viewplanes of Kāne‘ohe’s other scenic resources—the Ko‘olau Mountains and Kāne‘ohe Bay.

To determine the effect of NPF and overall campus buildout of improvements of HSH on views of the Ko‘olau Mountains and Kāne‘ohe Bay, the key vantage points discussed in Section 4.9.1 were evaluated to determine the following:

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- Whether NPF would be potentially visible
- NPF’s potential visual impact on the views of the Ko‘olau Mountains and Kāne‘ohe Bay
- Based on NPF’s potential visual impact, whether the eventual overall campus buildout of improvements of HSH could also potentially visually impact the views of Kāne‘ohe’s scenic resources

Line of sight of the existing Goddard building for each vantage point was checked on Google Earth Pro and from the top of the Guensberg building prior to field investigation within the Kāne‘ohe area. During field investigation of each vantage point, the visibility of the existing Goddard building from each location was determined and photographed. The potential visibility of NPF was also gauged using nearby structures to the existing Goddard building as reference points: the flagpole in front of the existing Goddard building, which stands at approximately 34 feet from grade, and the green electrical pole near the water tank above the existing Goddard building. Significance of impact on the Ko‘olau Mountains or Kāne‘ohe Bay was based on a rough estimation of obstruction of visibility of the scenic resource in question. This was gauged based on the linear distance of each vantage point from the location of NPF, the elevation difference of each vantage point relative to the elevation of NPF, and clear versus potentially obstructed line of sight from key vantage points toward HSH and beyond to the scenic resource.

A summary of the evaluated potential impacts is provided in Table 4-5 and discussed in Sections 4.9.2.1 and 4.9.2.2. To further illustrate Table 4-5, Figure 4-11 demonstrates whether a person’s viewplane from each of the key vantage points would or would not be potentially impacted by NPF and future overall campus buildout of improvements.

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Table 4-5. Potential Impact on Scenic Resources for the New Patient Facility and Full Campus Buildout

Vantage Point	Anticipated Visibility of New Patient Facility from Vantage Point	Scenic Resource Affected	Possible Significance of Potential Impact (New Patient Facility)	Possible Significance of Potential Impact (Overall campus buildout of improvements)
Parks and open spaces				
Kāne‘ohe District Park	Yes (Partial)	Ko‘olau Mountains	None–Low	None–Low
He‘eia State Park	Yes (Partial)	Ko‘olau Mountains	None–Low	None–Low
Hawaiian Memorial Park and Hawai‘i State Veterans Cemetery	Yes (Partial)	Ko‘olau Mountains	None–Low	None–Low
Ho‘omaluhia Botanical Gardens	None	Ko‘olau Mountains Kāne‘ohe Bay	None	None
Golf Courses (Ko‘olau, Pali, Bayview)	None	Ko‘olau Mountains	None	None
Ha‘ikū Stairs	Yes (Partial)	Kāne‘ohe Bay	None–Low	None
Residential areas	Varies	Ko‘olau Mountains	None–Low	None–Low
Commercial districts				
Kāne‘ohe Shopping Center	None	Ko‘olau Mountains	None	None
Kāne‘ohe Bay Shopping Center	None	Ko‘olau Mountains	None	None
Windward Mall	None	Ko‘olau Mountains	None	None
Windward City	Yes	Ko‘olau Mountains	None–Low	None–Low
Windward Community College	Yes	Ko‘olau Mountains	Low	Low
Major Highways				
Interstate H-3	Yes	Kāne‘ohe Bay	None–Low	None
Likelike Highway	Yes (Partial)	Ko‘olau Mountains	None–Low	None–Low
Kamehameha Highway	Yes (Partial)	Ko‘olau Mountains	None–Low	None–Low
Kahekili Highway	Yes (Partial)	Ko‘olau Mountains	None–Low	None–Low

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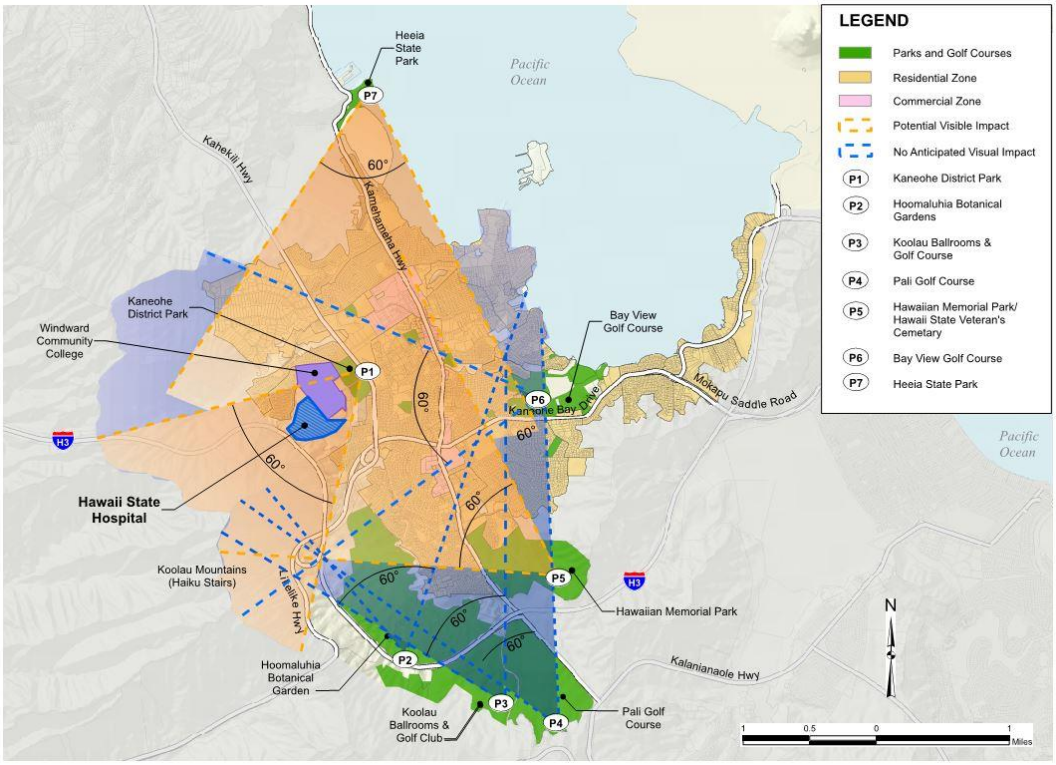

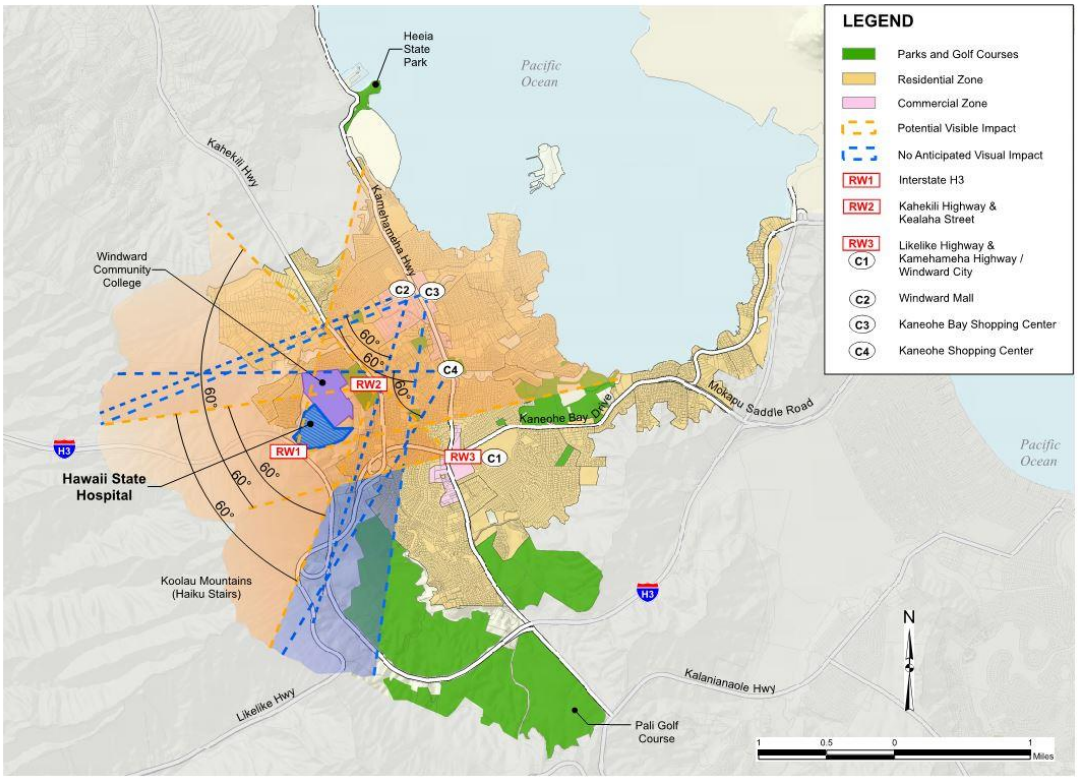

Figure 4-11. Potentially impacted or not impacted viewplanes from key vantage points, including both parks (top) and urban areas (bottom)

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4.9.2.1 Potential Impact on Parks and Open Spaces

The potential impacts on identified key vantage points from within parks and other open spaces are summarized below:

- Kāne‘ohe District Park is the closest park in proximity to the HSH campus; it is separated from HSH only by the WCC campus and is approximately 0.5 mile *makai* of the HSH campus. As shown on Figure 4-12, because of the topography and buildings of the WCC campus, almost all of the existing buildings on the HSH campus are not visible when viewing HSH from the park. However, it is possible that NPF will be visible from certain parts of Kāne‘ohe District Park, specifically from near the tennis courts and children’s playground where there is a break in the tall trees that surround HSH. Because it is approximately 0.5 mile away from the Goddard building, the visual impact of the building from the park is likely to be none to low. Despite its proposed height, NPF will still be significantly shorter than Interstate H-3 and is proportionally much smaller than the Ko‘olau Mountains behind it, as illustrated by Figure 4-13. NPF will apparently have little to no significant visual impact on the views of the Ko‘olau Mountains from the district park.

  Moreover, construction for the full-campus buildout would also appear to have little to no significant visual impact on the views of the Ko‘olau Mountains from the district park. NPF is located at the highest elevation on campus relative to the other buildings. It is also unlikely that construction of new or improved buildings for the overall campus buildout of improvements will exceed the height of NPF. Nonetheless, as needed, detailed visual impact assessments for these improvements may be completed in the future during the planning and design of each improvement.

Figure 4-12. View of the Ko‘olau Mountains facing toward HSH from Kāne‘ohe District Park

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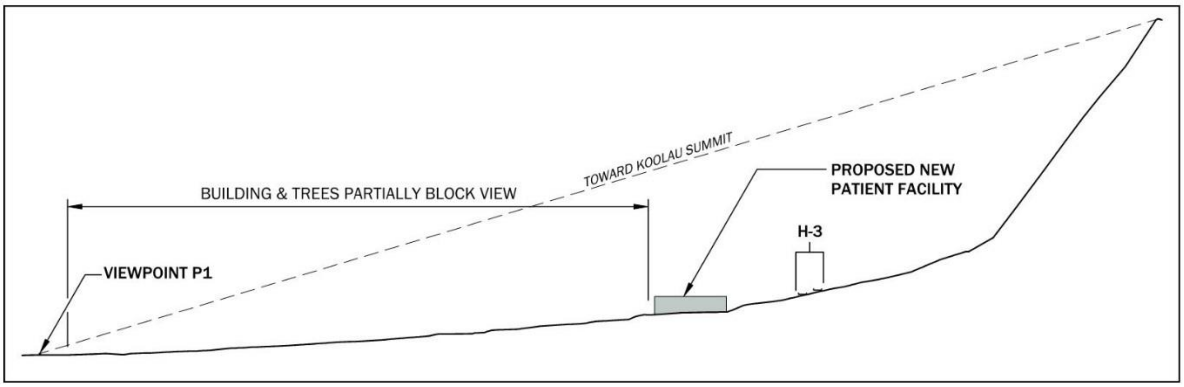

Figure 4-13. Section cut of the view of the NPF against the Ko‘olau Mountains from Kāne‘ohe District Park

- He‘eia State Park: The existing Goddard and Guensberg buildings are visible from the southeastern shore of the state park as shown on Figure 4-14. Therefore, NPF and future campus improvements will also be visible. However, the state park is located approximately 2.5 miles away from the HSH campus and the height of all the HSH buildings from the state park in proportion to the Ko‘olau Mountains is relatively small in comparison. Therefore, despite a potential increase in building height, the visual impact of NPF or any other improvements from the overall campus buildout of improvements on the view of the Ko‘olau Mountains from the state park would likely be low to none.

Figure 4-14. View of the Ko‘olau Mountains and Kāne‘ohe facing toward HSH from the southeastern shore of He‘eia State Park

- Hawaiian Memorial Park and Hawai‘i State Veterans Cemetery: The existing Goddard and Guensberg buildings are visible from the Plaza/Columbarium, a monument at the southeastern

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end of the memorial park where the land slopes upward from the rest of the park toward a ridgeline (see Figure 4-15). The monument is located approximately 2 miles from the HSH campus and, similar to He‘eia State Park, the height of the HSH buildings from the memorial park in proportion to the Ko‘olau Mountains is relatively small. Therefore, despite a potential increase in building height, the visual impact of NPF or any other improvements from the overall campus buildout of improvements on the view of the Ko‘olau Mountains from the state park would likely be low to none.

Figure 4-15. View of the Ko‘olau Mountains facing toward HSH from the Plaza/ Columbarium at Hawaiian Memorial Park

- **Ho‘omaluhia Botanical Gardens:** Although the botanical gardens are less than 1 linear mile from the HSH campus, the campus does not appear to be visible from the gardens. The botanical gardens are located in a low-lying valley, approximately 200 feet in elevation below the elevation of the HSH campus. Furthermore, a ridgeline and tall trees are located between the HSH campus and the botanical gardens. Even from the highest public vantage point within the gardens, Kilonani Mauka overlook, the HSH campus still did not seem to be visible over the ridgeline, as shown on Figure 4-16. Therefore, NPF and future overall campus buildout of improvements will probably have no visual impact on either the Ko‘olau Mountains or Kāne‘ohe Bay on the botanical gardens.

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Figure 4-16. View of the Ko‘olau Mountains and Kāne‘ohe Bay facing the direction of HSH from Kilonani Mauka overlook, the highest public vantage point of Ho‘omaluhia Botanical Garden

- **Golf courses:** The HSH campus was not apparently visible from the Ko’olau Golf Club, Pali Golf Course, or Bay View Golf Course as shown on Figure 4-17. The Ko‘olau Golf Club and Pali Golf Course are approximately 2.5 miles south and southwest of the campus, beyond Ho‘omaluhia Botanical Gardens. The view from the two golf courses is blocked by the same ridgeline and trees as the view from Ho‘omaluhia Botanical Gardens. Furthermore, the Pali Golf Course is low in elevation compared to the HSH campus, similar to the botanical gardens, which prevent line of sight to the campus. The Bay View Golf Course is located almost 2 miles east of the HSH campus. However, because of topography and an obstructed line of sight, the HSH campus does not appear to be visible from the golf course or its driving range. Therefore, NPF and the full campus buildout will apparently have no visual impact on the views from all three locations.

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Figure 4-17. View of the Ko‘olau Mountains facing toward HSH from the Ko‘olau Golf Club (top left), Pali Golf Course (top right), and Bayview Golf Course (bottom middle)

- **Ko‘olau Mountains:** While there are a number of ways to access the Ko‘olau Mountains from within the Kāne‘ohe area, the most popular trail within proximity of HSH is a hiking trail called Ha‘ikū Stairs or Stairway to Heaven. The HSH campus is visible from one of the pillboxes along the trail near the summit of the Ko‘olau Mountains. However, the linear distance of HSH is only 0.5 mile from the pillbox and the difference in elevation between the two locations is approximately 1,200 feet or more. Therefore, the viewpoint of the HSH buildings from Ha‘ikū Stairs are primarily rooftops with very little to no perception of building heights. The difference in elevation between the campus and the pillbox are such that the view of the Kāne‘ohe area and Kāne‘ohe Bay are uninterrupted by the campus and will likely remain so, even with the construction of taller buildings during the first phase and overall campus buildout of improvements. Therefore, NPF and other campus improvements appear to have very low, if any, visual impact of the views from the trail.

4.9.2.2 Urban Environment

The potential impacts on identified key vantage points from within the surrounding urban environment are summarized below:

- **Residential communities:** Within Kāne‘ohe town, the HSH campus was visible to only a few residential areas because of the low-lying dips in elevation within the town, small hills, and tall forested areas that surround HSH. Figure 4-18 shows an example of some of the views looking toward the Ko‘olau Mountains from various locations around HSH, including two examples where HSH could be seen (see R1 on Figure 4-10) and two where it was not visible, despite close

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proximity to the campus (see R4 on Figure 4-10 for location). The residential areas that could see HSH included three medium-density apartment complexes within 1 mile of HSH, a retirement apartment complex a couple of miles from HSH, and a gated community on Lilipuna Point (see Key Notes R1–R3 on Figure 4-10 for location). Where the existing buildings on the HSH campus were visible, NPF and any future campus improvements would also be visible. However, the closest residential area is still more than 0.5 mile away and, similar to Kāne‘ohe District Park, NPF and any improvements from the overall campus buildout of improvements will still be significantly shorter than Interstate H-3 and is proportionally much smaller than the Ko‘olau Mountains behind it. The visual impact of NPF or any other improvements from the overall campus buildout of improvements on the view of the Ko‘olau Mountains from residential communities would likely be low to none.

Figure 4-18. Views of the Ko‘olau Mountains facing toward HSH from a sample of residential areas within 1 mile of HSH

Top left: view from Ha‘ikū Hale, a medium-density apartment complex across Kahekili Highway.
Top right: view from Na Pali Gardens, a community of medium-density apartment complexes southeast of HSH.
Bottom left: view from Kahuhipa Street, part of a single-family housing area along the northern edge of the HSH-WCC campus.
Bottom right: view from Paepu‘u Street, part of a single-family housing area along the southern edge of the HSH campus.

- **Commercial districts:** As noted in Table 4-5, HSH was visible only to the area around Windward City. HSH was not visible to the rest of the central business district because of topography, tall forested areas, and buildings blocking the line of sight. Figure 4-19 illustrates the obstructed view toward HSH from Windward Mall.

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Figure 4-19. View of the Ko‘olau Mountains facing toward HSH from the top floor of the parking lot of Windward Mall

However, HSH was clearly visible from Windward City because of clear line of sight along Likelike Highway. Therefore, NPF and any future campus improvements would also be visible from Windward City. However, Windward City is approximately 1 mile *makai* of HSH and the height of NPF and other future campus improvements in proportion to the Ko‘olau Mountains would still be small. Figures illustrating the visibility of HSH from Windward City are further discussed above under “major roadways.” NPF and future campus improvements will have little to no significant visual impact on the views of the Ko‘olau Mountains from Windward City

- **WCC:** The existing Goddard and Guensberg buildings are currently not visible from most of the WCC campus. However, with the increase in building height of NPF, it is likely that the building will be partially visible from certain parts of the WCC campus, including from Hale Alaka‘i, the Great Lawn, and along Ala Ko‘olau Road. Despite the increased visibility, NPF will still remain proportionally small relative to the Ko‘olau Mountains, as illustrated by Figure 4-20. Figures 4-21 and 4-22 demonstrate the existing view of the Ko‘olau Mountains from Hale Alaka‘i and the Great Lawn and a rendered image of the same view of the Ko‘olau Mountains once NPF is complete.

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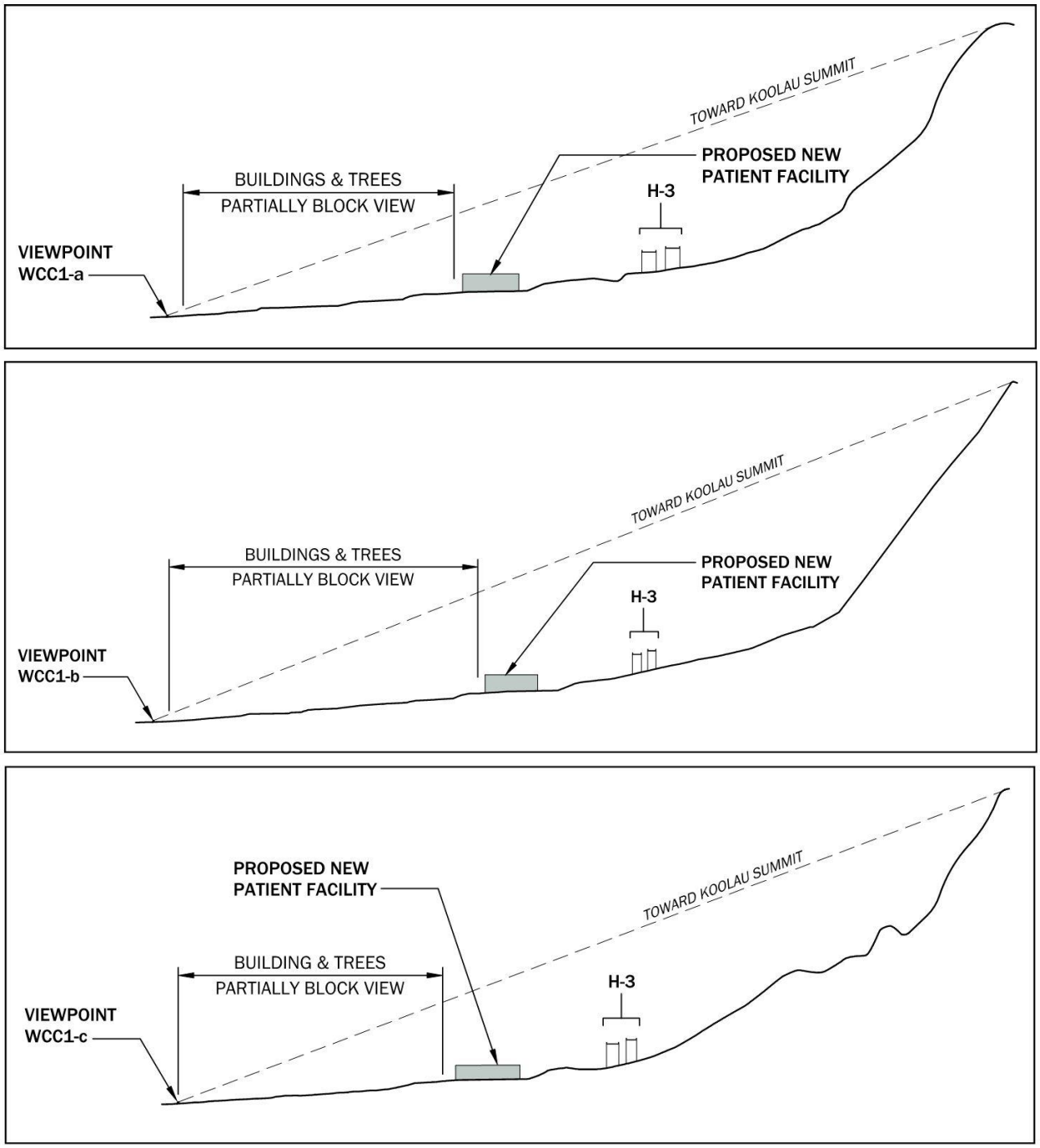

Figure 4-20. Section cut of the view of the NPF against the Ko‘olau Mountains from the Great Lawn (top), behind Hale Alaka‘i (middle), and the northern side of Ala Ko‘olau (bottom)

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Figure 4-21. Existing view toward the Ko‘olau Mountains from the Great Lawn (top) and the same view with a rendering of the completed NPF (bottom)

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Figure 4-22. Existing view toward the Ko‘olau Mountains from behind Hale Alaka‘i (top) and the same view with a rendering of the completed NPF (bottom)

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Moreover, all future campus improvements will be at lower elevations than NPF and it is unlikely that construction of new or improved buildings for the overall campus buildout of improvements will exceed the height of NPF. Nonetheless, as needed, detailed visual impact assessments for these improvements may be completed in the future during the planning and design of each improvement.

- **Major roadways:** The existing Goddard building is visible from a portion of all four major highways that surround the HSH campus, as shown in Figure 4-10 and described below:
  - From Interstate H-3, the rooftop of the Goddard building is partially visible along the view corridor of Kāne‘ohe Bay, as shown on Figure 4-23. However, a large tree blocks most of the view of the Goddard building from Interstate H-3. Also, despite the increase in height of NPF, the facility will still be below the height of the freeway deck and therefore will apparently have no significant visual impact on the view of Kāne‘ohe Bay from Interstate H-3.

Figure 4-23. View toward Kāne‘ohe Bay from Interstate H-3 heading eastbound

The rooftop of the existing Goddard building and existing Guensberg building are partially visible.

  - From Kahekili Highway, the HSH campus is mostly hidden by tall trees between the campus and the highway (see Figure 4-24). It is possible for NPF and future campus improvements to exceed the height of these trees. However, NPF will still be significantly shorter than Interstate H-3 and is proportionally much smaller than the Ko‘olau Mountains behind it. NPF will apparently have little to no significant visual impact on the views of the Ko‘olau Mountains from Kahekili Highway.

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Figure 4-24. View of HSH and the Ko‘olau Mountains behind it from Kahekili Highway and Kea‘ahala Road

– From the intersection of Likelike Highway and Kamehameha Highway, where Windward City is located, the existing Goddard building and other HSH buildings are currently visible, meaning that NPF and other future campus improvements will also be visible. However, the intersection is approximately 1 mile away from HSH and the relative height of the proposed NPF to Interstate H-3 and the Ko‘olau Mountains will still be relatively small, as illustrated by Figure 4-25. Figure 4-26 demonstrates the existing view of the Ko‘olau Mountains from the intersection and a rendered image of the same view of the Ko‘olau Mountains once NPF is complete. Because of the proportion of NPF to the Ko‘olau Mountains, it is unlikely that the facility will have significant visual impact on the views of the Ko‘olau Mountains from the two highways.

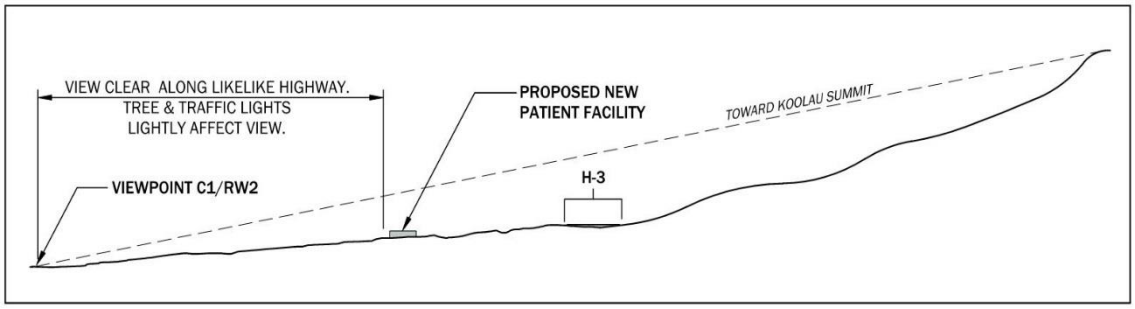

Figure 4-25. Section cut of the view of the NPF against the Ko‘olau Mountains from the intersection of Likelike Highway and Kamehameha Highway, where Windward City is located

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Figure 4-26. Existing view toward the Ko‘olau Mountains from the intersection of Likelike Highway and Kamehameha Highway, where Windward City is located (top), and the same view with a rendering of the completed NPF (bottom)

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Further, all future campus improvements will be at lower elevations than NPF and it is unlikely that construction of new or improved buildings for the overall campus buildout of improvements will exceed the elevation of NPF. It is unlikely that improvements from the overall campus buildout of improvements will have significant visual impact on the views of the Ko‘olau Mountains from this intersection. Nonetheless, as needed, detailed visual impact assessments for these improvements may be completed in the future during the planning and design of each improvement.

While it appears that NPF and overall campus buildout of improvements will likely have little to no significant visual impact on Kāne‘ohe’s scenic resources from either the natural or buildout environments, mitigation measures will be taken to ensure that the visual impact of the HSH improvements on the Kāne‘ohe area will remain low. These measures are discussed in Section 4.9.2.3.

4.9.2.3 Mitigation Measures

During construction, temporary stockpile areas, equipment, vehicles, and BMP materials at HSH may be visible to portions of the Kāne‘ohe area. However, these visual impairments would be short-term and removed upon completion of work. Any potential visual blocks during construction will be taken into consideration during design to mitigate their impact on the community.

There is the potential for the planned facilities of the first phase and overall campus buildout of improvements to have a low visual impact on Kāne‘ohe’s scenic resources from certain vantage points. To mitigate any potential visual impact, the facilities’ architecture and color will be coordinated during the future design phases of the project to account for this possible concern.

In addition, new landscaping and irrigation to maintain this landscaping will be installed for NPF and overall campus buildout of improvements to accommodate future phases of improvements, buffer the facility from neighborhood properties, delineate the HSH property from the WCC campus and the rest of the Kāne‘ohe area, and improve the overall aesthetics of the HSH site (see Appendix M).

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Section 5

Infrastructure and Utilities: Description of Affected Environment, Potential Impacts, and Mitigation Measures

This section describes existing conditions of the infrastructure and utilities that serve HSH. The existing conditions of the utility lines that may be affected by the first phase of construction (the proposed NPF including associated supporting infrastructure) is the main focus of discussion for this section. The existing conditions are based on available information including existing record drawings, site visits, reports, and interviews with HSH staff. Tools, methodologies, and approaches that may be used for further investigation of each utility system are discussed.

This section describes potential impacts on existing infrastructure and utilities due to the project. Mitigation measures, as needed, are also discussed. Engineer's opinions of approximate conceptual probable cost for suggested mitigation measures for various infrastructure and site improvements for both the first phase and overall campus buildouts of improvements at HSH in 2016 U.S. dollars are provided in Appendices N and O. The first phase of improvements is evaluated and used as a unit basis for approximate proportionate projections of the overall campus buildout of improvements because the extents, details, and timing of the future phases are unknown at this time. Based on the 2015 MPU, HSH's capacity will be increased from 178 beds to 516 beds to accommodate the long-term increase in patient census. The proposed emergency generator building, currently under construction, will be incorporated into the evaluation of the project. It is located on the southeast portion of the campus just west (*mauka*) of the site entrance (guard shack) off of Poʻokela Street.

5.1 Roadways, Parking, and Fire Truck Maneuverability

This section describes the roadways, parking, and fire truck maneuverability in the project area, including the affected environment and potential impacts and mitigation measures.

5.1.1 Affected Environment

This section describes the affected environment in the project area, including roadways, parking, and fire truck maneuverability.

5.1.1.1 Roadways

Access to the HSH campus is controlled by a guarded entrance on Ala Koʻolau Road on the southern portion of the site. The primary access to the guard shack is a short road off of Poʻokela Street approximately 0.25 mile south of Poʻokela Street's intersection with Keaʻahala Road (Figure 5-1). A secondary access to the site is via an access road directly off of Keaʻahala Road that runs parallel to and west of Poʻokela Street. The one-way access road services the Hakipuʻu Learning Center and runs along the west of the DOT Baseyard and the Kāneʻohe District Courthouse, connecting

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Kea‘ahala Road to Ala Ko‘olau Road to the north of the HSH guard shack. In addition, a roadway connection exists between HSH and Honeysuckle Road on the WCC campus; however, this connection is gated and closed.

A general field reconnaissance of road pavement conditions was performed in March 2016 to assess the access roads to and around the Goddard building. Based on this assessment, Ala Ko‘olau Road and Kea‘ahala Road appear to be in a good condition. The secondary access road to the Hakipu‘u Learning Center, which is paved with asphaltic concrete (AC), is in poor condition with cracks and poorly patched potholes. The existing access road around the existing Goddard building appears to be considerably distressed with many cracks and will be removed under the ongoing Goddard building demolition project.

Further survey and site verification of the existing condition of the access roads located within the HSH campus that will primarily access the proposed NPF was investigated in May 2016. All HSH road are paved with AC. Asphalt pavement has a variable life depending on the design of the pavement and the service conditions. Typically, AC roads may require rehabilitation after 15 to 20 years.

Figure 5-1 shows overall conditions of the existing HSH roadway that was evaluated. The conditions can be classified into four conditions, which include good, light polish aggregate, severely stressed aggregate, and complete reconstruction conditions. Table 5-1 below summarizes the expected service life for each roadway condition. The aforementioned secondary access road to the site (around 830 feet long from Kea‘ahala Road) that connects Kea‘ahala Road to Ala Ko‘olau Road is the only pavement area that is severely cracked and deteriorated. The other area of the road that was classified as “severely stressed aggregate condition” is the road portion located between Hina Mauka and DOT Baseyard. Pikake Road near the connection to Ala Ko‘olau Road and Ala Ko‘olau Road are showing some initial signs of distress, which was classified as “light polish aggregate condition.”

Table 5-1. Overall Roadway Conditions and Expected Service Life

Condition Description	Expected Service Life
Good condition	Original expected service life
Light polish aggregate	6–10 years
Severely stressed aggregate	3–6 years
Complete reconstruction	1–3 years

In addition to the overall conditions evaluations, a localized conditions assessment was performed. Table 5-2 below summarizes the existing localized conditions at each area that was numbered. The area of each localized pavement condition can be seen on Figure 5-1. This table also provides detailed conditions and expected service life of each localized area.

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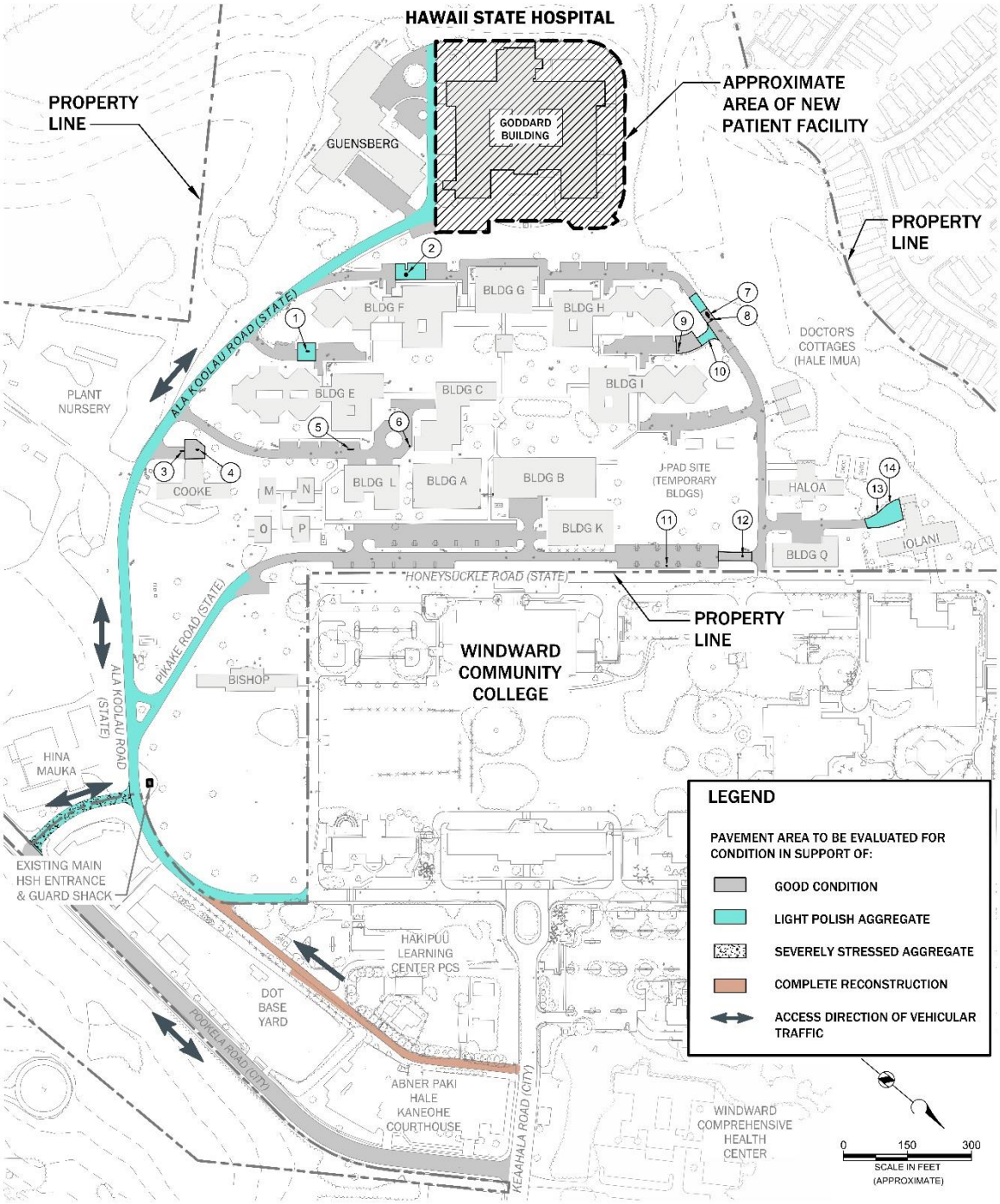

Figure 5-1. Existing roadway pavement condition

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Table 5-2. Supplemental Notes on Existing Pavement Condition and Expected Service Life

Keynote #	Condition Description	Expected Service Life of Localized Area
1	8.5' x 2.5'; light fatigue (alligator cracking), light water bleeding and pumping	6–10 years
2	2' x 1'; light fatigue (alligator cracking), light water bleeding and pumping	6–10 years
3	4' x 2.5'; light polished aggregate, light fatigue (alligator cracking)	Original expected service life
4	2.5' x 1'; existing cold mix patch—moderate tire shoving	1–3 years
5	31' x 1'; light raveling (loosening of fine surface aggregate) along construction joint overlay	Original expected service life
6	3' x 2.5'; light raveling (loosening of fine surface aggregate)	Original expected service life
7	12' x 4"; light fatigue (alligator cracking), light water bleeding and pumping along construction joint	6–10 years
8	4.5' x 3.5'; moderate severity pothole—severe fatigue (alligator cracking), moderate water bleeding and pumping	1–3 years
9	4' x 1.5'; light fatigue (alligator cracking), light water bleeding and pumping	6–10 years
10	3.5' x 2'; low-severity pothole—severe fatigue (alligator cracking), light water bleeding and pumping	3–5 years
11	2.5' x 2.5'; light polished aggregate, light raveling (loosening of fine surface aggregate)	Original expected service life
12	4' x 3.5'; low severity pothole—moderate fatigue (alligator cracking), light water bleeding and pumping	3–5 years
13	27' x entire width of roadway; severe polishing and moderate raveling (loss of fine aggregate, exposed coarse aggregate), trench cut and patch across area	6–10 years
14	55' x entire width of roadway; severe fatigue (alligator cracking), severe longitudinal cracking, severe raveling (loss of coarse aggregate), trench cut and patch across area	3–5 years

5.1.1.2 Parking

The 2015 MPU identified two potential areas for future additional parking lots, known as Zones 14 and 15, to accommodate the proposed NPF and other future improvement phases. Zone 14 is the open land area northeast and *makai* of the existing Goddard building and west and *mauka* of Hale Imua. Zone 15 is the open land area located to the east of the Guensberg building. Refer to Figure 3-10 in the 2015 MPU for the approximate locations of Zones 14 and 15. A site investigation was performed in May 2016 to assess the viability of Zones 14 and 15 as future parking areas. Zone 14 was found to be an open land with a slope of approximately 7 percent covered with dense vegetation including tall grasses about 3 feet high, shrubs, and trees. Zone 15 is an open lawn area with an average slope of 8 percent and has some tall trees and a stormwater outlet structure. Site preparation (e.g., clearing, grubbing, and grading) for Zones 14 and 15 will need to occur prior to conversion into a parking lot. Another possible location for additional parking is the DOT Baseyard

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located adjacent to the HSH entrance on the southeastern portion of the site. This potential site is relatively flat and would require fewer site improvement efforts to construct a new parking area than Zones 14 and 15 would need. Presently, DOH is in the process to request land ownership of this area back from DOT. Zones 14 and 15 are relatively closer to the proposed NPF than the DOT Baseyard; however, site preparation at the DOT Baseyard prior to construction would be less than that for Zones 14 and 15.

5.1.1.3 Fire Truck Maneuverability

A fire truck maneuverability study was performed based on the Honolulu Fire Department (HFD) *Fire Code* (including Fire Apparatus Roads and Onsite Fire Hydrants Guidelines) to investigate the existing roadway, beginning from site entrances as shown on Figure 5-2 to all existing buildings. This is to ensure that fire trucks can travel to all buildings when responding to emergencies and access to all fire hydrants when a fire happens. The fire truck dimensions for the maneuverability study were based on the biggest size of fire truck that was used at HFD’s two Kāne‘ohe stations—Stations 17 and 37 (the nearest emergency-responding HFD station)—as discussed in Section 6.4.1.2.2 of this DEIS. The truck dimension information is shown on Figures 5-3 to 5-7, which was used to develop a design vehicle to be used in the AutoDesk tracking module of computer-aided design (CAD). The problem areas that do not have enough spaces for the fire truck to travel and turn are indicated on Figures 5-5 to 5-7. Table 5-3 summarizes areas where fire truck maneuverability problems were found.

Table 5-3. Fire Truck Maneuverability Problem Areas

Location Description	Problems
Access road along Building G as shown on Figure 5-5	Fire truck cannot make a 90-degree turn on both corner
Access road located between Buildings E and F as shown on Figure 5-6	Fire truck cannot make a U-turn to leave the area and need to back out
Access road located between Buildings I and H as shown on Figure 5-7	Fire truck cannot make a U-turn to leave the area and need to back out
Access road located between Building I and J-pad site as shown on Figure 5-7	Fire truck cannot make a U-turn to leave the area and need to back out
Access road near ‘Iolani Building as shown on Figure 5-7	Fire truck cannot make a U-turn to leave the area and need to back out

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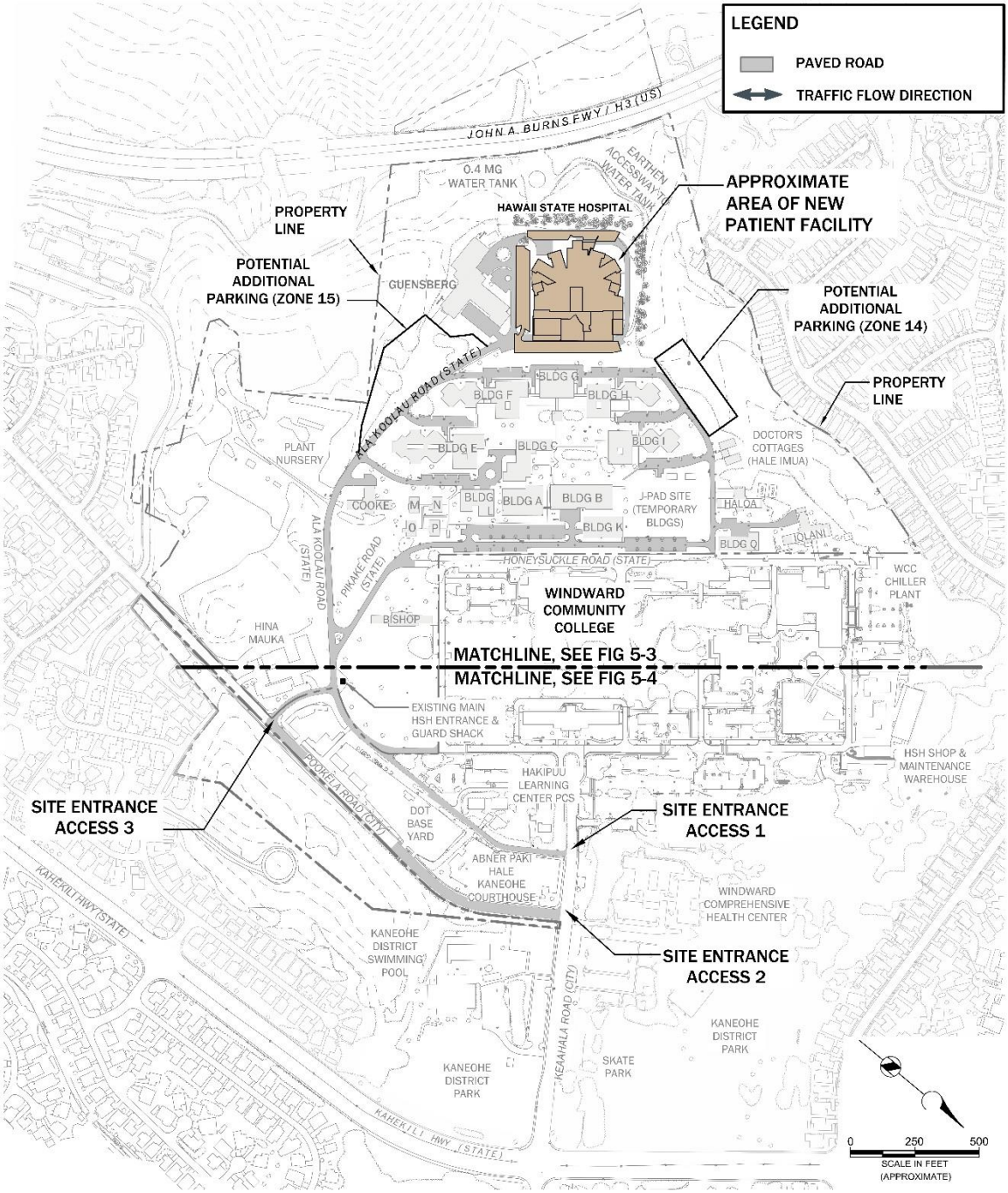

Figure 5-2. Fire truck maneuverability: key map

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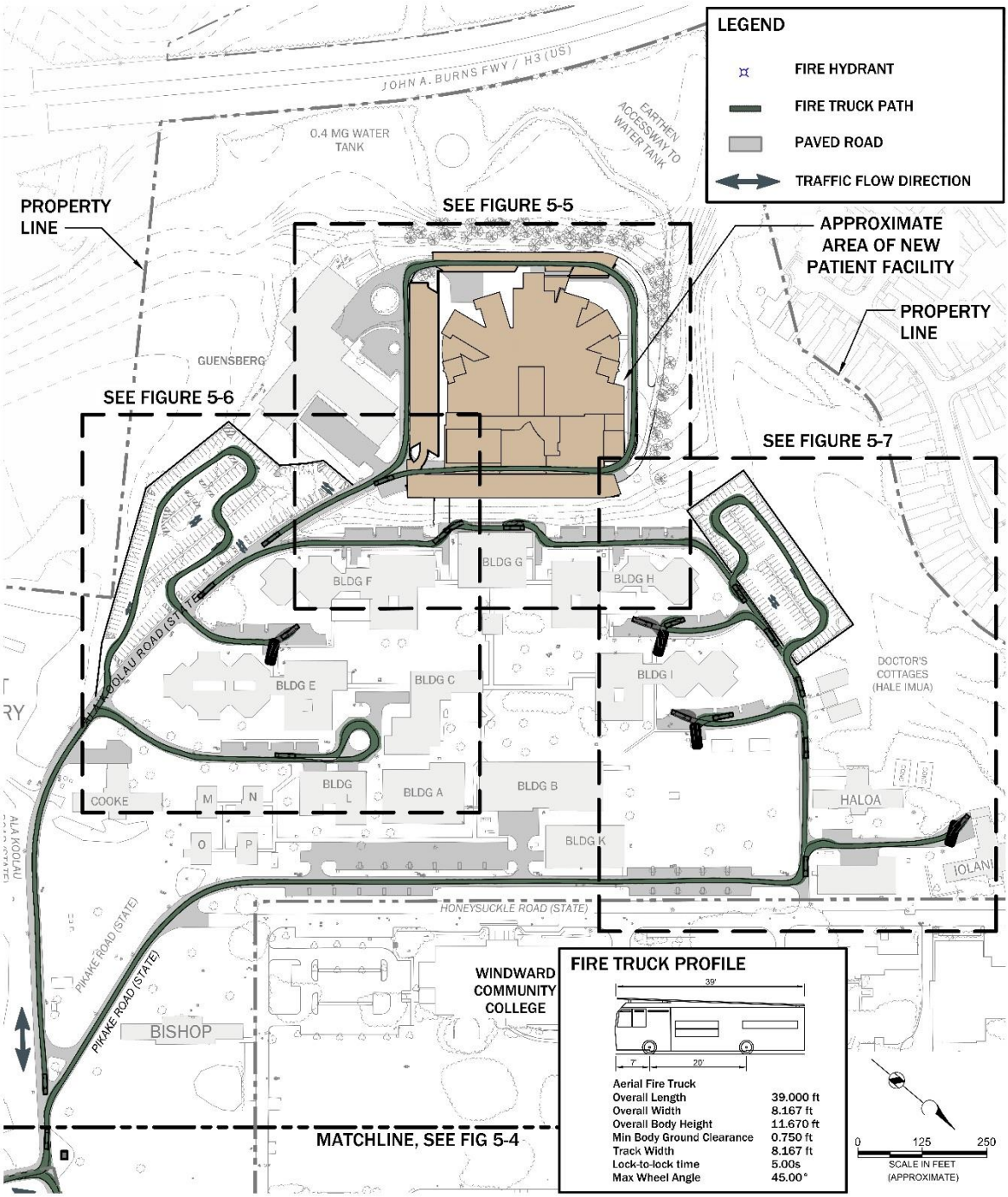

Figure 5-3. Fire truck maneuverability: *mauka*

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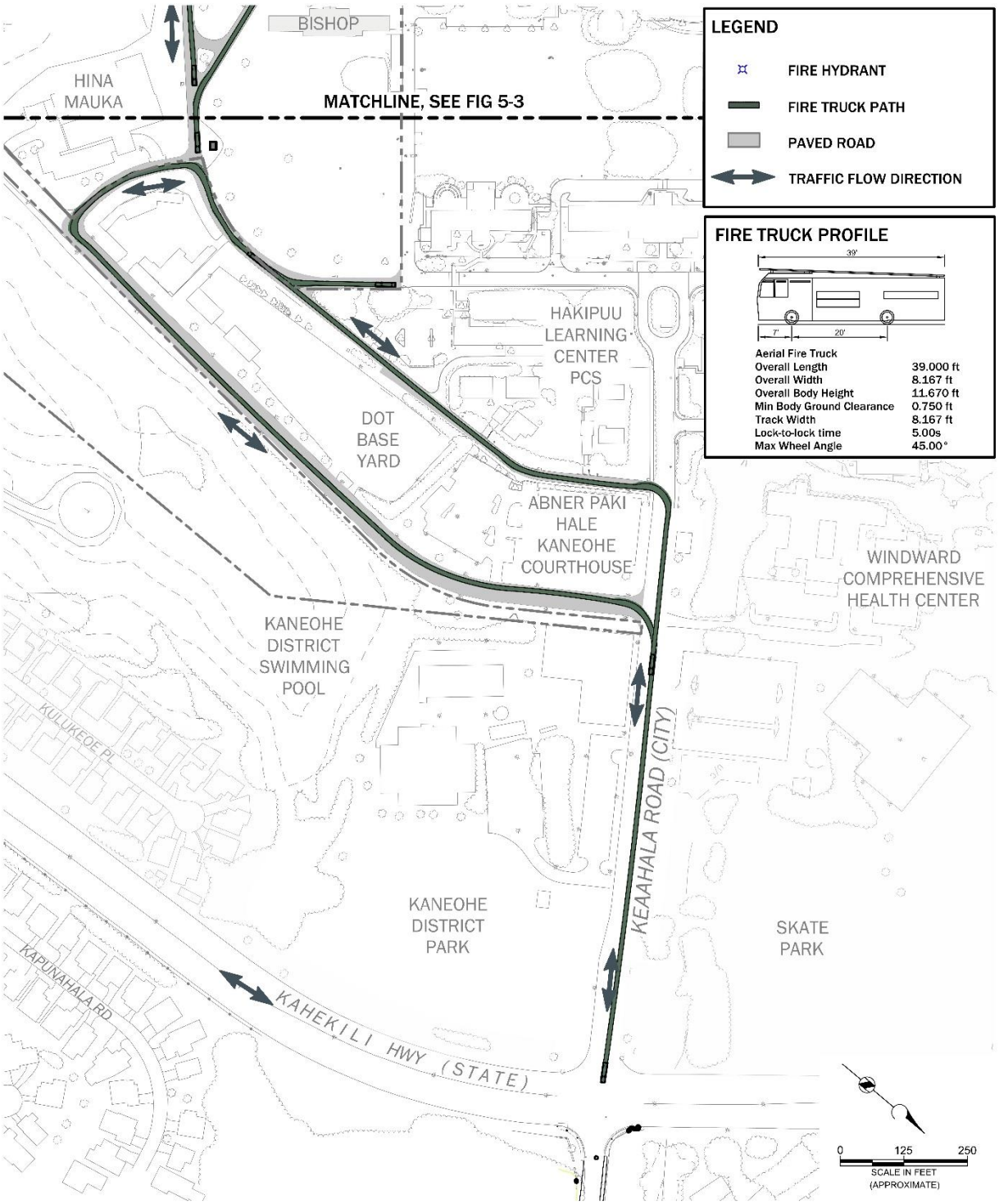

Figure 5-4. Fire truck maneuverability: *makai*

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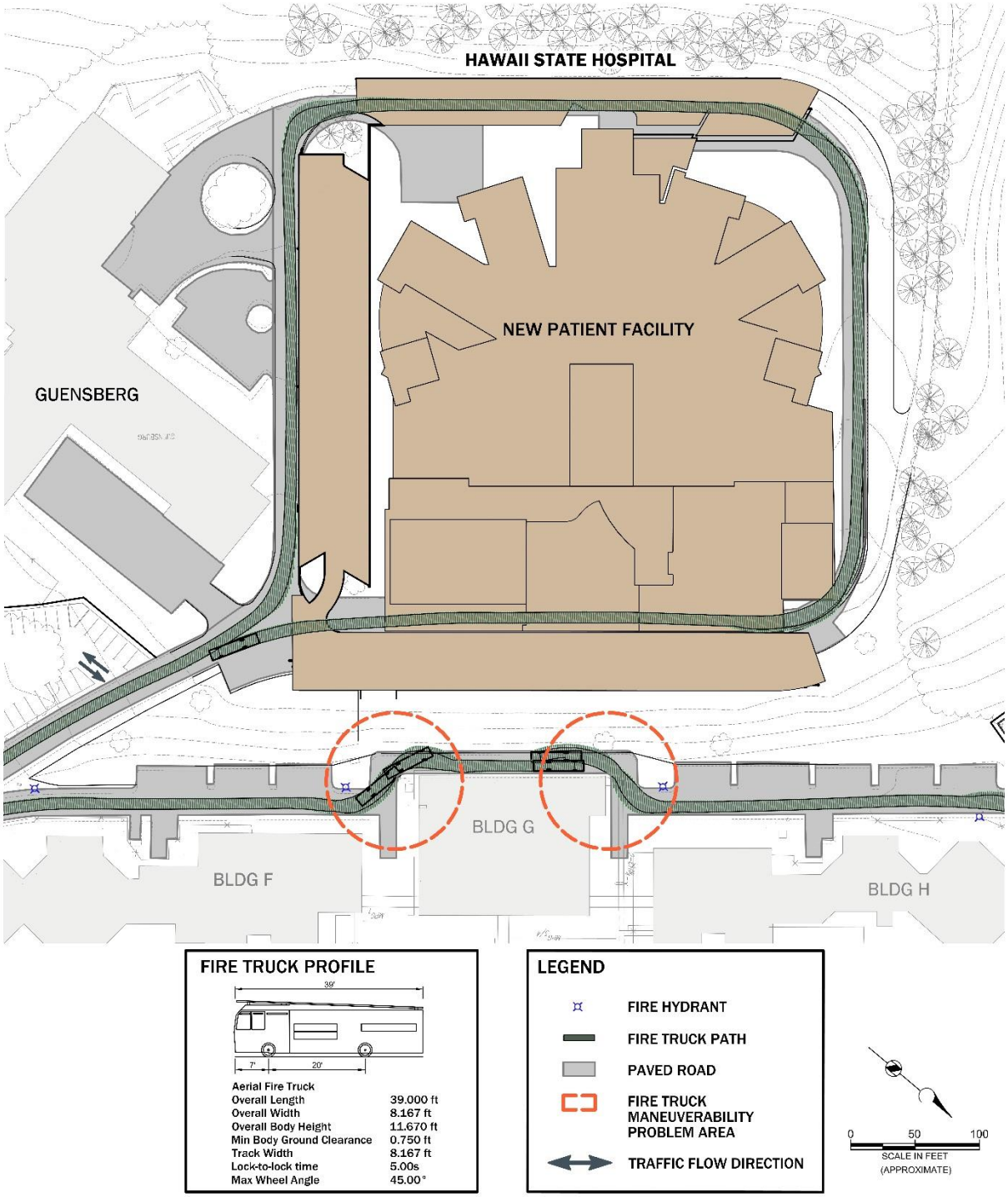

Figure 5-5. Fire truck maneuverability: problem area 1

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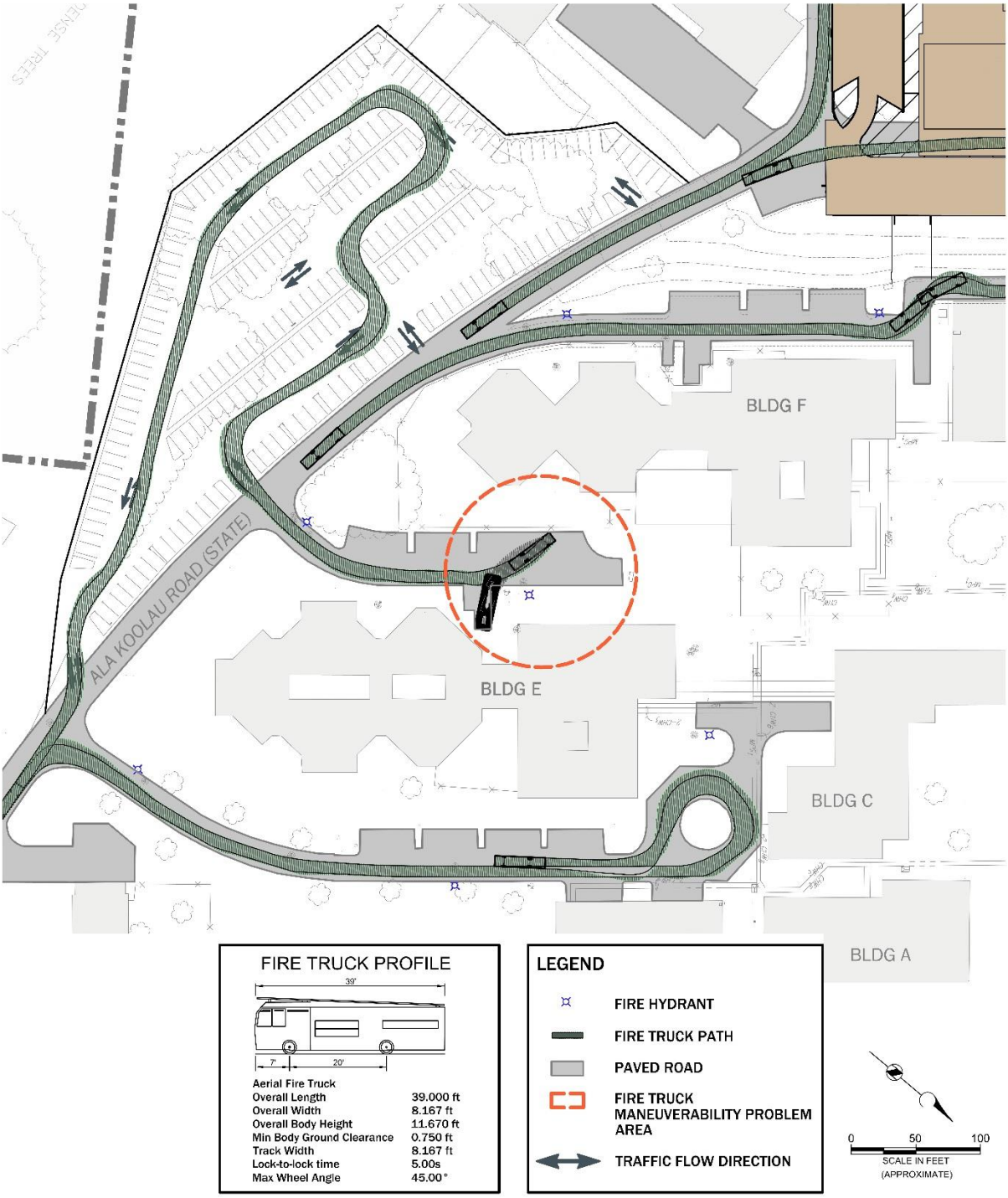

Figure 5-6. Fire truck maneuverability: problem area 2

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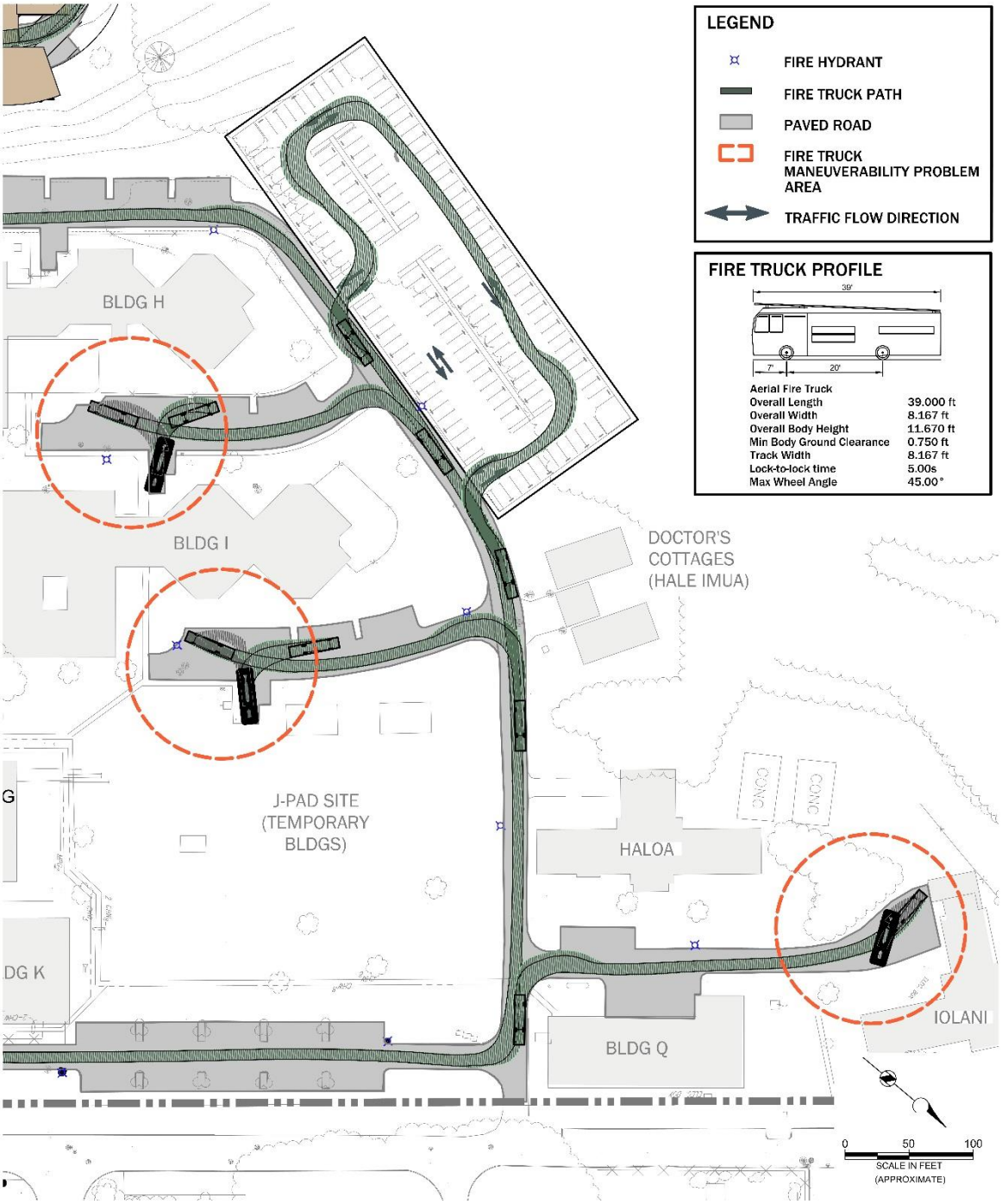

Figure 5-7. Fire truck maneuverability: problem area 3

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5.1.2 Potential Impacts and Mitigation Measures: Roadways

This section describes potential impacts and mitigation measures in the project area, including roadways, parking, and fire truck maneuverability.

5.1.2.1 Roadways

As part of the first phase of the project, new AC pavement will be installed around the NPF based on the site layout for the proposed facility as shown on Figure 5-8.

All existing site accessways and HSH's portion of Ala Ko‘olau Road, which will support operations of the NPF, were visually assessed in May 2016. The roadway pavement throughout HSH was resurfaced a few years ago and is in relatively good, stable condition with some observed localized distressed areas. Thus, based on the visual assessment, the proposed resurfacing and reconstruction improvements to it are not vital for the NPF. However, local repairs may be completed in the future if the pavement distress worsens to a point where a potential concern to driver comfort and safety or vehicle damage develops, as summarized in Tables 5-4 and 5-5 for overall and localized roadway conditions, respectively. Although highly dependent on, and influenced by, many factors including, but not limited to—weather, localized subsurface conditions, workmanship of installation, frequency of routined maintenance and levels of traffic, typical service life expectancies of resurfaced and reconstructed pavements average approximately 8–15 years and 15–25 years, respectively.

The aforementioned secondary access road to the site (around 830 feet long from Kea‘ahala Road) that connects Kea‘ahala Road to Ala Ko‘olau Road that is severely cracked and deteriorated should be totally reconstructed within a 3-year time frame. The road portion located between Hina Mauka and the DOT Baseyard that was classified as "severely stressed aggregate condition" should be resurfaced within a 6-year time frame. The Pikake Road near the connection to Ala Ko‘olau Road and Ala Ko‘olau Road, which is showing some initial signs of distress and was classified as "light polish aggregate condition," should be resurfaced within a 10-year time frame. Other roadway areas, including access roads to all existing HSH buildings and Po‘okela Street, are in good condition and no recommended repair is needed. However, localized repair as summarized in Table 5-5 should still be performed.

In addition to improving or repairing any distressed AC pavement, the DEIS explored the need for possible accessway widening or extension/modification within the HSH property as needed to mitigate any adverse impacts of the first phase of improvements on local traffic based on the results of the traffic forecast and impact analysis discussed in Section 4.6 of this DEIS. It was found that the widening or extension/modification of the existing road that provides access to the NPF is not needed; however, in order to meet fire truck maneuverability requirements, some access road areas need to be widened or extended.

Figure 5-8 shows areas that need to be improved based on the conditions of the pavement. The recommended pavement improvements include reconstruction, resurfacing, and localized resurfacing.

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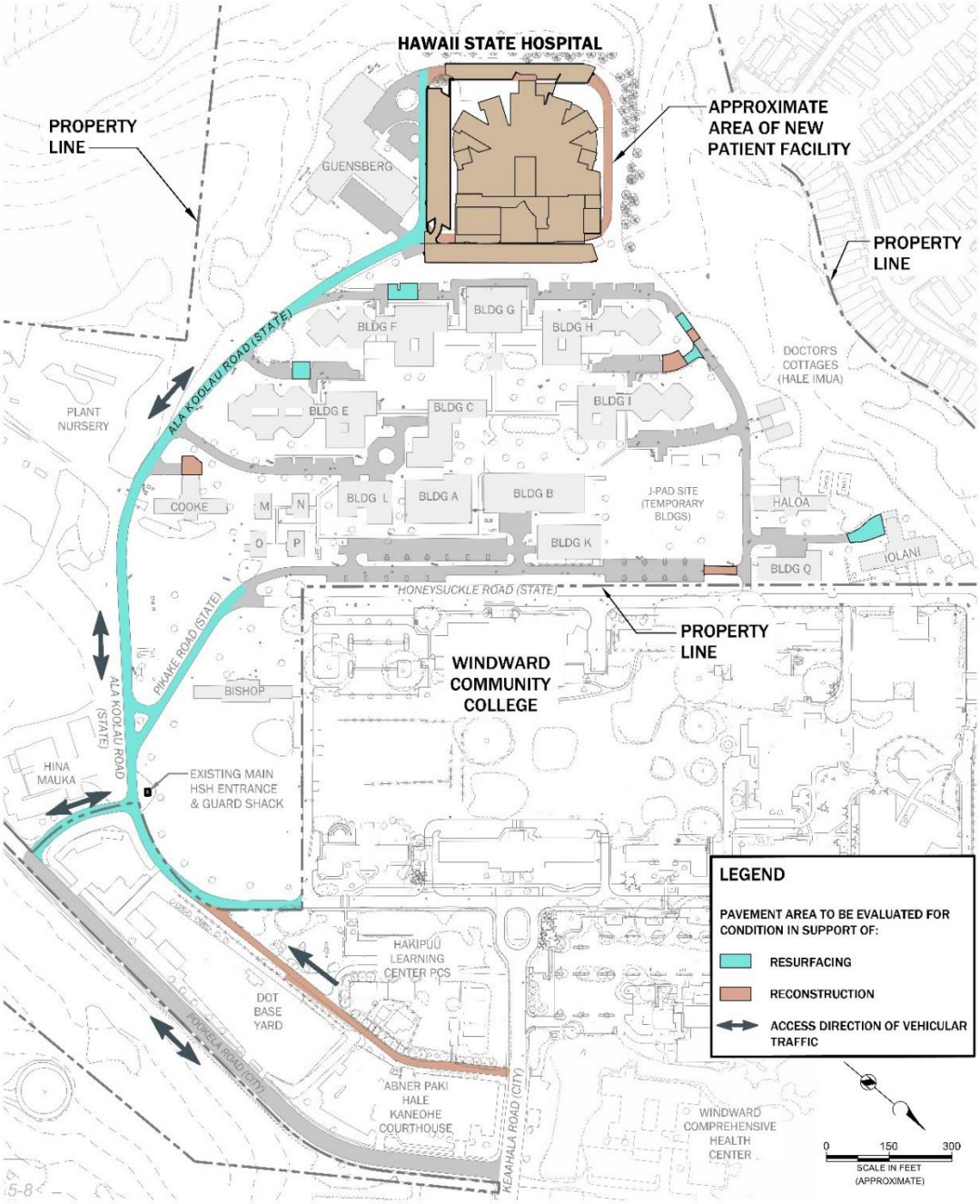

Figure 5-8. Roadway pavement for first phase of site improvements

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Tables 5-4 and 5-5 below summarize the recommended roadway improvements for the first phase.

Table 5-4. Overall Roadway Conditions and Recommended Repairs

Condition Description	Recommended Repair
Good condition	No action needed
Light polish aggregate	Resurfacing within 6–10 years
Severely stressed aggregate	Resurfacing within 3–6 years
Complete reconstruction	Reconstruction

Table 5-5. Localized Roadway Conditions and Recommended Repairs

Keynote	Condition Description	Recommended Repair
1	8.5' x 2.5'; light fatigue (alligator cracking), light water bleeding and pumping	Localized resurfacing, as needed
2	2' x 1'; light fatigue (alligator cracking), light water bleeding and pumping	Localized resurfacing, as needed
3	4' x 2.5'; light polished aggregate, light fatigue (alligator cracking)	No action needed
4	2.5' x 1'; existing cold mix patch—moderate tire shoving	Localized reconstruction
5	31' x 1'; light raveling (loosening of fine surface aggregate) along construction joint overlay	No action needed
6	3' x 2.5'; light raveling (loosening of fine surface aggregate)	No action needed
7	12' x 4"; light fatigue (alligator cracking), light water bleeding and pumping along construction joint	Localized resurfacing, as needed
8	4.5' x 3.5'; moderate severity pothole—severe fatigue (alligator cracking), moderate water bleeding and pumping	Localized reconstruction
9	4' x 1.5'; light fatigue (alligator cracking), light water bleeding and pumping	Localized resurfacing, as needed
10	3.5' x 2'; low severity pothole—severe fatigue (alligator cracking), light water bleeding and pumping	Localized reconstruction
11	2.5' x 2.5'; light polished aggregate, light raveling (loosening of fine surface aggregate)	No action needed
12	4' x 3.5'; low severity pothole—moderate fatigue (alligator cracking), light water bleeding and pumping	Localized reconstruction
13	27' x entire width of roadway; severe polishing and moderate raveling (loss of fine aggregate, exposed coarse aggregate), trench cut and patch across area	Resurface
14	55' x entire width of roadway; severe fatigue (alligator cracking), severe longitudinal cracking, severe raveling (loss of coarse aggregate), trench cut and patch across area	Resurface

The roadway assessment for the long-term, overall campus buildout of improvements at HSH was also performed as part of this DEIS. The assessment was conducted based on the proposed layout of the new buildings as shown on Figure 5-9 below. The objective of this assessment is to provide recommended roadway modification and realignment to accommodate an accessway to the new building. However, the condition should be reevaluated when the timing and details of the future improvement work are known.

Design of the recommended AC pavement improvements shall be in conformance with the latest editions of the *Hawai‘i Statewide Uniform Design Manual for Streets and Highways and Standard Plans*, and the City’s *Standard Details for Public Works Construction*, and *Standard Specifications for Public Works Construction*, all as amended. Figure 5-9 shows areas that need to be improved for the long-term, overall campus buildout of improvements at HSH.

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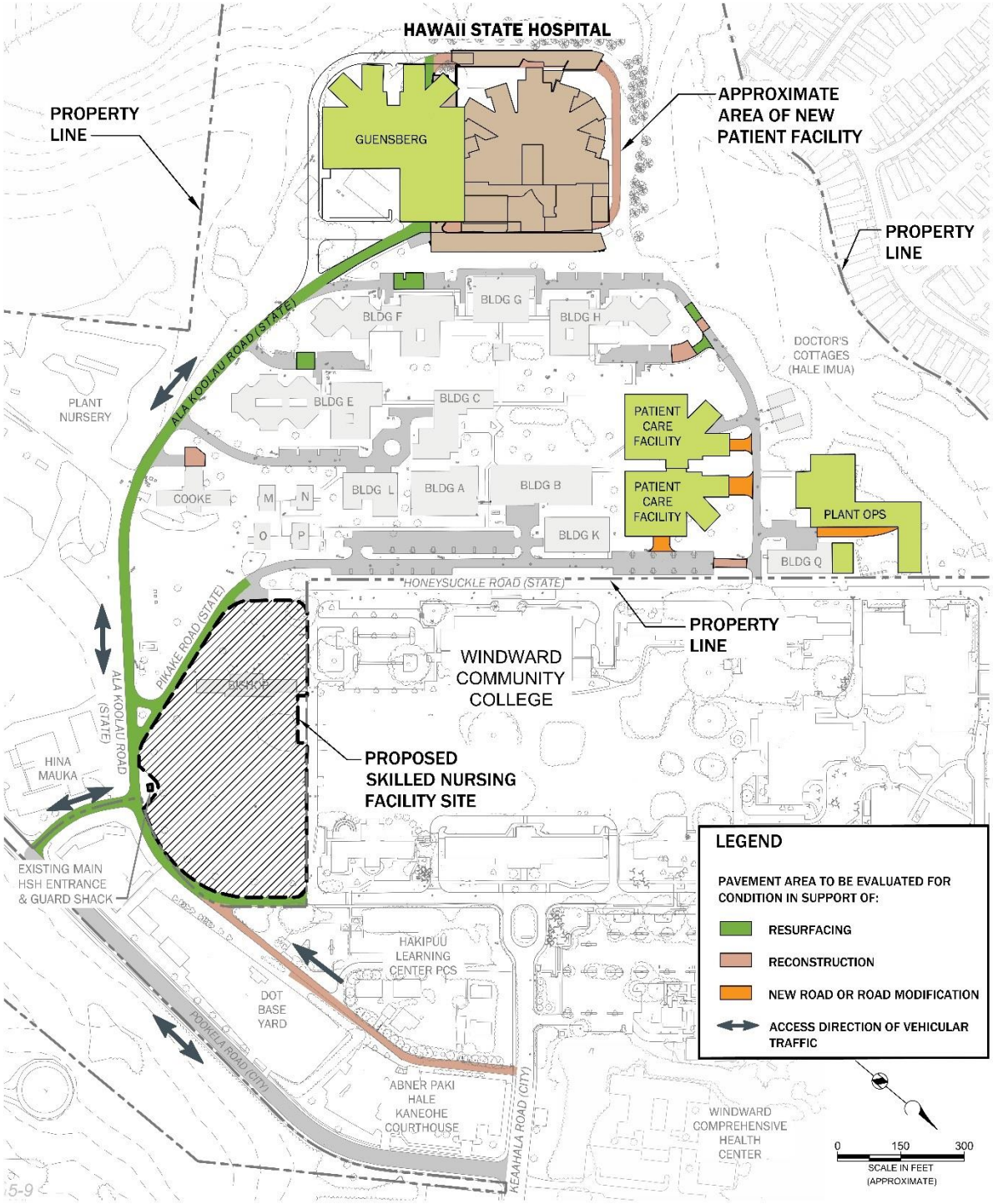

Figure 5-9. Roadway pavement for full buildout of campus improvements

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5.1.2.2 Parking

With regard to the NPF's impact on existing parking, current and projected off-street parking demands for the first phase and full buildout were determined via a parking demand evaluation in conjunction with ROH Chapter 21, Article 6, Off-Street Parking and Loading. The parking demand evaluation included the collection of 24-hour tube counts along the roadways near the guard shack and Ala Ko‘olau near NPF and counting the existing parking stalls within the HSH property. Further details on the evaluation are discussed in Section 4.6, Vehicular Traffic.

Based on the parking evaluation, the proposed 144-bed NPF will likely require 255 additional parking stalls. Three new parking areas are planned to mitigate this increased parking demand. The first parking area will have 97 new parking stalls located at the NPF (see Figure 5-10). Figure 5-10 shows the conceptual layout of this future parking lot, including locations of stalls, aisles, wheel stops, and light posts. Figure 5-10 also shows the four accessible parking stalls as required by Table 208.2 of the 2010 ADA Standard for Accessible Design.

The second and third proposed parking areas will be located at Zones 14 and 15, as discussed in Section 5.1.1, and will contain 200 and 133 parking spaces, respectively. These include the six accessible parking stalls at Zone 14 and the give accessible parking stalls at Zone 15, as required by Table 208.2 of the 2010 ADA Standard for Accessible Design. Figures 5-11 and 5-12 show conceptual layouts of the future parking lots at Zones 14 and 15, including locations of stalls, aisles, ingress/egress driveway off accessways, concrete wheel stops, canopy tree wells, light posts, stormwater drainage structures, and proposed sidewalk layouts to the proposed NPF. The design phase will further explore these and other details for parking at Zones 14 and 15, including potential retaining walls to limit excavation and embankment and stormwater drainage plans as discussed in Section 5.5.

The proposed total of 430 parking stalls will be more than adequate for the NPF and there will be no adverse impacts on the existing parking capacity. In addition, the extra 175 parking stalls could be available for future improvement phases.

For the overall campus buildout of improvements at HSH excluding SNF, 973 additional parking stalls are required based on the results of the parking evaluation. Based on 2015 MPU, potential additional parking areas besides Zones 14 and 15 for future improvements are Zone 7 (DOT Baseyard area), Zone 8 (Cooke building and four Transitional Care Cottages area), and Zone 10 (empty lot area located along the east side of Po‘okela Street). It is expected that these three zone areas should be sufficient to provide additional parking stalls for the overall campus buildout of improvements and no significant adverse impacts are anticipated. However, further conceptual parking stalls design should be performed when the timing and details of the future improvement work are known.

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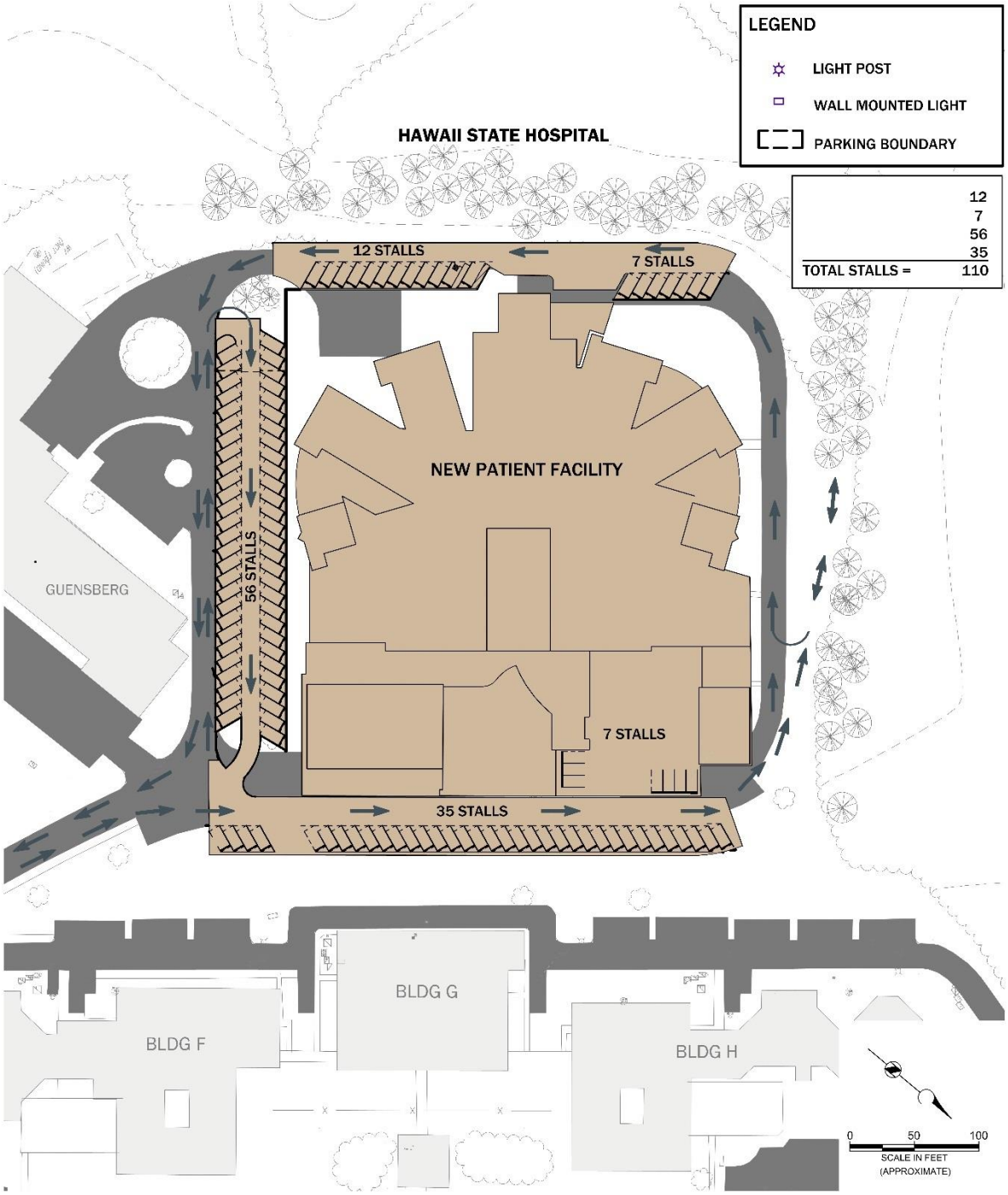

Figure 5-10. Proposed NPF parking: one-way traffic

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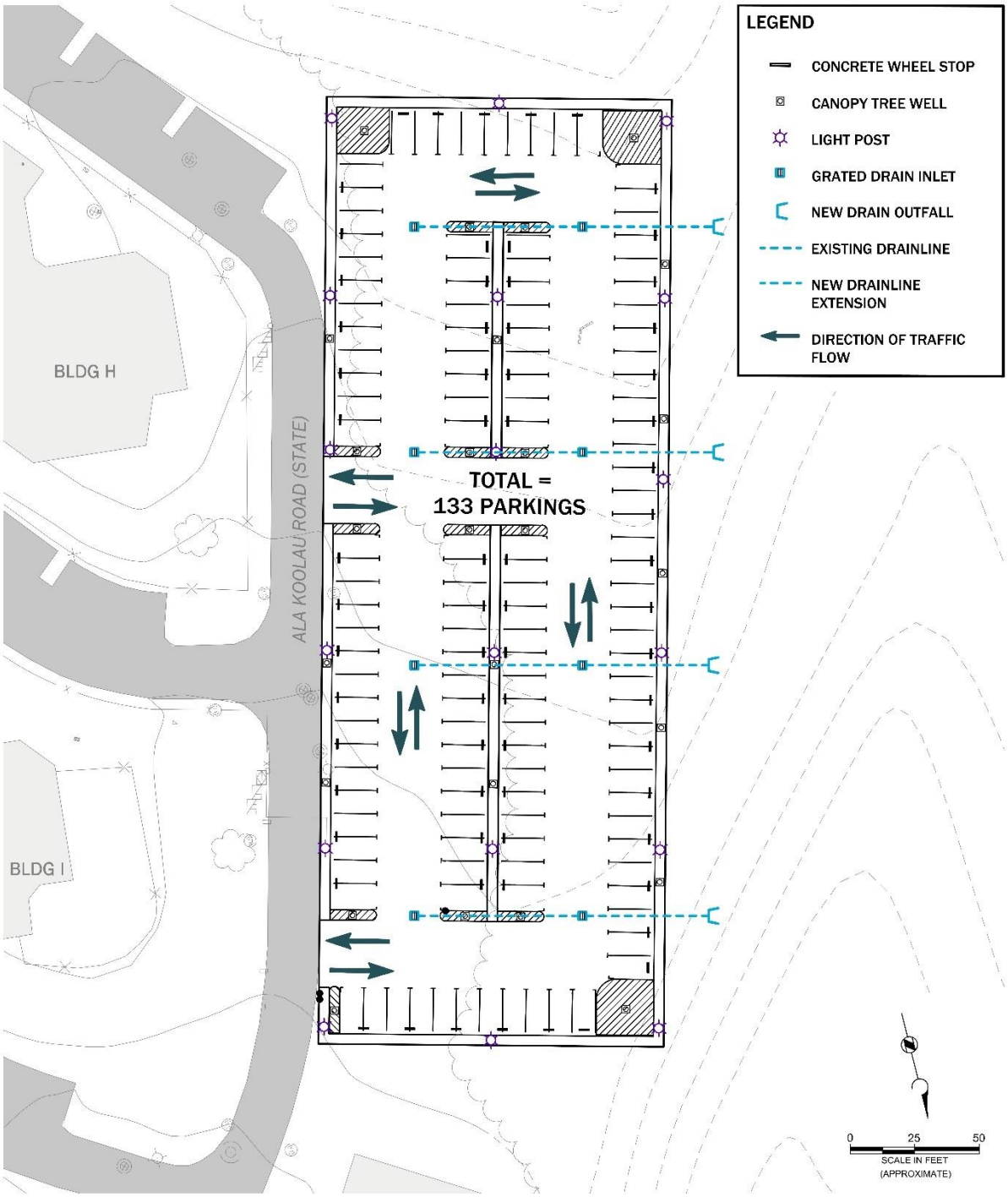

Figure 5-11. Potential additional parking: HSH 2015 MPU Planning Zone 14

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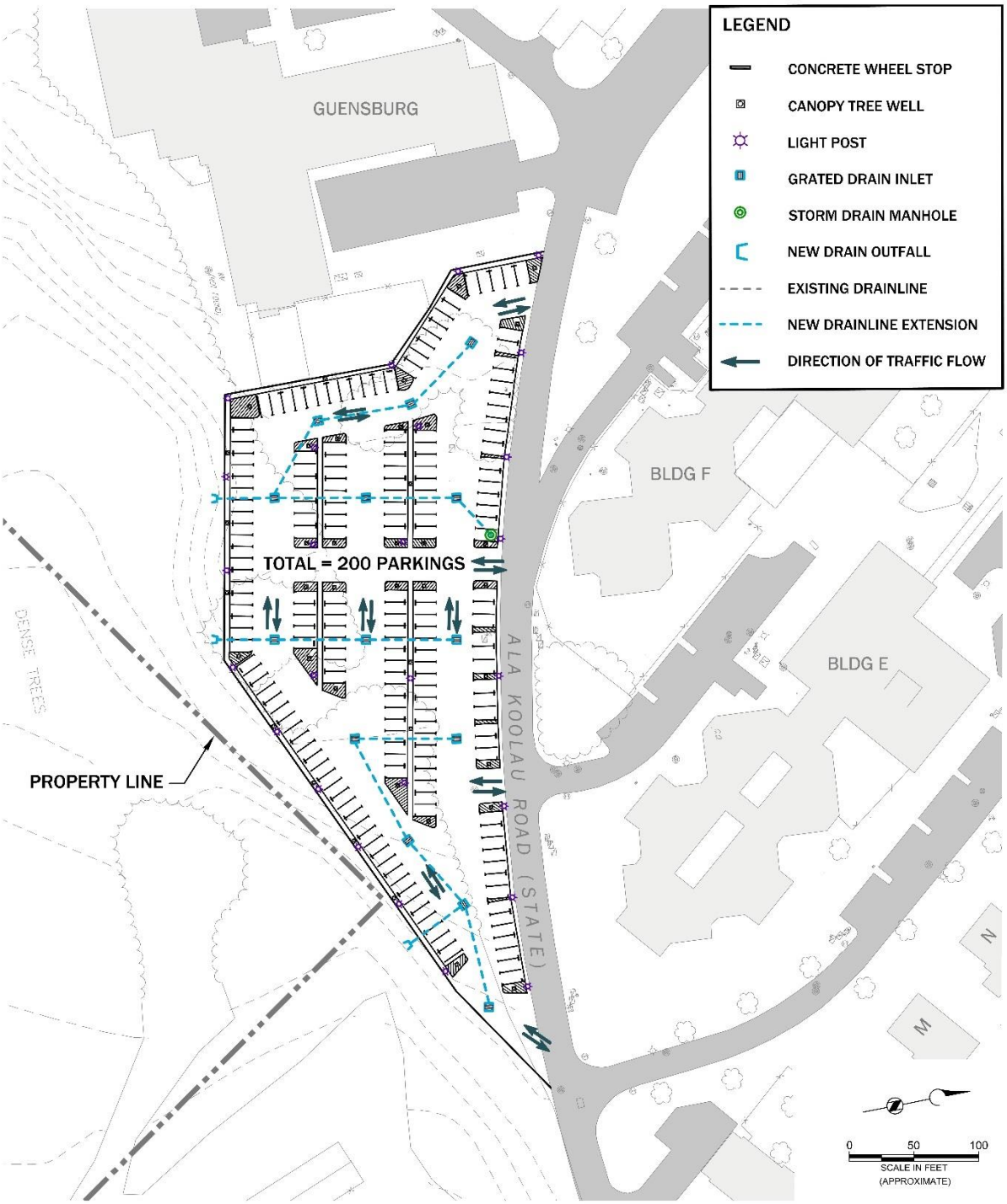

Figure 5-12. Potential additional parking: HSH 2015 MPU Planning Zone 15

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5.1.2.3 Fire Truck Maneuverability

Conceptual layouts of new proposed roadways and accessways to connect existing roadways to the new facilities of the first phase, including additional parking (Zones 14 and 15) as shown on Figures 5-2 to 5-7 were created based upon the fire truck dimensions and HFD *Fire Code* (including Fire Apparatus Roads and Onsite Fire Hydrants Guidelines) as mentioned in Section 6.4.1.2.2 to ensure that new roadways and/or accessways have enough space for the fire truck to travel and/or turn from the existing roadway to the new facilities. The details of the recommended improvements for the new roadways and accesses are summarized in Table 5-6.

Table 5-6. Recommended Improvements for Problem Areas

Location Description	Problems	Recommended Improvements
Access road along Building G as shown on Figure 5-5	Fire truck cannot make a 90-degree turn on both corners	The 90-degree corner of the road should be widened
Access road located between Buildings E and F as shown on Figure 5-6	Fire truck cannot make a U-turn to leave the area and need to back out	If possible, the dead end of the access road area should be expanded to create enough turning space for the fire truck
Access road located between Buildings I and H as shown on Figure 5-7	Fire truck cannot make a U-turn to leave the area and need to back out	If possible, the dead end of the access road area should be expanded to create enough turning space for the fire truck
Access road located between Building I and J-pad site as shown on Figure 5-7	Fire truck cannot make a U-turn to leave the area and need to back out	If possible, the dead end of the access road area should be expanded to create enough turning space for the fire truck
Access road near ‘Iolani Building as shown on Figure 5-7	Fire truck cannot make a U-turn to leave the area and need to back out	If possible, the dead end of the access road area should be expanded to create enough turning space for the fire truck

For overall campus buildout of improvement, a fire truck maneuverability study should be performed when more details of the future improvement work are known.

5.2 Potable and Fire Water

This section describes the potable and fire water in the project area, including the affected environment and potential impacts and mitigation measures.

5.2.1 Affected Environment

Water is provided to the HSH campus via a large HBWS service main (16-inch-diameter water line) that comes from the adjacent residential neighborhood (south-to-north flow). The HSH water system is metered separately from the WCC water system at the northwest corner of the HSH campus, just northeast of the ‘Iolani building and adjacent to the WCC chiller building. The HSH water comes through a 4-inch connection from the HBWS 16-inch-diameter water line, and flows through a 4-inch compound meter and reduced pressure principle backflow preventer. Downstream of the backflow preventer, flow splits into two directions: one 6-inch-diameter pipe flows upslope to the HSH campus, while a second 6-inch-diameter (or 8-inch-diameter pipe; record drawings were not available) flows downslope through a pressure-reducing valve and provides water to the HSH maintenance baseyard area.

According to both HSH and WCC utility maintenance staff, the HSH water system was separated from WCC approximately 15 years ago. There should be no interconnections between the two water systems. The HSH water system does provide water for WCC agricultural facilities *makai* of the

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maintenance baseyard, but it is submetered and subtracted from the HSH water bill. There is no landscape irrigation system on site. Water usage data at the HSH campus from July 2014 through July 2015 were provided by past HBWS water bills. During that period, the average water usage was 59,400 gallons per day (gpd) (41 gallons per minute [gpm]) with an estimated population of 562. The average per capita demand is 106 gpd.

The existing HSH potable water system piping layout, illustrated in Figure 5-13, was created based on available information from the 2005 MP, 2015 MPU, available topographic survey maps, record drawings, information from HSH staff, and field observations of aboveground features such as fire hydrants and valve box locations. The piping layout shown on the figure and information on pipe materials, sizes, alignments, approximate age, and connection and splitting points, were obtained from available record drawings.

The HSH site is serviced by a looped potable water system (combinations of 6- and 8-inch-diameter water lines and valves) of service mains. A larger loop encompasses most of the site, and smaller interior loops divide the larger loop. Loops encircle the following buildings:

- Buildings A, B, C, K, L, M, N, O, and P
- Buildings D, F, and G
- Building E
- Building H
- Building I

Other buildings are outside of the looped areas but are still served by the mains. These main lines are either 6- or 8-inch-diameter lines as shown Figure 5-13. The looped distribution system allows for water to be drawn from multiple directions and minimizes the potential for service disruptions should a problem, such as a break, occur somewhere in the mains. Record plans indicate that the pipe materials are mostly ductile iron, with some older cast-iron pipes. The pipes in the vicinity of Buildings A through P are ductile iron, installed in the late 1990s/early 2000s. The other pipes are generally older cast-iron pipes, dating back to the 1940s and 1950s. HSH plumbing staff has reported occasional breaks on pipes of all ages, indicating that age is not a reliable predictor of pipe condition.

The existing 400,000-gallon bolted glass-fused-to-steel water storage tank was installed in 2013 to replace an older tank, and is in good condition. There is about 9 days’ worth of storage in the tank located at the west end and high point of the site to provide potable water during any regular HBWS service downtime. Water is not pumped into the tank, but is filled by system pressure. To mitigate the buildup of stagnant water in the tank, the tank is scheduled to be drawn upon once a month, and the stored water is used in parallel with the water from the main distribution system. Once the tank is drawn down to 25 percent of its full capacity, the tank is refilled with fresh water from the main distribution system to complete the monthly water stagnation prevention program.

An 8-inch tee is located in a valve vault on the west side of the Guensberg building that branches between the water tank and the Guensberg and Goddard buildings. One branch runs directly to the Goddard building. The other branch provides water to the Guensberg building and continues downslope along the southeast side of the HSH campus, leading to another tee and valve vault near the Cooke building. One branch at this vault appears to be a 6-inch-diameter water line from an old water well and abandoned pump house that previously served as the primary water source for HSH. The other branch appears to connect to the water distribution loop for the HSH campus.

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5.2.1.1 Fire Hydrant Coverage and Fire Flow

Twenty-two fire hydrants are located throughout the HSH campus, spaced at approximately 250 feet apart along the roadways (see Figure 5-14). The hydrants appear to be in good condition. Figure 5-15 shows the existing fire department building access coverage.The Guensberg building and Buildings E, F, H, and I are fully sprinklered, while others such as Buildings B and C are partially sprinklered. The Guensberg building and Buildings B, E, F, H, I, and L also have fire department connections available. The older buildings (Cooke, Bishop, Hāloa, and ‘Iolani) are not sprinklered.

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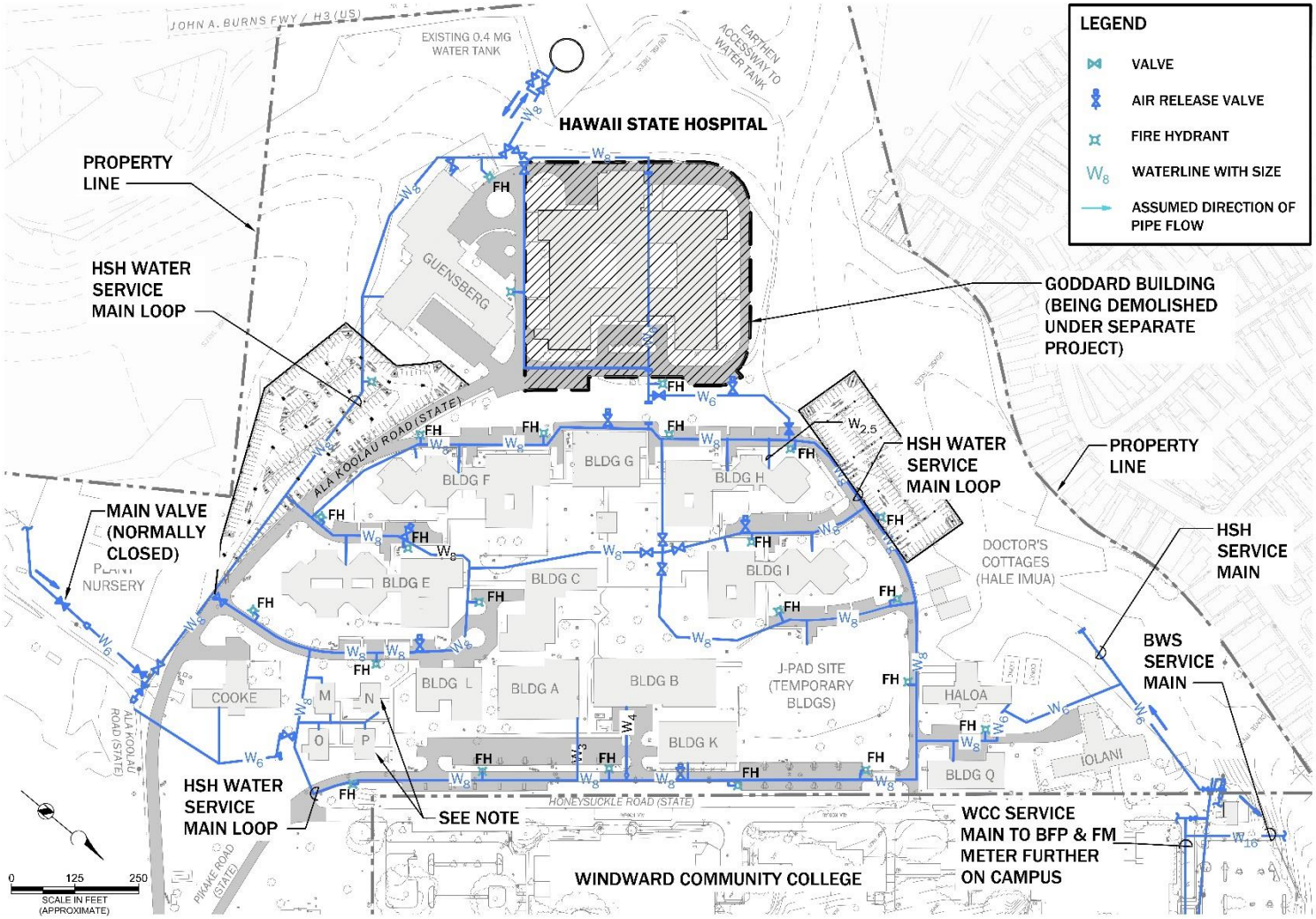

Figure 5-13. Existing water system and fire hydrant locations

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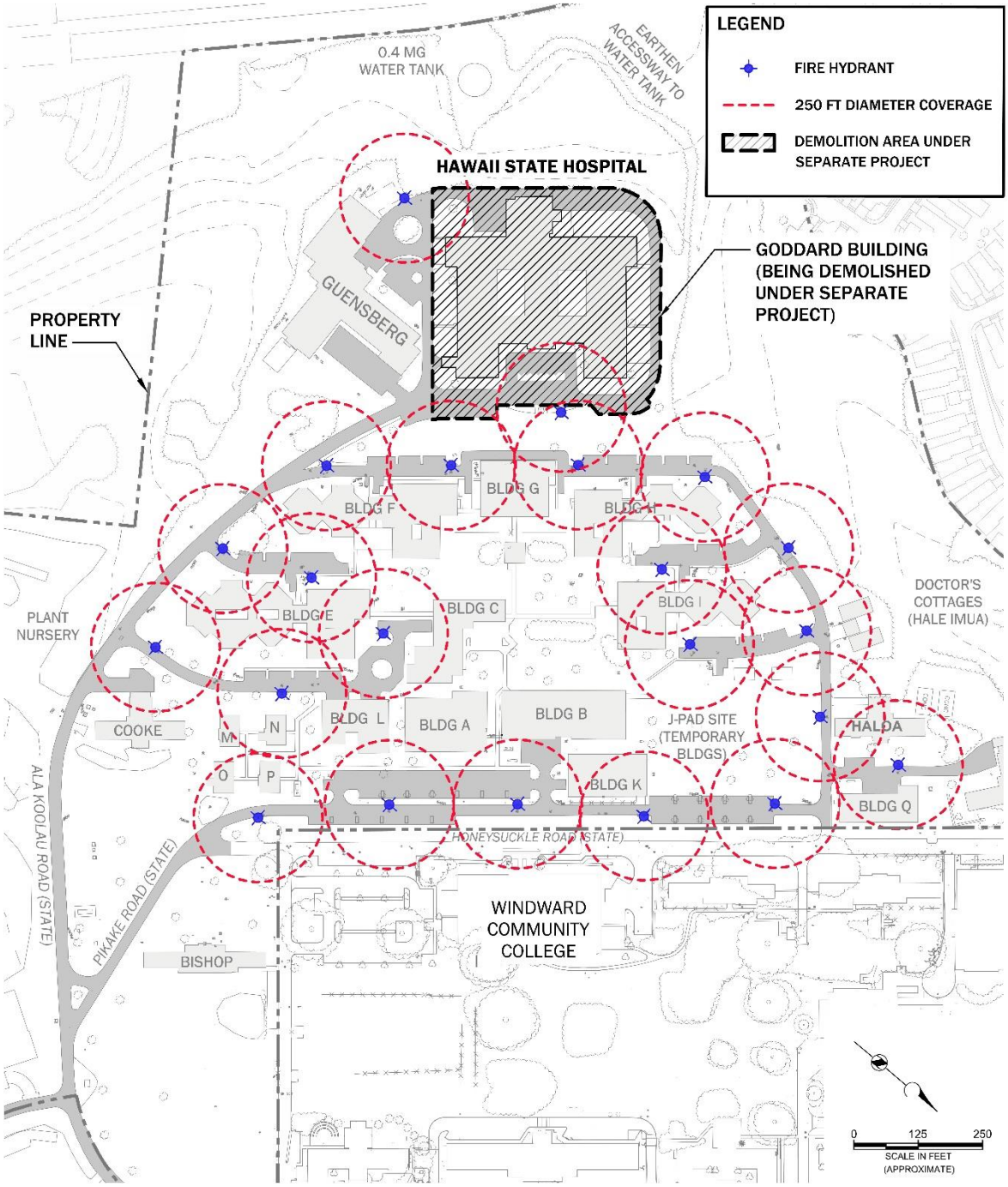

Figure 5-14. Existing fire hydrant coverage

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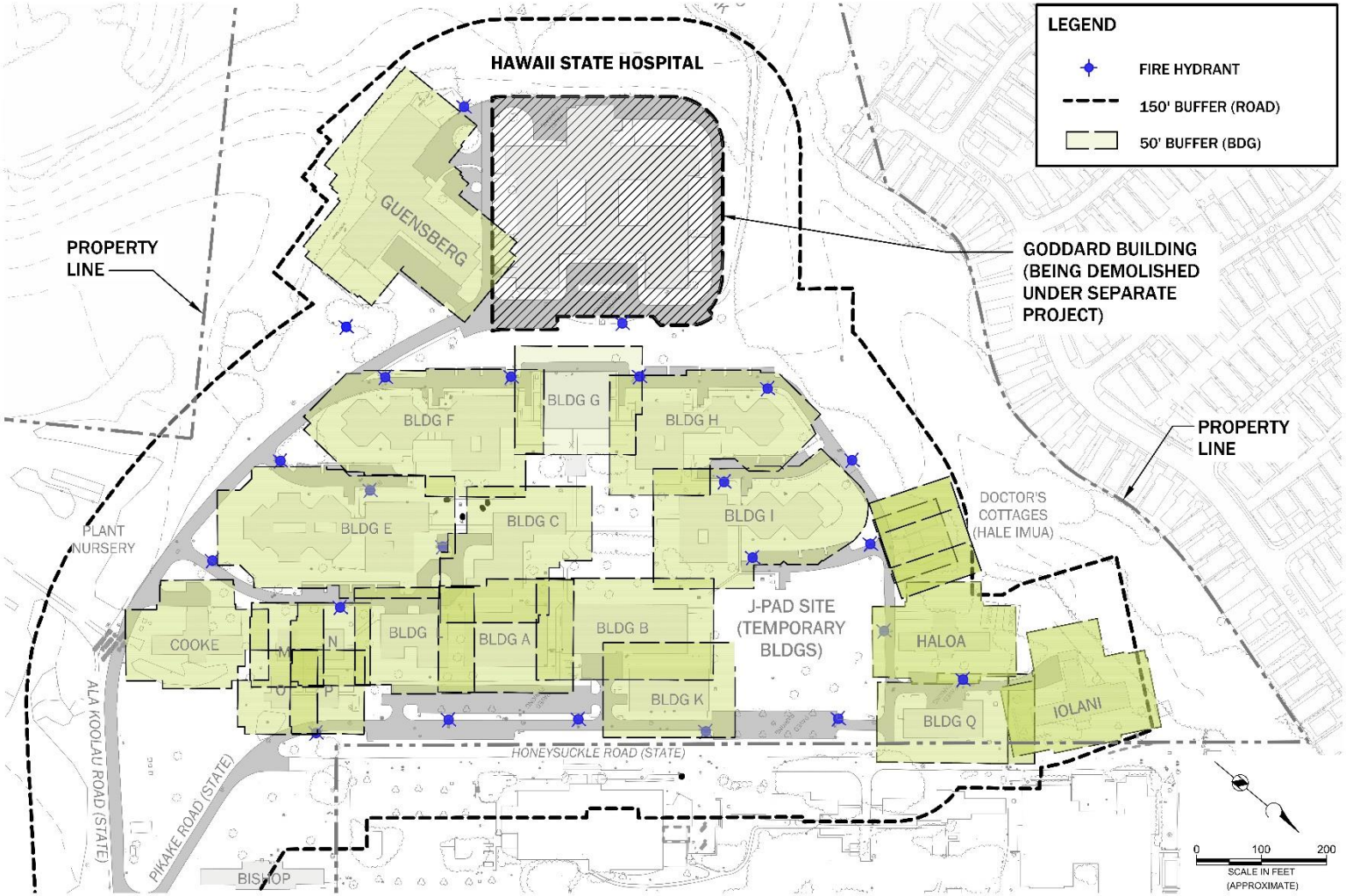

Figure 5-15. Existing fire department building access coverage

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5.2.2 Potential Impacts and Mitigation Measures

Design of the potable water system improvements will be in conformance with the latest editions of HBWS's *Water System Standards,* the State Fire Code, and the City Fire Code. The State Fire Code (HAR Title 12, Chapter 45.3) has adopted the National Fire Protection Association (NFPA) 1, 2012 edition, with some amendments. In a similar fashion, the City (Ordinance 15-45) has adopted the State Fire Code, with some amendments. New structures will be required to adhere to the codes; existing structures, if left unmodified, are not required to retroactively comply.

Based on preliminary feedback from HBWS, the existing HBWS water system is anticipated to be able to accommodate the proposed first phase of improvements. Final determination will be made by HBWS during the building permit review process. Projected water demands for future phases were estimated by multiplying the future population by the existing average per capita demand of 106 gpd.

5.2.2.1 Water System Analysis

The HSH water system was modeled using WaterGEMS V8i software (see Appendix P). The system was modeled as a series of nodes linked with pipes. The nodes represent the spatial intersection of water mains and facilities and associated demand and pressure. Node elevations were extracted from design drawings and topographic maps.

We assumed a conversion factor of 2 and 3 to convert existing maximum monthly demand to maximum day demand (MDD) and peak hour demand (PHD). We allocated water demand across the distribution system over the 56 demand nodes for the three service conditions in Table 5-7: (1) existing facility, (2) first-phase improvements, and (3) overall campus buildout of improvements. The first phase included the existing water demands plus the estimated demand from NPF. The full buildout includes all improvements identified in the HSH long-term plan. The model calculated friction losses within the water model using a Hazen-Williams C-factor of 110, as recommended by the *Water System Standards*.

Table 5-7. Existing and Projected Water Demands

Parameter	Existing Condition	First Phase	Full Buildout
Population	562	962	1,907
Average water demand (gpd)	59,400	101,700	201,600
Average water demand (gpm)	41	71	140

Projected demands are based on the existing average per capita demand of 106 gpd.

Fire hydrant flow tests were performed in July 2016 to determine existing flow rates and pressures at various locations in the system. The flow measurements were used to calibrate the water model, which indicates that available flow at all hydrants ranges from 2,000 gpm at 20 pounds per square inch (psi) to 3,500 gpm at 20 psi.

Modeling results indicate that the existing water distribution system is adequately sized to meet the current and projected MDD and PHD, with pressures expected to range between approximately 40 and 86 pounds per square inch gauge (psig). The pressure ranges meet the Water System Standard requirements as described below:

- Maximum daily flow plus fire flow with a residual pressure of 20 psi at critical fire hydrant
- Peak hour flow with a minimum residual pressure of 40 psi (note that buildings located adjacent to and at the same or lower elevation where the model predicts node pressures above 80 psig should have a pressure-reducing device on their water connections)

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5.2.2.2 Fire Hydrant Coverage and Fire Flow Requirements

Fire flow requirements are specified by the HBWS Water System Standards, Table 100-19. For hospitals, the required fire flow is 4,000 gpm for a 3-hour duration, with hydrants spaced at no more than 250 feet apart as measured along the roadway.

As confirmed during consultation with HFD, fire flow requirements for new buildings are specified in NFPA 1, Section 18.4. Section 18.4.5.2.1 allows for the required fire flow to be “reduced by 75 percent when the building is protected throughout by an approved automatic sprinkler system. The resulting fire flow shall not be less than 1,000 gpm (3,785 L/min).” Provided that the new buildings have approved sprinkler systems, the required fire flow is 4,000 gpm x 25 percent, or 1,000 gpm.

5.2.2.3 Fire Department Building Access Requirements

Of note are the following provisions regarding access to buildings:

- NFPA 1, Section 18.2.3.2.1: “A fire department access road shall extend to within 50 ft (15 m) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building.”
- HAR Section 12-45.3-86: “When any portion of the facility or building is in excess of 150 feet (45 720 mm) from a water supply on a fire apparatus road, as measured by an approved route around the exterior of the facility or building, onsite fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the AHJ.”
- NFPA 1, Section 18.2.3.2.2: “When buildings are protected throughout with an approved automatic sprinkler system that is installed in accordance with NFPA 13, NFPA 13D, or NFPA 13R, the distance in 18.2.3.2.2 shall be permitted to be increased to 450 ft (137 m).”

5.2.2.4 First-Phase Improvements

See Figures 5-16 through 5-18 for water and fire improvements related to the first phase. A 4-inch-diameter pipe connection to the potable water service lateral to the proposed Goddard building, backflow preventer, and gate valve for isolation will be designed for each phase of improvements to feed the irrigation system to maintain the proposed landscaping discussed in Section 4.9.2.3.

Fire pumps will be required for the proposed Goddard and Guensberg buildings based upon the estimated 20 psi incoming water pressure and a 68-foot, 4-story building height for each building. The fire pump will be electrically driven and be connected to the emergency generator.

In order to provide sufficient hydrant coverage at the site, two new fire hydrants and associated piping are recommended, along with a new 12-inch-diameter pipe running between the existing Guensberg and Goddard buildings. The proposed hydrant and piping locations are shown on Figure 5-16:

- The east side of the Zone 15 parking area
- Between the Guensberg and Goddard buildings

The first-phase improvements are limited to the on-campus HSH system and are not anticipated to affect the HBWS system. However, improvements and schedules should be coordinated with HBWS to ensure that potential impacts are minimized.

5.2.2.5 Overall Campus Buildout Improvements

No further improvements are anticipated for the overall campus buildout, based on the water system model results. See Figure 5-19 for fire department building coverage for the overall campus buildout of improvements.

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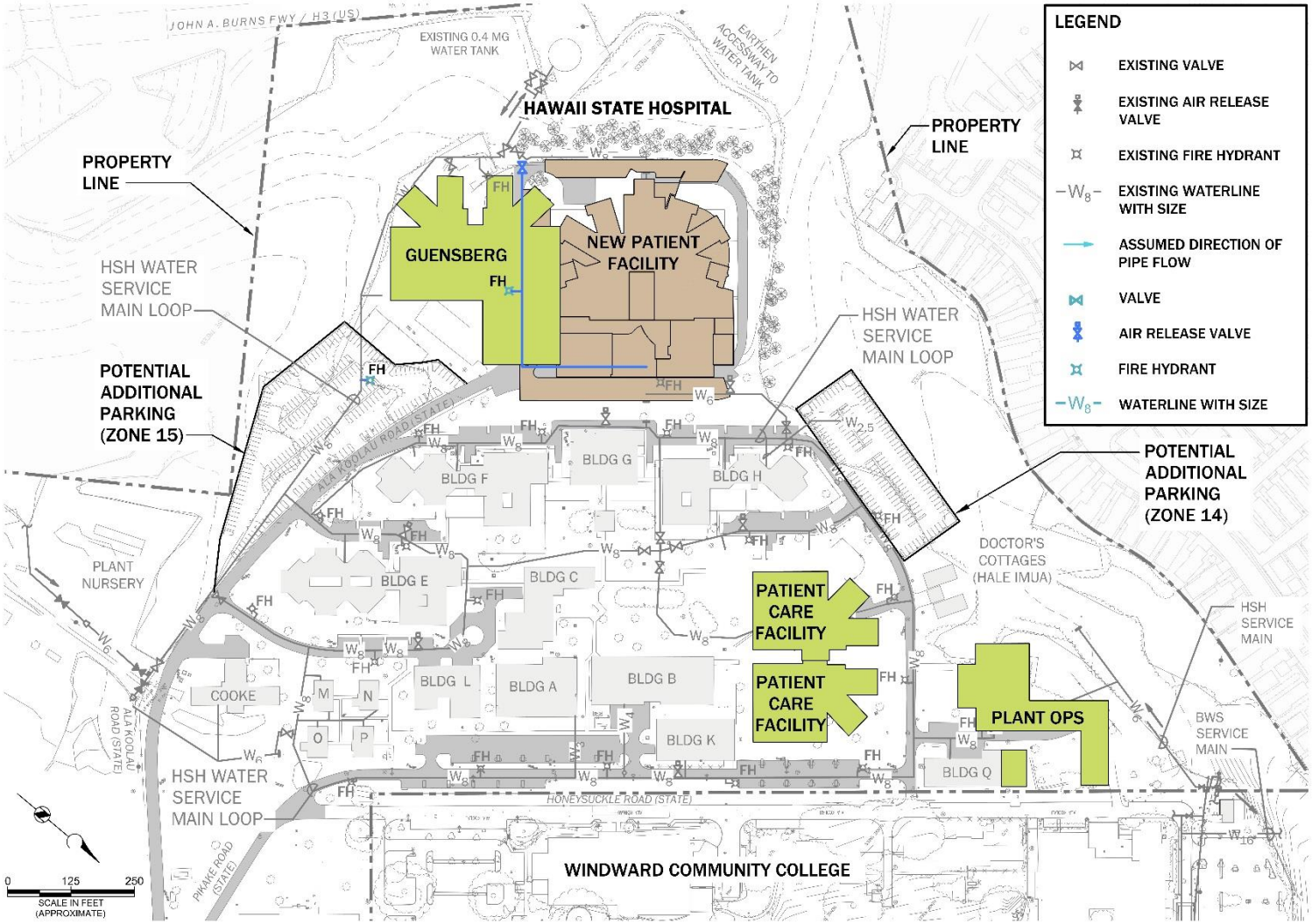

Figure 5-16. Water system for first phase

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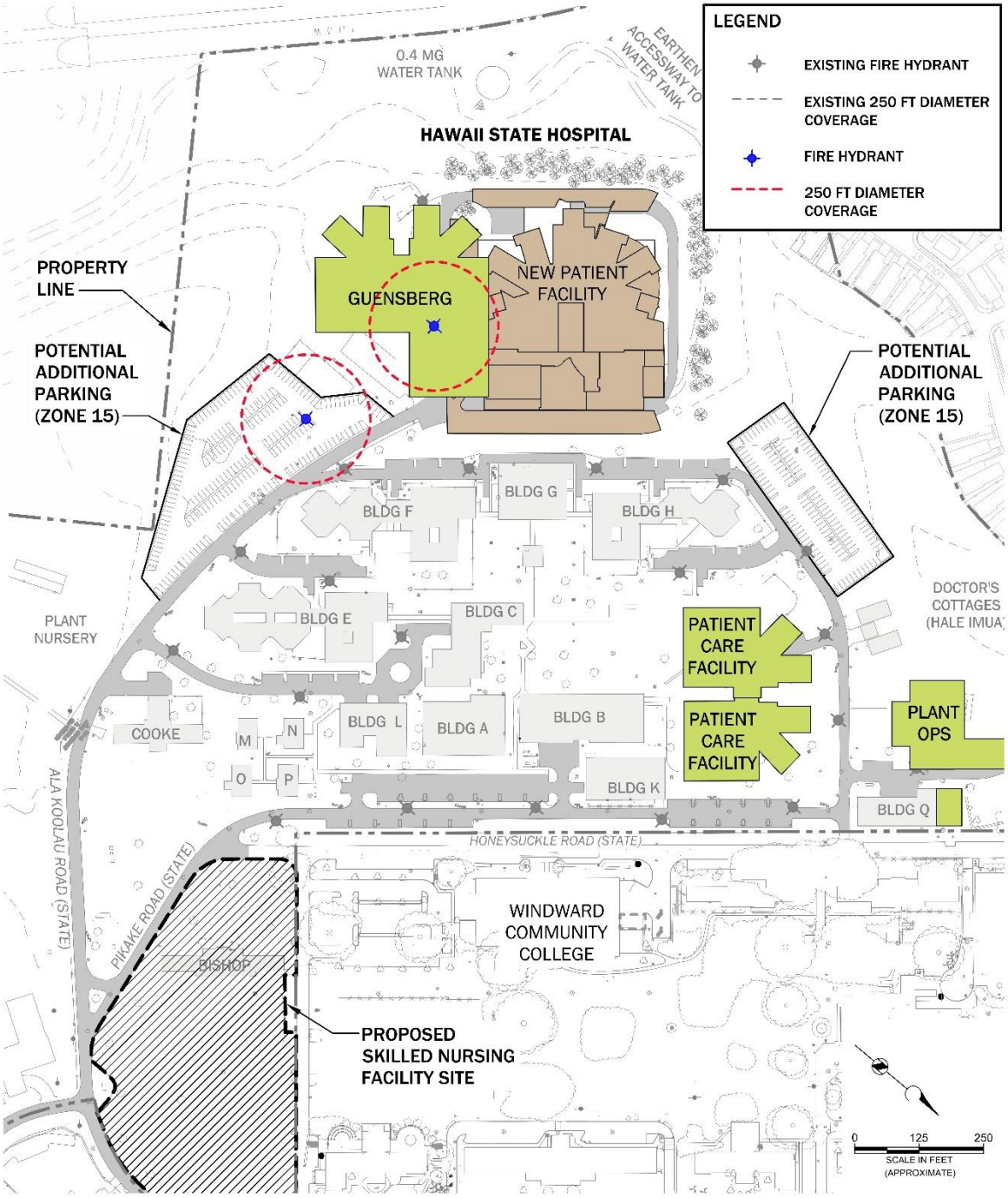

Figure 5-17. Fire hydrant coverage for first phase

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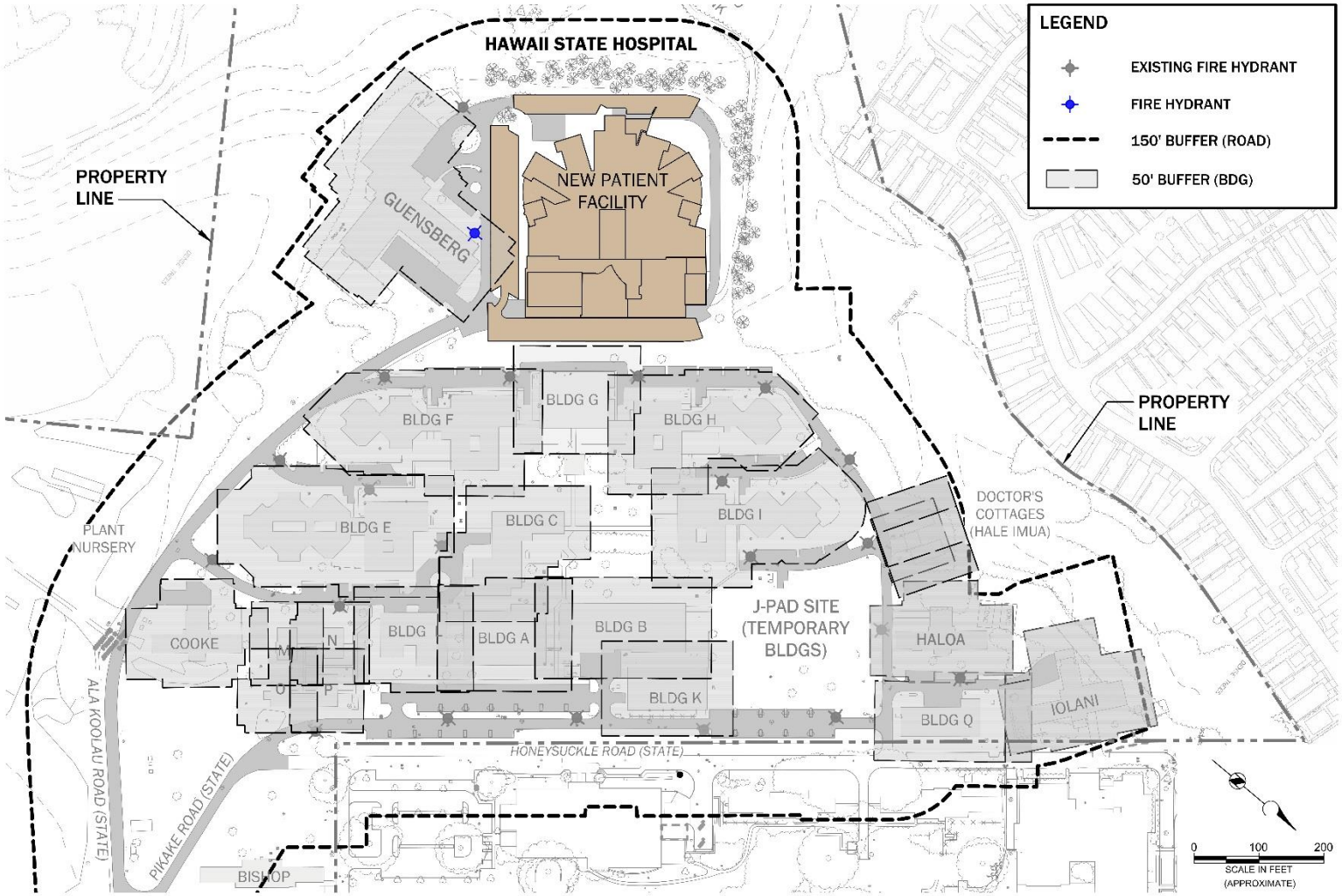

Figure 5-18. Fire department building access coverage for first phase

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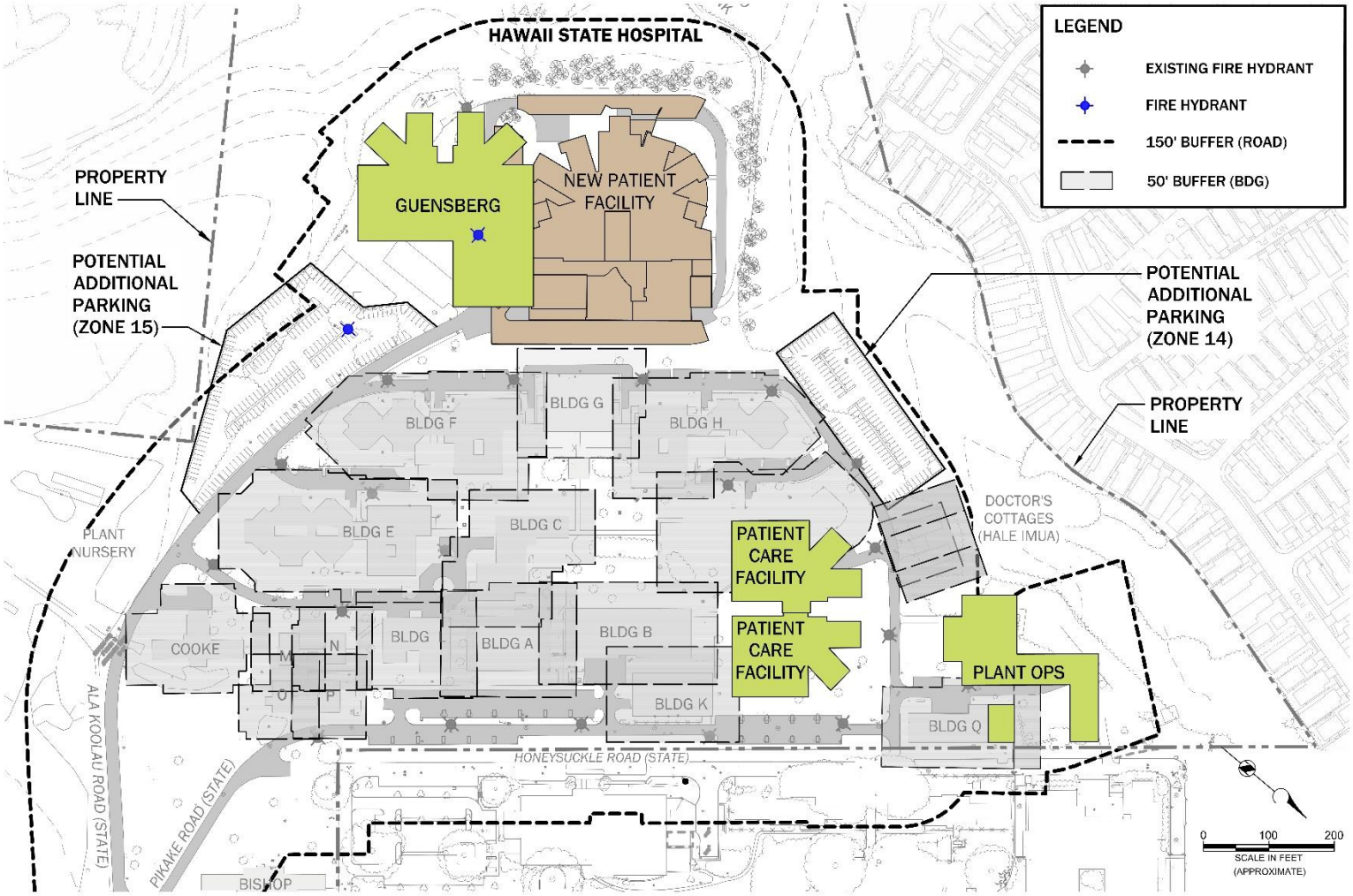

Figure 5-19. Fire department building access coverage for overall campus buildout of improvements

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5.3 Wastewater

This section describes the wastewater system in the project area, including the affected environment and potential impacts and mitigation measures.

5.3.1 Affected Environment

The collection system serving HSH is part of a private system that serves a number of parcels *mauka* of Kahekili Highway and accessed from Kea’ahala Road. It consists of two gravity sewer systems: a southern system and a northern system. Refer to Figures 5-20 and 5-21 for the existing wastewater system. Most of the sewer system within HSH was installed in the late 1980s. Record drawings and field verifications indicate that the majority of existing lines within the HSH boundaries are 6- and 8-inch-diameter vitrified clay pipe (VCP).

The southern system serves most of the HSH site, including Buildings A, B, C, E, F, G, H, I, K, L, M, N, O, P, Cooke, Goddard, and Guensberg. Wastewater generally flows from *mauka* to *makai* (west to east), and collects into an 8-inch-diameter main that runs down Ala Ko‘olau Road. Downstream of HSH, this main cuts through the DOT Baseyard and State Courthouse parcels, collects flow from these facilities, and runs through Po’okela Road for a short distance before connecting to the main 10-inch-diameter pipe in Kea’ahala Road.

The northern system serves the existing Hāloa and ‘Iolani buildings, Building Q, and Hale Imua. Wastewater generally flows from *mauka* to *makai* (west to east). Record drawings and field verifications show that this system connects to the WCC sewer system near Honeysuckle Road. An 8-inch-diameter main runs through the WCC campus and eventually makes its way around the north side of WCHC before connecting to the common 10-inch-diameter main in Kea’ahala Road.

The northern and southern sewer systems combine in Kea’ahala Road at the Po’okela Road intersection. From this point, a 10-inch-diameter reinforced concrete pipe (RCP) continues down Kea‘ahala Road, where it also collects flows from the Kāne‘ohe District Park before connecting to the City collection system *makai* of Kahekili Highway at a manhole near the intersection of Kea‘ahala Road and Kāmau Place.

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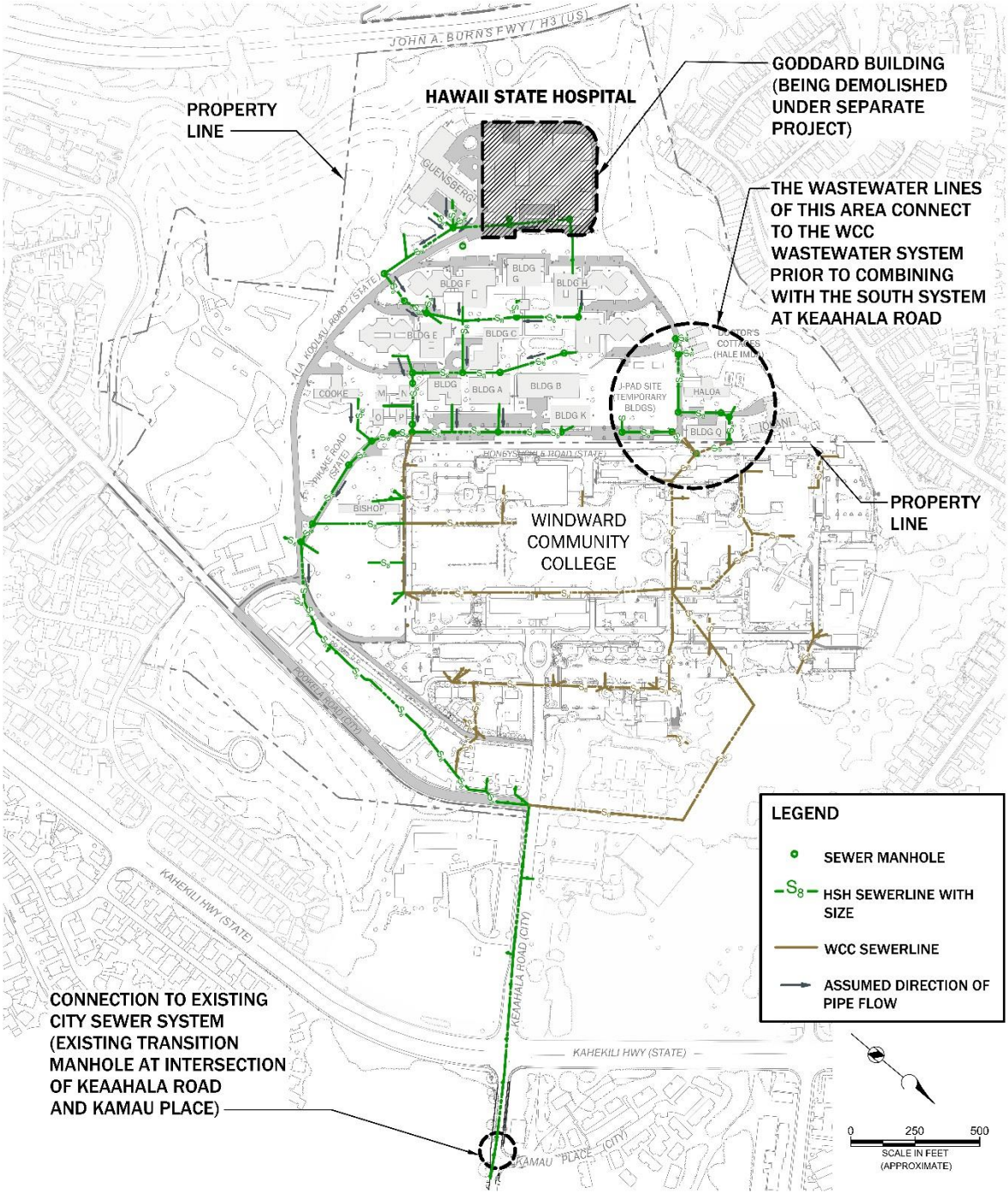

Figure 5-20. Existing overall wastewater lines

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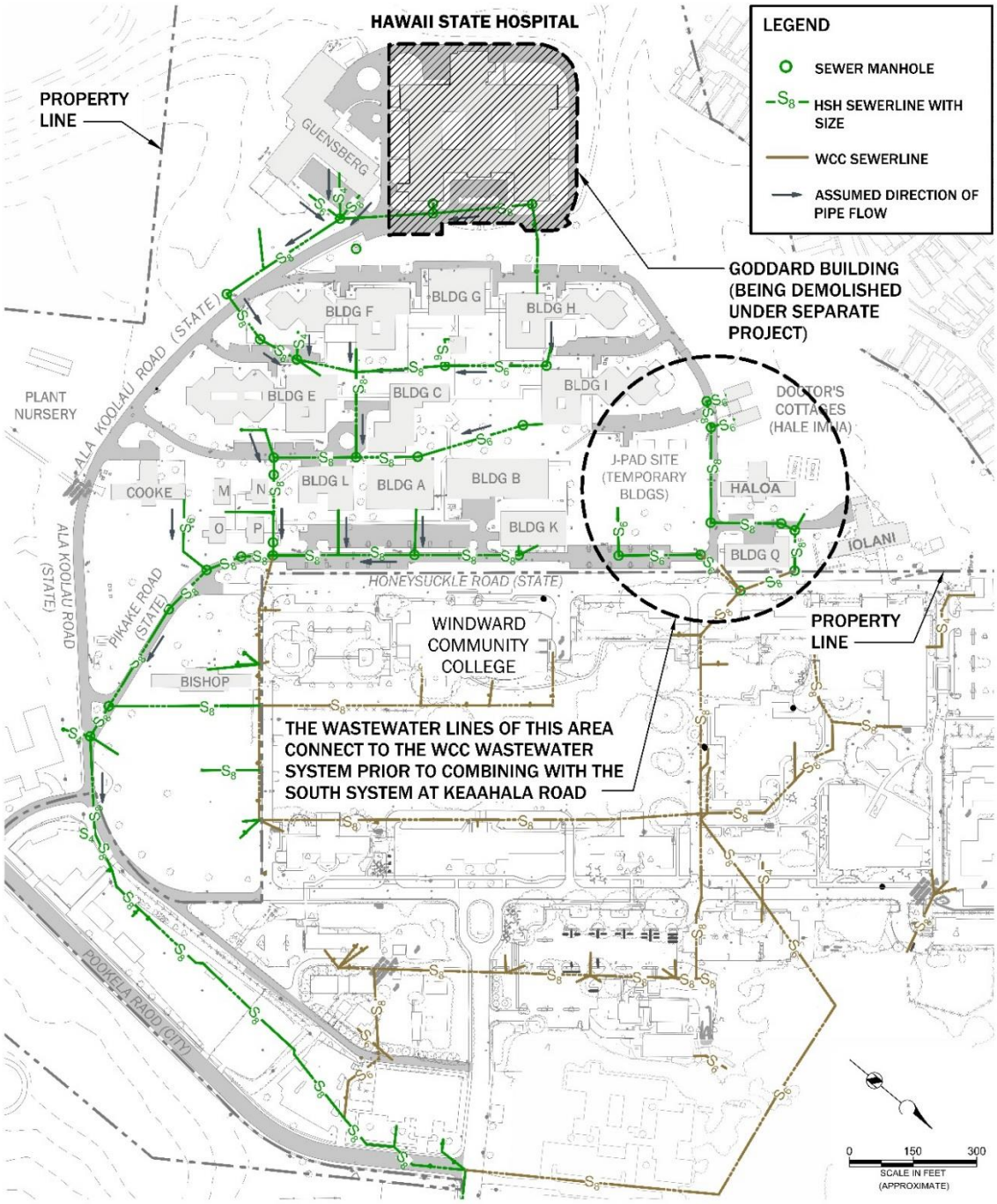

Figure 5-21. Existing wastewater lines

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5.3.2 Potential Impacts and Mitigation Measures

The current estimated total population at HSH is 562. The full buildout estimated total population, which includes Phases 1, 2, 3A, and 3B and the SNF, is 1,974. The projected wastewater flows from HSH, in addition to the wastewater flows from WCC and the other areas served by the private wastewater system, need to be assessed and analyzed to determine if adequate capacity exists in the current collection system, or if improvements need to be made to accommodate the increase in population.

5.3.2.1 Wastewater Flows

For existing and future conditions, dry weather wastewater flows were estimated based on potable water usage. HBWS typically estimates that wastewater flows are 80 percent of water use. This DEIS follows the HBWS estimation process. Table 5-8 shows the estimated existing and future (full buildout) dry weather, average daily wastewater flows for HSH and other parcels that contribute to the private wastewater collection system.

Table 5-8. Average Daily Dry Weather Wastewater Flow Estimates

Area	Existing Water Use[a] (gpd)	Full Buildout Water Use[b] (gpd)	Existing WW Flow[c] (gpd)	Full Buildout WW Flow[c] (gpd)
HSH	66,300	225,000	53,000	180,000
WCC	12,400	14,900	9,900	11,900
WCHC	750	900	600	720
Other areas[d]	24,000	28,800	19,200	23,000

a. *Water use for HSH, WCC, and WCHC obtained from actual water billing records. Water use for other areas estimated based on City planning guidelines for parcel area and land use.*

b. *Full buildout water use for HSH obtained from projected population figures (see Section 5.2). Full buildout water use for WCC, WCHC, and other areas obtained by adding 20% to existing water use estimates.*

c. *Wastewater flows estimated as 80% of water use for a given area.*

d. *Other areas include Hina Mauka, DOT Baseyard, State Courthouse, and Kāneʻohe District Park.*

5.3.2.2 Collection System Hydraulic Analysis

A hydraulic model of the entire private wastewater collection system was constructed to determine any capacity deficiencies under both current and future (full buildout) scenarios. A fully dynamic hydraulic model was constructed using SewerGEMS® V8i Select Series 3 modeling software by Bentley Systems, Inc. The model scenarios were based on the City Wastewater System Design Standards. The Standards specify that the wastewater system should be capable of conveying the dry weather peak flows and a peak wet weather flow of 1,250 gallons per acre per day (gpad) if the site is above the groundwater table. To determine the daily dry weather peak flows, an assumed typical peaking factor of 1.6 was applied to the average daily flows. The overall gross acreage of the parcels served by the private wastewater system was used along with the 1,250 gpad unit flow to generate the peak wet weather flow estimate.

For both existing and full buildout scenarios, the private wastewater collection system showed no capacity deficiencies. The main 10-inch-diameter pipe in Kea’ahala before the connection with the City system still showed roughly 40 percent of pipe area available even during full buildout, wet weather conditions.

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5.3.2.3 Collection System Field Inspections

A CCTV inspection of the existing private wastewater system was conducted between May 9 and May 20, 2016, by subcontractor Underground Services, Inc. (USi). The CCTV inspection covered approximately 10,000 lineal feet (LF) of pipe and included the main pipes serving both the southern and northern systems as well as the 10-inch-diameter main in Kea'ahala Road up to the City connection point. The purpose of the inspection was to verify pipe connectivity and assess pipe condition to identify any areas that may need repair or replacement. Appendix Q contains the CCTV inspection summary for the sewer pipe inspected.

The field inspections showed that the pipes within the HSH boundaries are in fair to good condition. The most common defects found were occasional root intrusion at pipe or manhole joints, ragging, and accumulation of grease. These defects were not severe, and in some cases USi was able to remove ragging and other debris that had accumulated near an accessible manhole. For purposes of describing condition, the following categories and scoring ranges are used: good (8 to 10), fair (4 to 7), poor (0 to 3).

For areas outside of the HSH boundaries, the field inspections showed that the majority of pipes are in fair to good condition. However, five pipe segments in particular were in critical condition and at high risk of near-term failure. Table 5-9 lists these critical pipe segments and the defects that were found.

Table 5-9. Critical Pipe Segments

Pipe[a]	Area	Defect	Condition
P-30	Po'okela Road (State Courthouse)	Pipe broken at 43' from upstream manhole (SMH-30).	1
P-41	WCC	Missing pipe wall at 98' from upstream manhole (SMH-41). Multiple circumferential fractures. Multiple joints with root intrusion.	0
P-53	WCHC	Hole in pipe at 127' from upstream manhole (SMH-53). Multiple joints with root intrusion	1
P-54	WCHC	Pipe fractures at 62' and 102' from upstream manhole (SMH-54). Multiple joints with root intrusion.	2
P-58	Kea'ahala Road at Kahekili Highway	Pipe fractures at 78' from upstream manhole (SMH-58).	1

a. See Appendix Q for wastewater system pipe numbering.

5.3.2.4 Mitigation Measures

As stated, the proposed expansion of the HSH for the overall campus buildout of improvements does not overload the existing collection system. Ample capacity exists even during peak wet weather conditions. Therefore, no improvements related to increased capacity are required. However, the CCTV inspection effort found five critical pipe segments outside of the HSH boundary that need to be repaired or replaced very soon, as they are at high risk of failure.

Because these critical pipe segments are not located within the HSH boundary, it is uncertain who has jurisdiction over performing these improvements. For segment P-41, it seems logical to assume that WCC would be responsible for maintaining this pipe because it lies within the campus. However, the remaining four segments are questionable as to which entity should perform the maintenance. Preliminary research indicates that Kea'ahala Road is a City street up to the intersection with Po'okela Road. Po'okela Road is a City street as well. It is recommended that the City be approached about the possibility of it taking control of the wastewater collection system that lies within the City right-of-way.

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5.4 Chilled Water

This section describes the chilled-water system in the project area, including the affected environment and potential impacts and mitigation measures.

5.4.1 Affected Environment

Based on information received from HSH staff, the Guensberg building has its own chilled-water system. The Goddard building has never had one and the building cooling system is provided by natural ventilation. Other HSH buildings (including Buildings A, B, C, E, F, G, H, I, K, and L) receive chilled water from the chilled-water plant (Building Q). Building Q is a combination central chiller plant and laundry facility. The water is used for air-conditioning systems. The chilled-water plant includes three chillers, three chiller water pumps, three condenser water pumps, two cooling towers, piping, valves, fittings, and all associated components. The chiller plant has three centrifugal chillers piped in parallel but designed for only two chillers to operate at one time. One chiller is a 50 percent backup system with a backup chilled-water and condenser water pump. There are only two cooling towers, which were replaced in 2013.

The chillers use R-11, which is a high ozone-depleting refrigerant that has been restricted in production in the United States in accordance with those nations that have signed the 1999 Montreal Protocol. There are no restrictions on using equipment that contains R-11 in Hawai‘i. Therefore, the chillers can continue to be used to serve the HSH facilities. However, the chiller cannot use other refrigerants such as R-134a; therefore, if R-11 is not available, the existing chilled-water system will not be able to produce chilled water for the HSH buildings. The system does not have a central direct digital control system that controls the chiller plant. The chillers are equipped with high-efficiency purges that will purge the units without emissions of R-11. The chillers are equipped with a brush-cleaning system that is operated pneumatically. The condenser water system has an automatic chemical feeding system and the chilled-water system has pot feeders. The design of replacement chillers is planned for 2017, if funds are approved by the legislature.

The chilled-water distribution system is a constant-flow system with a pressure-controlled bypass valve to vary the flow through the distribution loop while the chillers always have constant flow. The existing chiller plant building does not have an exhaust fan as required by American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) 15, nor does it have a refrigerant alarm. The chiller plant and cooling towers are maintained for HSH staff through a contract with an outside company.

Figure 5-23 shows the existing chilled-water system that supplies chilled water to all buildings at the HSH campus except for the existing Goddard and Guensberg buildings, which have never received chilled water from this system.

All piping and valves for the existing chilled-water system are underground. Based on the information from HSH staff, no pipe breakages have occurred. Several existing isolation valves were investigated by opening their valve box covers. It was found that they are severely corroded. See Figure 5-22 below for the example of the existing isolation valve condition. These isolation valves should be replaced with new ones during the next time that the chiller plant is scheduled for shutdown.

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Figure 5-22. Isolation valve of the chilled-water system

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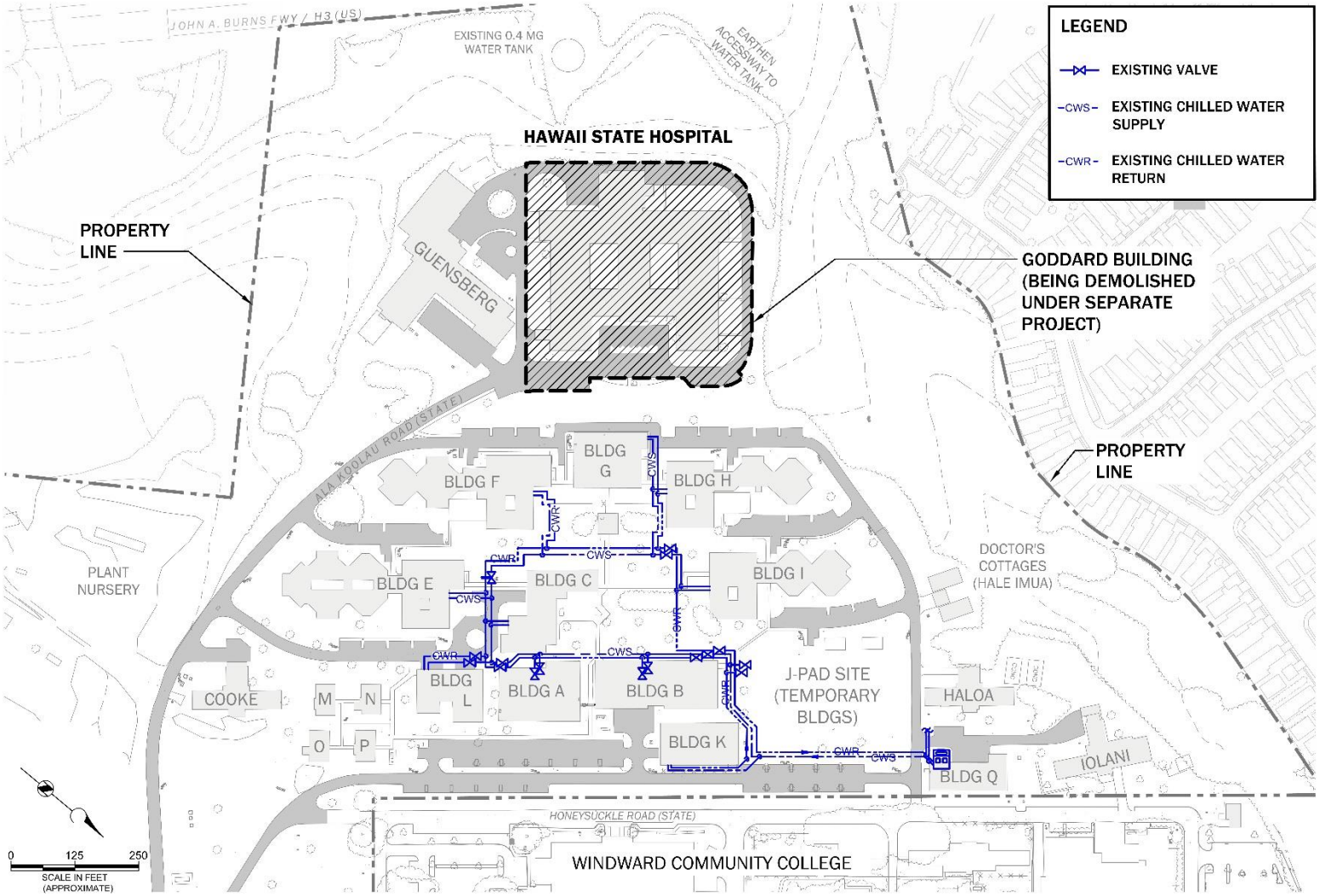

Figure 5-23. Existing chilled-water system

5.4.2 Potential Impacts and Mitigation Measures

The existing chillers, pumps, and cooling towers appear to be in excellent condition and should provide many years of continued service life if maintained properly.

The proposed NPF is anticipated to include a central chilled-water air-conditioning plant to serve its air-conditioning requirements.

Because of the State’s phased funding, it is anticipated that NPF and Guensberg building replacements will have their own chiller plants. The air-conditioning needs for the overall campus buildout of improvements will come from the existing chilled-water plant at Building Q. According to the existing as-built drawings, there is an underground chilled water stub-out to serve the J-Pad site. The SNF will have its own chilled-water system. The total connected short-term air-conditioning load is estimated at 300 tons.

If the older buildings are added to the load—including Hāloa (23 tons), Cooke (35 tons), and ‘Iolani (46 tons), the total HSH campus air conditioning load would increase the total by another 104 tons. However, per discussions with HSH facilities personnel, the older buildings should not be connected to a central loop because most of these buildings are naturally ventilated or are air-conditioned by window air-conditioning units. These buildings are not scheduled for renovation in the 2005 MP and, therefore, should remain as-is.

Because each of the first two phases will have their own chiller plant, the size will be determined during the design stage.

See Figures 5-24 and 5-25 for the locations of the proposed chilled-water system for first phase and overall campus buildout of improvements, respectively.

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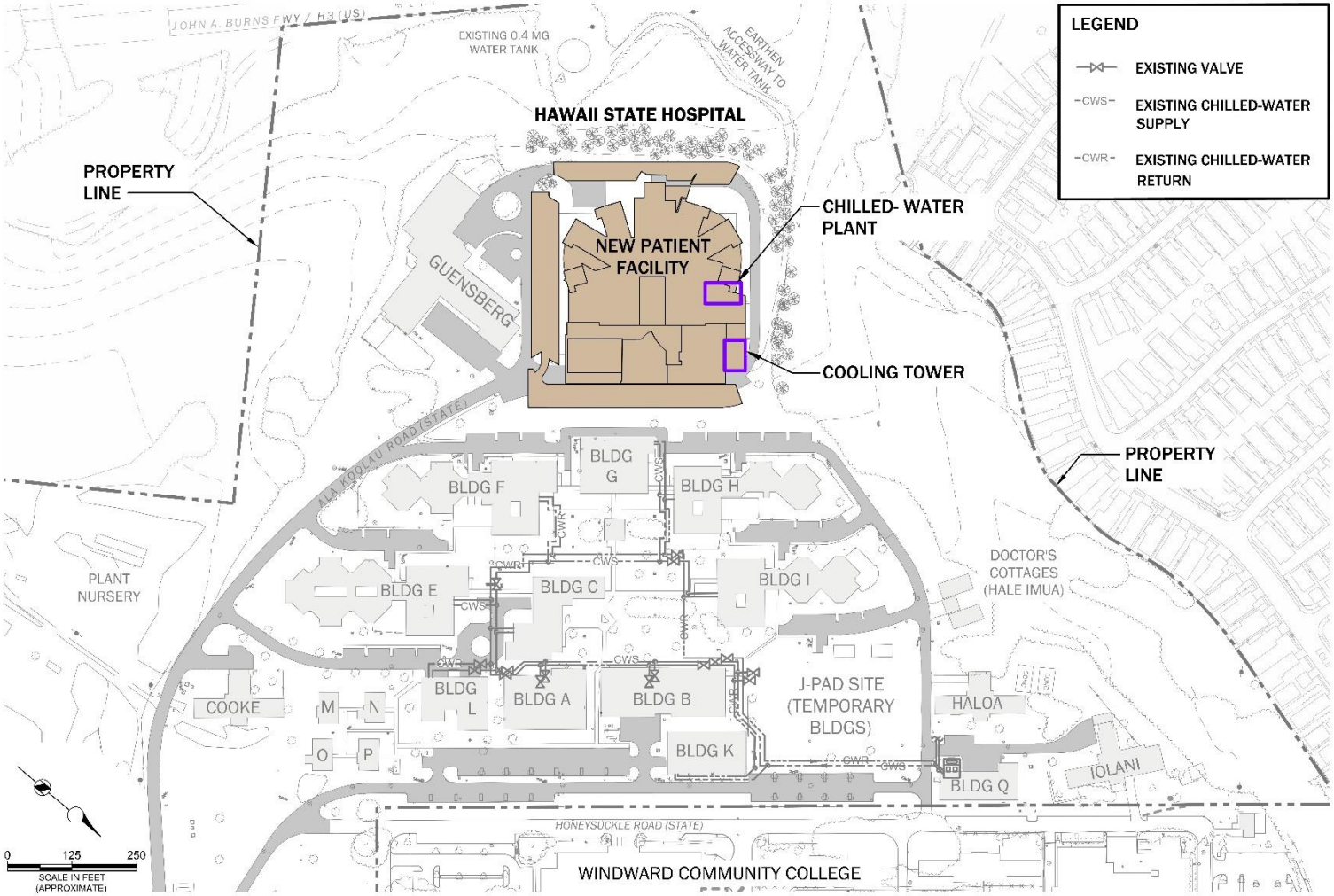

Figure 5-24. Chilled-water system for the first phase of site improvements

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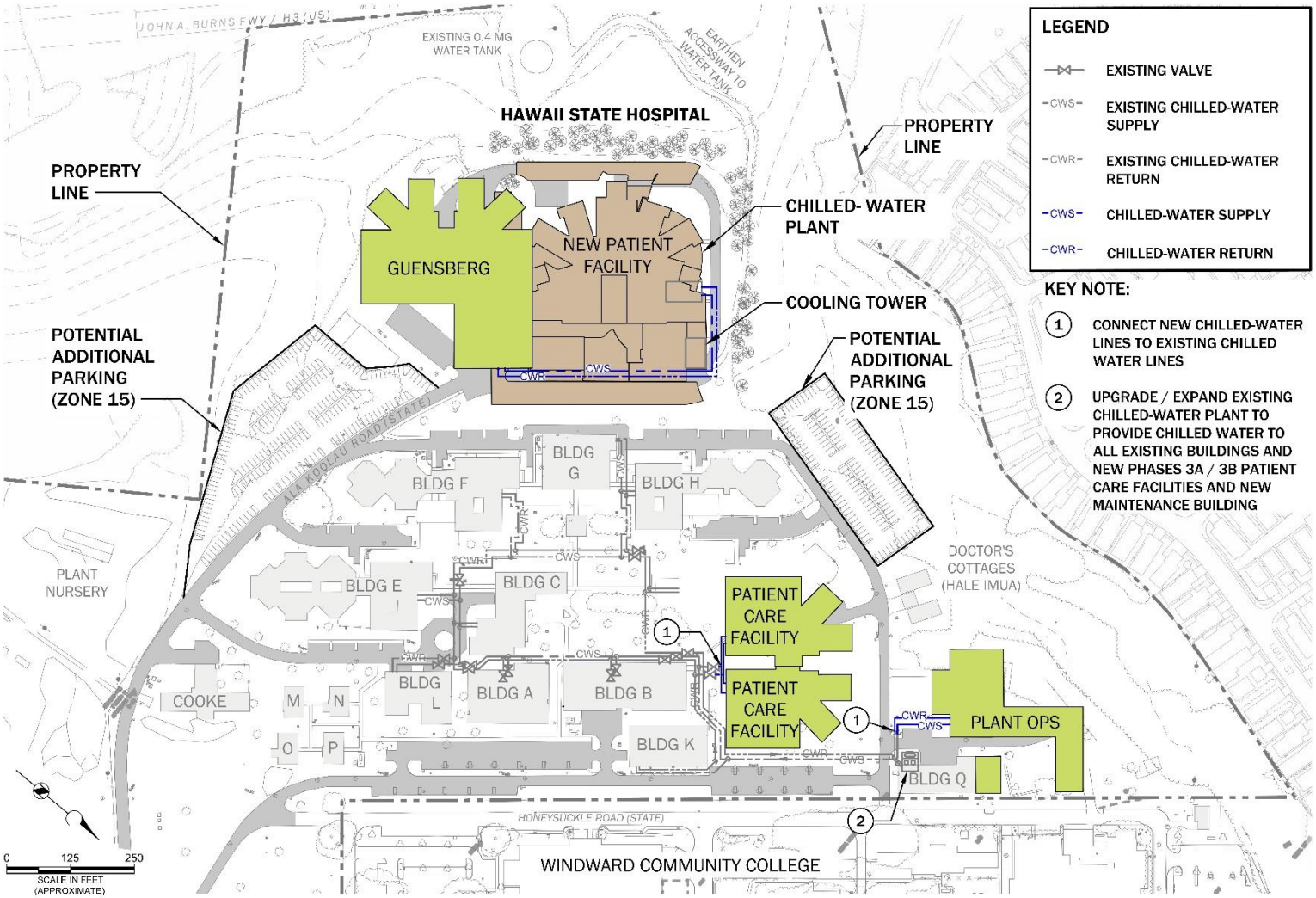

Figure 5-25. Chilled-water system for overall campus buildout of improvements

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5.5 Stormwater

This section discusses the potential improvements to the stormwater drainage system that may result from the construction and operation of HSH NPF (first phase) and overall campus buildout of improvements, which includes additional patient facilities and parking, campus entrance improvements, administration facility expansion, plant operations and warehouse facility relocation (from the bottom northwest corner of the WCC property to the existing Building Q, Hāloa, and ‘Iolani building location), SNF, Aloha Gardens improvements, and installation of a landscape buffer between HSH and the neighboring WCC campus. The environments affected, potential impacts to the site and downstream cumulative impacts, mitigation measures for completion of the first phase, and overall campus buildout of improvements are evaluated and discussed with respect to the stormwater drainage system.

5.5.1 Affected Environment

Stormwater surface runoff is collected via catch basins and grated inlets and conveyed through buried gravity pipelines to discharge at grade via concrete headwall outlets within vegetated swales and large grassy areas along the northern and southern portions of the site that slope down gradually and eventually toward Kea‘ahala and Kapunahala streams, respectively. Refer to Section 3.5 for additional description on surface waters downstream of the site.

According to previous reports, record drawings, and field verifications, the onsite stormwater drainage system (see Figure 5-26) consists of five main subsystems (A–E). The subsystems are generally described as follows:

- Subsystem A—Goddard/Guensberg: located on the northern and southern sides of the Goddard building, 15- and 18-inch-diameter pipes that outlet either to the grassy area *makai* of the Guensberg building or the wooded area to the north of the existing Goddard building. Drainage from the southern and eastern areas of the existing Goddard building is captured and directed to a grass field south of the Guensberg building, while drainage from the northern area of the existing Goddard building is collected and directed northwesterly to a wooded area.
- Subsystem B—southern *mauka*: located *mauka* of Buildings L and C, 18- to 30-inch-diameter pipes that outlet to the southern side of Ala Ko‘olau Road.
- Subsystem C—southern *makai*: runs along Honeysuckle Road, 18- to 24-inch-diameter pipes that outlet to the southern side of Ala Ko‘olau Road.
- Subsystem D—northern *mauka*: extends *makai* of Buildings H and I, 18- to 36-inch-diameter pipes that outlet to the north of the developed area.
- Subsystem E—northern *makai*: 18- and 24-inch-diameter pipes that connect to an existing WCC storm drain system.

Both HSH and WCC utility maintenance staff have reported that the HSH and WCC stormwater drainage systems were completely separated approximately 15 years ago; however, field verification efforts indicate that some HSH areas around the eastern boundary (*makai* of the Bishop building) and Subsystem E drain into other stormwater systems used by WCC and other customers *makai* of the HSH site.

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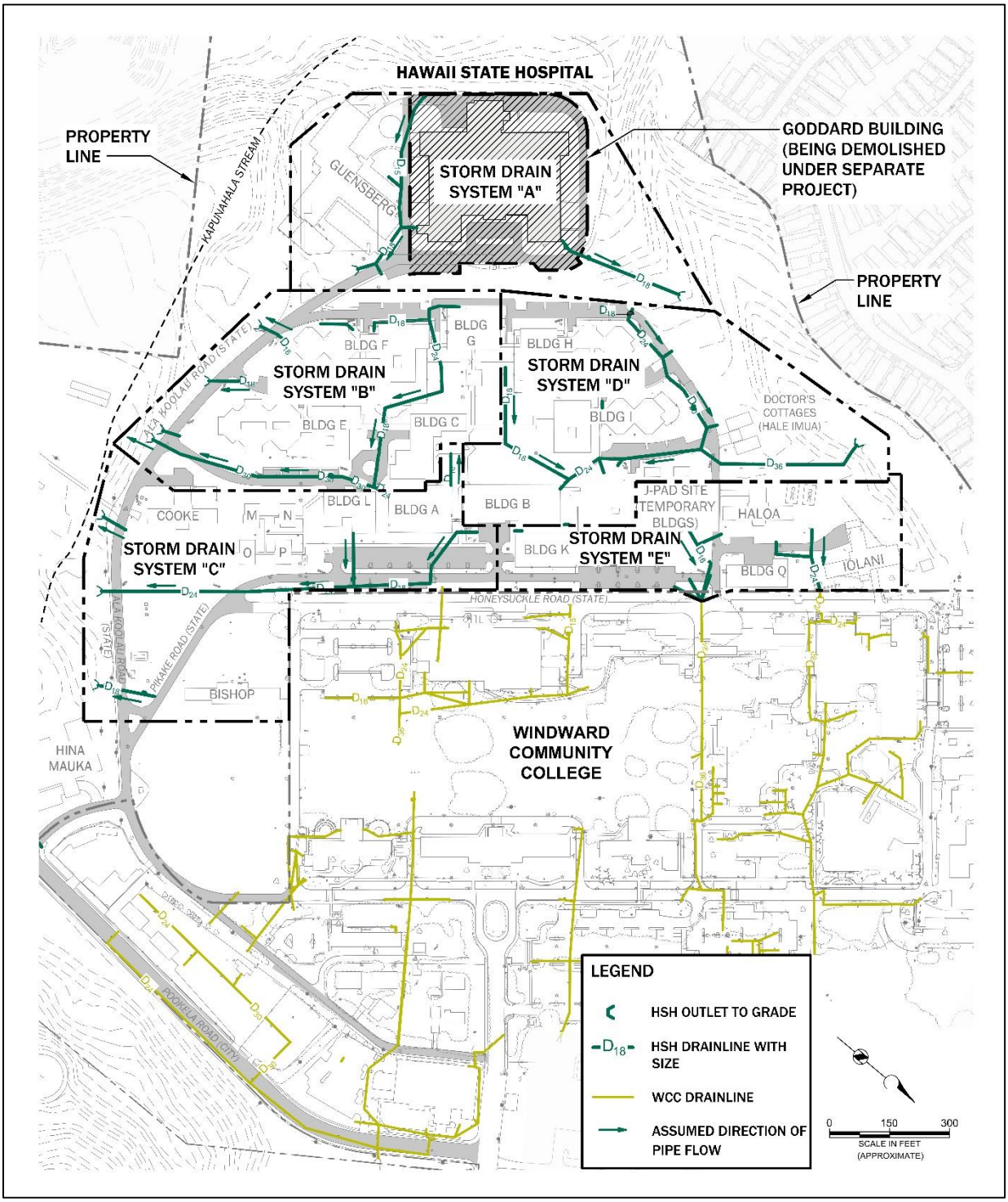

Figure 5-26. Existing stormwater lines

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5.5.2 Potential Impacts and Mitigation Measures

This section evaluates potential impacts to the existing site and stormwater drainage system that may result from the proposed improvements. CZM, the methodology presented in *The Stormwater Impact Assessments* guide developed by the OP, was used to perform this evaluation. The potential impacts to the site and downstream receiving water bodies may include the following:

- Alteration of drainage patterns may cause flooding of onsite areas or surrounding properties
- Increased peak stormwater runoff flow may be caused by the addition of impervious areas (buildings, walkways, parking lots, etc.) to the site, which may overload existing drainage pipes, increase the chance of localized site flooding, and alter receiving stream flow patterns

Refer to Section 3.5 for a discussion of potential impacts to surface water quality that may be caused by the proposed improvements. *The Stormwater Impact Assessments*' five-step framework for evaluating the impacts of stormwater at the HSH site are presented herein.

5.5.2.1 Step 1 – Gather Pertinent Data

Section 3.5.1.5 lists applicable TMDL requirements for water bodies in the vicinity of the project site. These requirements may influence the type of stormwater infrastructure that may be required because of the proposed development from a water quality perspective.

An extensive effort was undertaken during the development of this DEIS to determine the physical makeup of the stormwater collection system. The following activities are presented in the order in which they were conducted.

5.5.2.1.1 Preliminary Mapping

A preliminary map of the HSH stormwater collection system was developed based on previous record drawings from various phases of development over the history of the site. The preliminary map included areas such as the WCC campus, DOT Baseyard, and State Courthouse parcels.

5.5.2.1.2 Field Reconnaissance

A project team conducted a field reconnaissance site visit to confirm the drainage subsystems shown in Figure 5-26 and verify connectivity of pipes and location of drain inlets and outfalls. At the conclusion of the field reconnaissance, it was determined that Subsystem E and portions of the parcel *makai* of the Bishop building flow into the WCC stormwater collection system.

The field reconnaissance also failed to confirm the locations of the northern outfall for Subsystem A, the outfall for Subsystem D, the drainage area discharging to one of the outfalls in Subsystem B (south of Building F), and the origin of the drainage pipes between the State Courthouse and Hakipu‘u Learning Center. Further detailed investigation would be required to locate these facilities.

5.5.2.1.3 CCTV Inspection

A CCTV inspection of select stormwater infrastructure was conducted on June 27, 2016, by subcontractor USi. The CCTV inspection covered approximately 480 LF of pipe. The primary purpose of the inspection was to locate the facilities that could not be found during field reconnaissance efforts. A secondary outcome of the CCTV inspections was the ability to assess the interior condition of the pipes that were inspected. Appendix R contains the CCTV inspection summary for the stormwater pipe inspected.

Because of heavy sediment buildup in a number of pipes, the CCTV inspection effort was very limited in the amount of pipe length it was able to cover. However, these inspections did indicate some structural defects that warrant corrective action (see Table 5-10). For purposes of describing pipe

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conditions, the following categories and scoring ranges are used: good (8 to 10), fair (4 to 7), and poor (0 to 3).

Table 5-10. Drainage Critical Pipe Segments

Pipe No.[a]	Area	Defect	Condition
P-01	Subsystem A, northern drainline and outfall	Major root ball at approximately 240 ft from curb inlet.	3
P-02	Subsystem B, outfall across from Bldg F main gate.	Collapsed pipe encountered at 50 ft upstream of outfall.	0
P-05	Hakipuu Learning Center	Collapsed pipe encountered at 36 ft upstream of curb inlet fronting Hakipuu Learning Center.	0

[a] *See Appendix R for stormwatersystem pipe numbering.*

5.5.2.1.4 Smoke Testing

For pipes and outfall structures that could not be located via CCTV, USi used smoke testing on June 30, 2016, as an alternative means to locating these facilities. The concept of smoke testing is fairly simple. A non-toxic, mineral-based oil is converted to smoke, which is blown into a manhole or drain inlet. The smoke travels through the pipe and exits through defects in the pipe such as cracks, holes, and dislocated joints. In this effort, the project team looked for smoke that would be emitted through the outfall structures so they could be physically located. This effort proved to be successful in locating the missing outfalls and also in determining the origins of the pipe systems in question.

5.5.2.1.5 Map Revisions

Once the aforementioned efforts were completed, a planning-level survey was conducted and the stormwater collection system map was revised to better reflect existing conditions. This allowed for reasonable accuracy when analyzing the collection system for present and future conditions.

5.5.2.2 Step 2 – Determine Appropriate Level of Analysis

With the type of data available, it was determined that an appropriate level of analysis for evaluating stormwater impacts with respect to collection system infrastructure would be a hydraulic model to simulate ultimate buildout conditions. The rationale is that if a model of the system at ultimate buildout conditions shows no capacity deficiencies (e.g. major surcharging or spilling), then any phase of development prior to ultimate buildout would also not experience any capacity deficiencies.

5.5.2.3 Step 3 – Analyze Background Information in Light of Proposed Action

It is anticipated that the existing surface drainage patterns will remain largely unchanged by the improvements proposed for the First Phase and Overall Campus Buildout of Improvements of the site. As such, no mitigation measures would be proposed for either the First Phase or the Overall Campus Buildout of Improvements. The stormwater collection system will remain largely unchanged after the First Phase is completed as shown in Figure 5-27.

5.5.2.3.1 Increased Peak Stormwater Runoff Flow

The New Patient Facility constructed in the First Phase would add a negligible amount of impervious area to the site because the existing Goddard Building would be demolished in order to construct the New Patient Facility within the existing Goddard Building footprint.

For the Overall Campus Buildout of Improvements, additional impervious areas would be constructed on the site which may lead to an increase in peak runoff flow. Most of this increased peak runoff

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would likely come from the proposed additional parking areas at Zones 14 and 15 (see Figures 5-11 and 5-12). The new patient care facilities, new operations building, and skilled nursing facilities would not likely result in large net increases to the overall site impervious areas because they would replace existing buildings.

5.5.2.3.2 Hydraulic Modeling of Existing System

To evaluate the on-site and off-site impacts to the drainage systems, a hydraulic analysis of the existing HSH and WCC stormwater drainage systems was conducted to determine if it is sufficiently sized to accommodate any increase in runoff peak flows caused by the Overall Campus Buildout of Improvements. A conservative estimate of stormwater peak flow was developed that assumed that most of the area is impervious. Using this approach ensures that the modeled peak flows are likely higher than those that would be produced by any increase in impervious area. The hydraulic model was constructed using SewerGEMS® V8i Select Series 3 modeling software by Bentley Systems, Inc.

To prepare the model, physical attributes of the system (pipes, catch basins, and manholes) were determined through verification in the field, CCTV, smoke testing, and topographic surveys as described earlier. The rim and invert elevation of each catch-basin and manhole were surveyed and the size and invert elevation of each pipe was measured. A map of the modeled stormwater infrastructure is shown in Appendix R.

5.5.2.3.3 Model Methodology and Results

Modeling methodology was based on the Rules Relating to Storm Drainage Standards Per the CCH Drainage Standards, Department of Planning and Permitting, City and County of Honolulu, January 2000 (CCH Drainage Standards). Per the Drainage Standards, the Rational Method is to be used to estimate peak runoff flows from drainage areas that are less than 100 acres. The Rational Method is defined using the following equation:

$$Q = C\ i\ A$$

Where:

Q = flow (cfs)

C = land-use runoff coefficient (dimensionless)

i = rainfall intensity (inches/hour)

A = tributary area (acres)

To apply a degree of conservatism, a runoff coefficient (C) of 0.9 was used, which is appropriate for highly developed sites with mostly impervious areas.

The tributary area size and configuration was estimated using the topographic model of the site and engineering judgement. The site was also broken up into small sub-catchment areas that were less than 2 acres which were connected to catch basin inlets.

Per the CCH Drainage Standards, a 1-hour duration design storm with a recurrence interval of 10 years is to be used in the Rational Method calculation. The storm depth was obtained from the National Oceanic and Atmospheric Administration (NOAA) rainfall frequency maps located at the following website:

http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_hi.html

At the HSH site, a 1-hour storm with a 10-year recurrence interval has a depth of 3.1 inches. A rainfall intensity (i) of 3.1 inches per hour is assumed to occur for a duration equal-to or greater-than

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the time of concentration for each sub-catchment. With the small size of each sub-catchment, this is reasonable assumption.

The maximum hydraulic grade line at the calculated peak flow was determined by the modeling software and is presented in pipe segment profiles in Appendix R. Based on this hydraulic modeling methodology, existing stormwater collection system would likely have enough capacity to convey peak stormwater runoff flows from the Overall Campus Buildout of Improvements.

5.5.2.3.4 Anticipated Stormwater Drainage System Expansion

It is anticipated that the existing stormwater system may require expansion during the Overall Campus Buildout of Improvements phase. In particular, the following system reconfigurations may be completed

1.) Subsystem E which would serve the Plant Operations Building and New Patient Care Facilities (proposed to be located near existing Building I) the may be reconfigured to disconnect from the WCC stormwater conveyance system

2.) The drainage system for the proposed Skilled Nursing Facility may be connected to the existing 18, 24 and 30-inch stormwater drainage pipes located east of Po‘okela Street

3.) Additional stormwater infrastructure would be built to drain the additional parking lots proposed for MP zones 14 and 15.

The anticipated stormwater drainage system at buildout is shown in Figure 5-28.

5.5.2.4 Step 4 – Identify Mitigation Goals & Propose Mitigation Strategies

This step considers the primary, secondary, and cumulative impacts of the project development, and analyzes the mitigation goals and strategies to deal with those impacts. See Figures 5-27 and 5-28 for a potential expansion of the stormwater system for the first phase and overall campus buildout of improvements, respectively, to address and mitigate impacts from these phases on the stormwater system.

5.5.2.4.1 Primary Impacts

For NPF (first phase), the facility is being constructed in the same footprint as the existing Goddard building, and neither the amount of impervious area nor the stormwater runoff patterns are anticipated to change. Based on this minimal change, no mitigation measures are required. However, the condition assessment items in Table 5-10 should be addressed.

For the overall campus buildout of improvements, the buildout proposes some changes to the overall HSH campus. Zones 14 and 15 in the long term have the possibility of affecting the current stormwater patterns because of the potential increase in impervious surface area resulting from additional parking lots. Currently Zones 14 and 15 are on undeveloped land (including trees, grass, and dirt).

5.5.2.4.2 Secondary Impacts

For NPF (first phase), no secondary impacts are anticipated.

For the overall campus buildout of improvements, without mitigation, secondary impacts that may result from the overall buildout include an increase in peak runoff downstream from the HSH site. In addition, higher peak flow rates can cause an increase in contaminants in downstream waters.

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These contaminants may include sediment, nutrients, and other chemicals that may originate from the HSH site.

5.5.2.4.3 Cumulative Impacts

For NPF (first phase), no cumulative impacts are anticipated.

For the overall campus buildout of improvements, the secondary impacts of increased sediment, nutrients, and other chemicals that may originate from the HSH site for the overall campus buildout may contribute to cumulative impacts of a similar nature that may be experienced throughout the watershed.

5.5.2.4.4 Mitigation Goals and Strategies

In order to allow for these developments, mitigation strategies would be required to minimize the primary, secondary, and cumulative impacts at the HSH site and on downstream water bodies. In the Stormwater Impact Assessments guide, control measures are identified that can aid in stormwater retention, percolation, and treatment. Examples of these control measures include vegetated swales, subsurface stormwater capture/infiltration structures, stormwater wetlands, stormwater ponds, and filtering systems. All of these mitigation strategies may be feasibly implemented in stormwater mitigation design.

In addition, CZM offers the *Low Impact Development, A Practitioner's Guide* manual that provides stormwater mitigation techniques using low-impact development (LID). The three objectives of stormwater LID are preservation of natural features through conservation design, reduction of impervious cover, and utilization of natural features and source control for stormwater management. LID concepts from the manual that could potentially be applied to the HSH site include the following:

- Practice 6: Roadway Reduction
- Practice 7: Sidewalk Reduction
- Practice 11: Parking Reduction
- Practice 12: Vegetated Buffer/Filter Strips

These are only a sampling of the practices that could be used to mitigate stormwater impact. The design phase will include more detailed analysis and evaluation of the LID manual's principles.

5.5.2.5 Step 5 – Summarize Impacts and Mitigation

Step 5 will be finalized once the review and comment period on the DEIS is complete.

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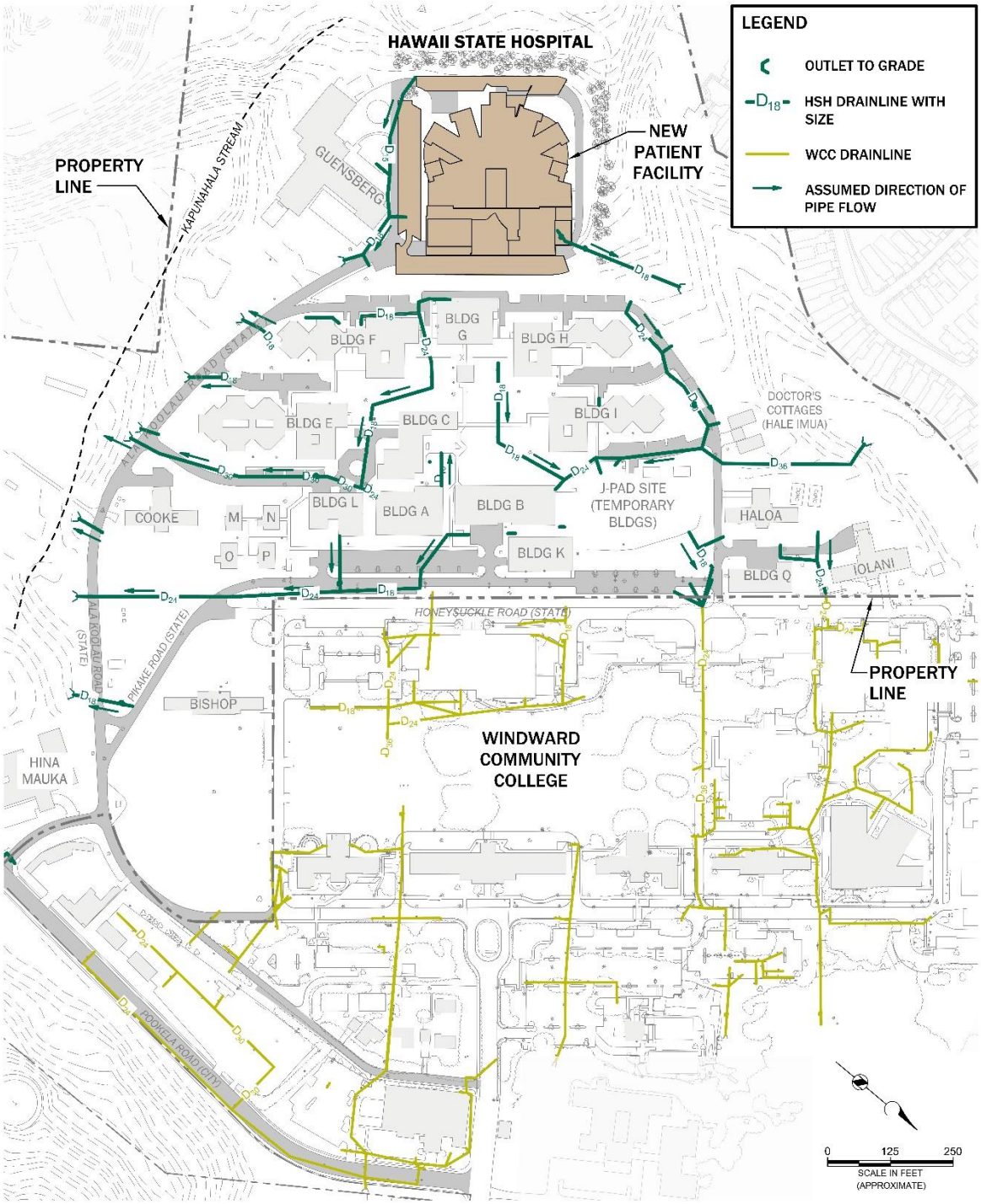

Figure 5-27. Possible layout of stormwater drainlines for first phase improvements

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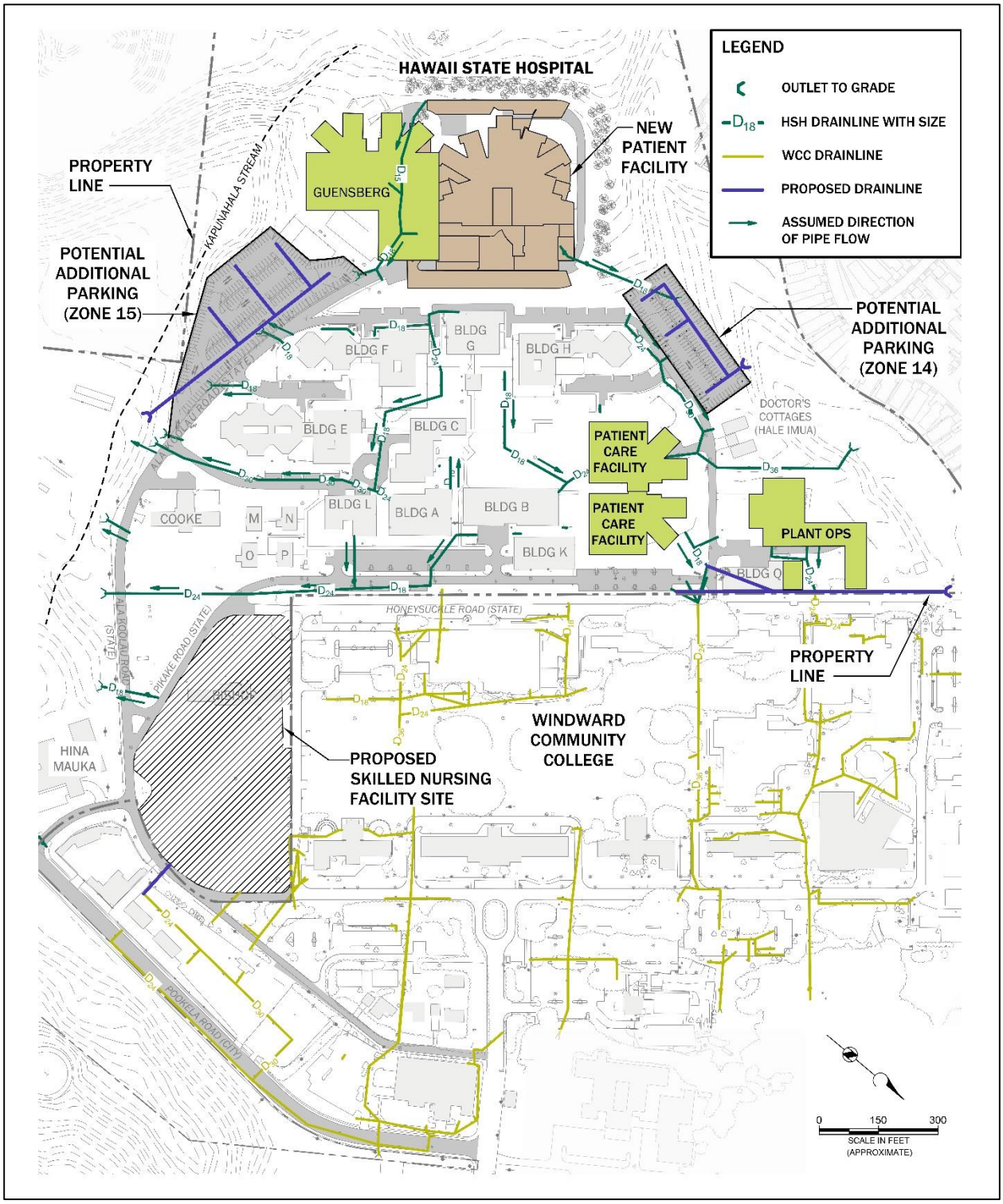

Figure 5-28. Possible layout of stormwater drainlines for overall campus buildout of improvements

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5.6 Fuel Sources

This section describes fuel sources in the project area, including the affected environment and potential impacts and mitigation measures.

5.6.1 Affected Environment

This section describes the affected environment related to fuel sources in the project area, including propane gas and fuel oil.

5.6.1.1 Propane Gas

Based on information received from HSH staff, liquefied petroleum gas (LPG) service at HSH used to consist of an underground piping network system and laterals to all buildings from centralized tanks. But HSH experienced line breaks of the distribution piping; thus, this centralized system has been shut down and abandoned in place. At present, every building at HSH has its own aboveground propane tank and piping system. Water heaters use LPG instead of electricity. Figure 5-29 shows the example of the 2,000-gallon aboveground LPG tank located near Building K.

Figure 5-29. 2,000-gallon aboveground LPG tank near Building K

The kitchen boiler located at Building A can use either LPG or fuel oil. The fuel oil is stored in a 4,000-gallon underground storage tank (UST) located near Building B. However, the fuel oil is not currently being used to power the boiler because of nuisance smell caused by the use of the fuel oil. Based on a site visit in May 2016, approximately 2,000 gallons of fuel oil is available in the UST and can be used, if needed. There have been no reported leaks and, according to HSH staff, there are underground leak sensors.

The existing Goddard building had its own underground LPG tank on the west side of the building that was removed. Figure 5-30 shows locations of the existing abandoned gas lines and approximate locations of the existing LPG tanks and UST for fuel oil. LPG is operated and maintained by Hawai‘i Gas. Table 5-11 below summarizes the LPG tank location, tank size, and estimated delivery of each tank that is used at HSH.

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Table 5-11. Existing LPG Tanks at Hawaii State Hospital		
Tank Location	Tank Size (Gallons)	Estimated Delivery Interval
Building B	2,000	Every 7-day interval
Buildings C and E	499	Every 10-day interval
Buildings F and G	499	Every 10-day interval
Buildings H and I	499	Every 10-day interval
Building Q (laundry)	2,000	Every 28-day interval
Guensberg building	499	Every 10-day interval

5.6.1.2 Fuel Oil

The kitchen boiler located at Building A can use either LPG or fuel oil. The fuel oil is stored in a 4,000-gallon UST located near Building B. However, the fuel oil is not currently being used to power the boiler because of nuisance smell caused by the use of the fuel oil. Based on a site visit in May 2016, approximately 2,000 gallons of fuel oil is available in the UST and can be used, if needed. There have been no reported leaks and, according to HSH staff, there are underground leak sensors.

5.6.2 Potential Impacts and Mitigation Measures

This section describes potential impacts and mitigation measures related to fuel sources in the project area, including propane gas and fuel oil.

5.6.2.1 Propane Gas

The proposed NPF will be serviced by a new dedicated aboveground LPG tank and piping system to support the hot water heating equipment for the proposed building. The proposed tank location will need to consider building setback requirements, as well as clearance requirements from other equipment, structures, facilities, and utilities.

Two 199,000-British-thermal-unit per hour (Btuh) instant gas water heaters will supplement the hot water needs for the proposed NPF. A new 499-gallon LPG tank should be situated in close proximity to the new mechanical room. When the proposed Guensberg building is constructed, the 499-gallon LPG tank can be replaced with a 1,150-gallon or 2,000-gallon LPG tank at the same location. See Figure 5-31 for the proposed locations of the water heater and LPG tank for NPF.

In addition, LPG consumption for future improvement phases was investigated based on available information and assumptions. Two 199,000 Btuh instant gas water heaters for the new Guensberg building and one each for the new Phases 3A and 3B patient care facility would be needed. The 499-gallon LPG tank will be replaced with a new 1,150-gallon or 2,000-gallon LPG tank to accommodate both the new Guensberg building and NPF. One 250-gallon LPG tank for each Phase 3 (A and B) patient care facility will be provided. See Figure 5-32 for the proposed locations of the water heater and LPG tank for the overall campus buildout of improvements.

The design of the new LPG tank and piping system will be in compliance with the most current version of NFPA *1, Uniform Fire Code* NFPA 54: National Fuel Gas Code and the City HFD *Fire Code* through coordination with Hawai‘i Gas.

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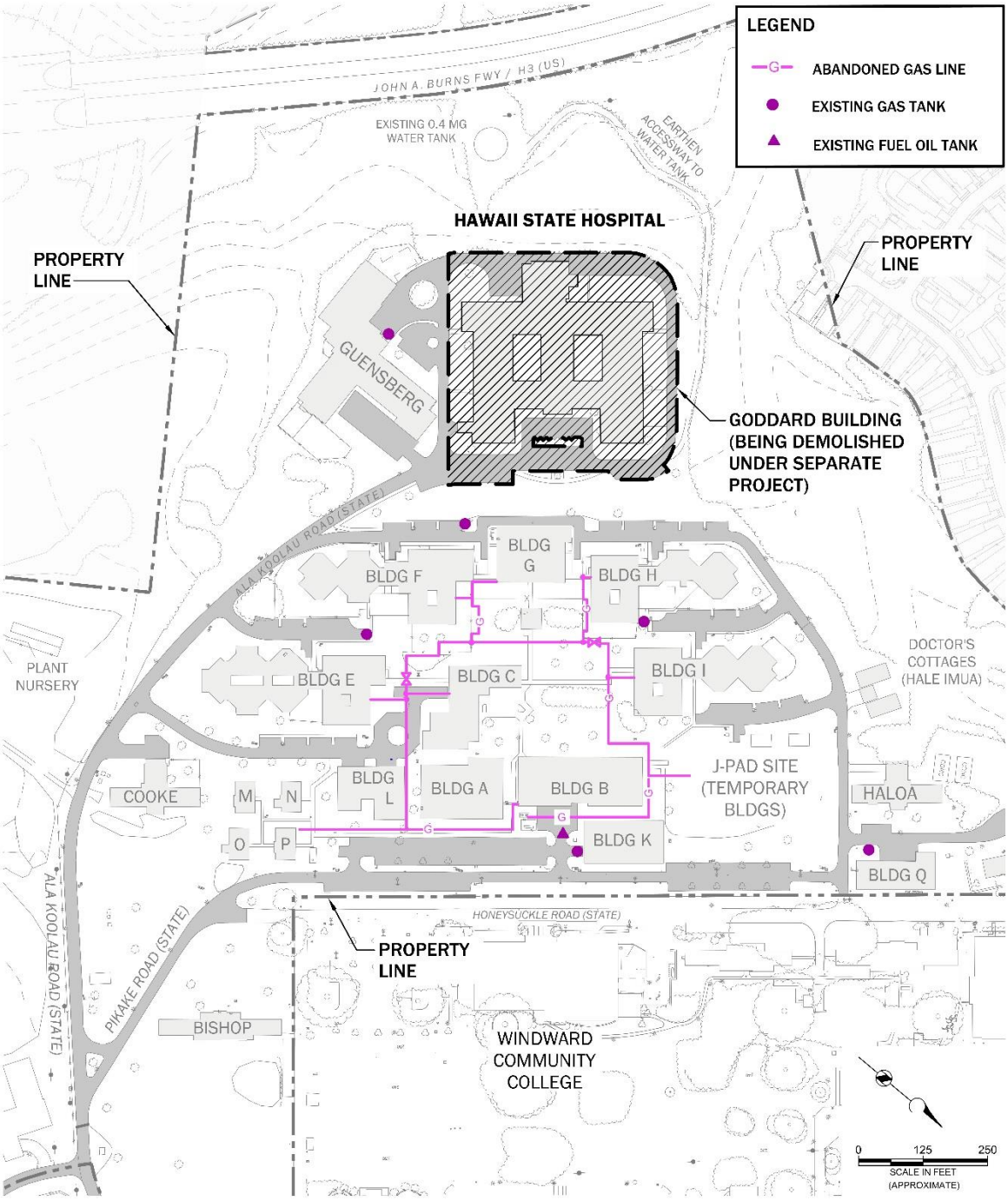

Figure 5-30. Existing gas and fuel oil tank

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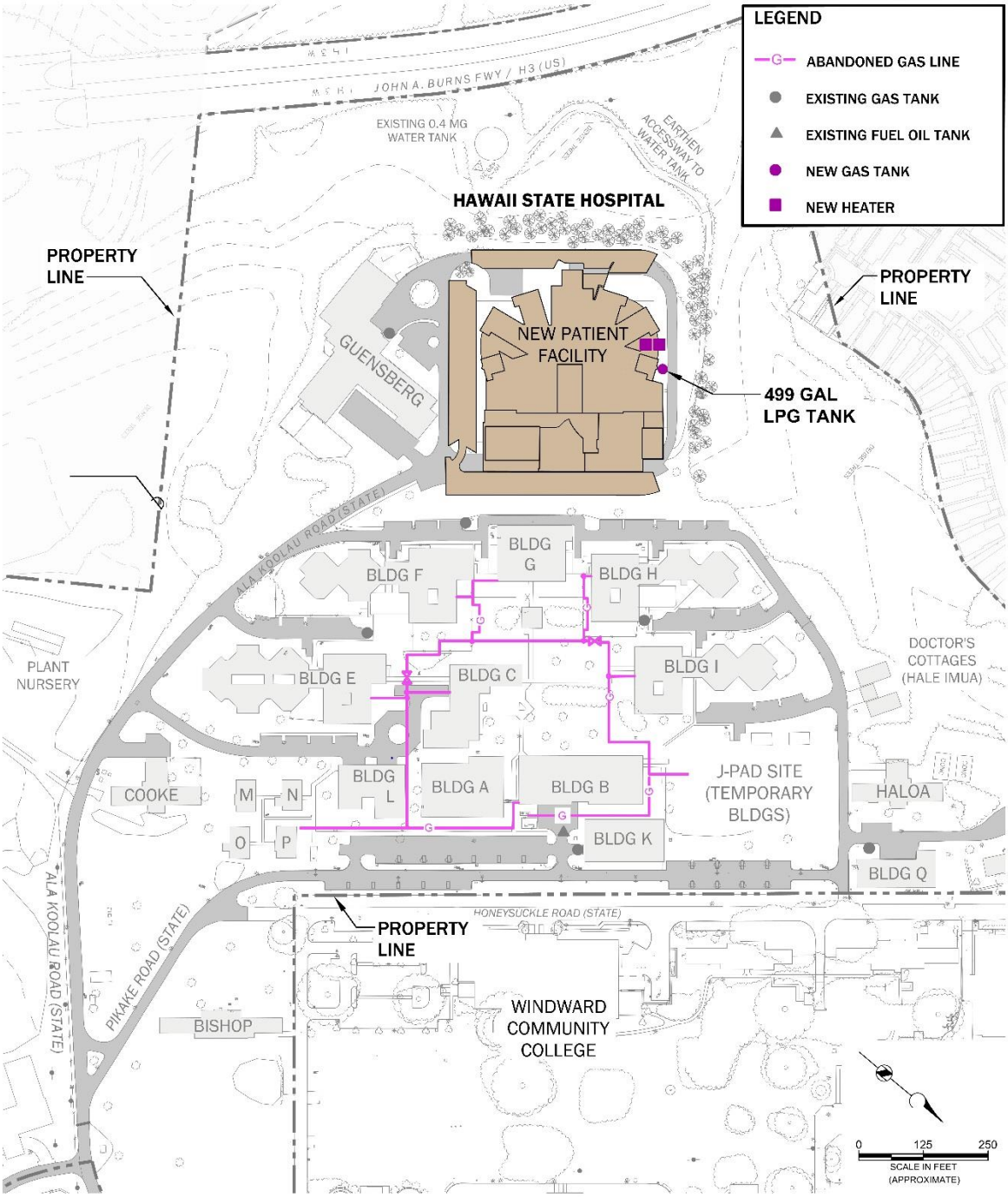

Figure 5-31. New gas tank and heater for first phase

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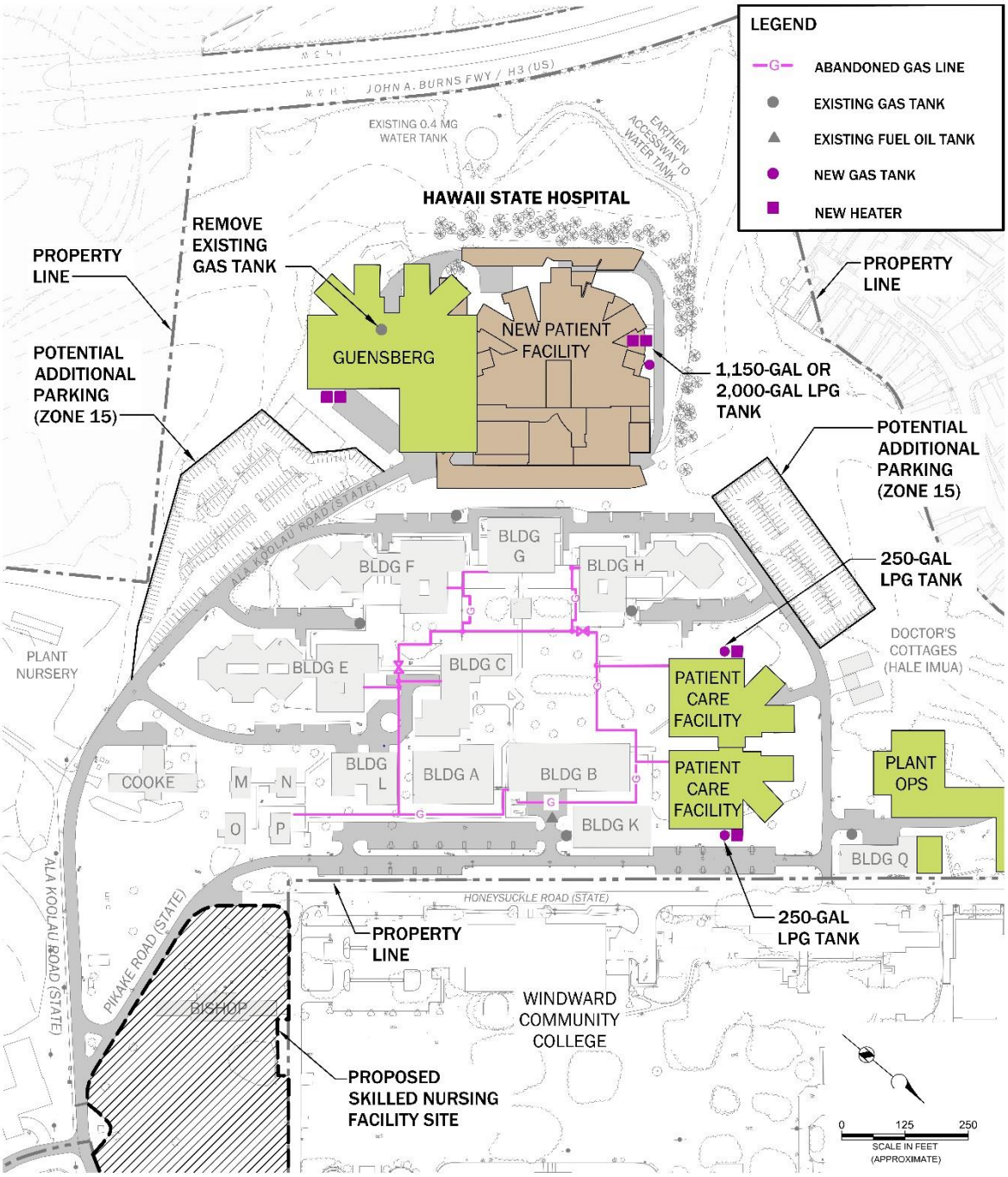

Figure 5-32. New gas tank and heater for full buildout of campus improvements

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5.6.2.2 Fuel Oil

Based on the 2005 MP, no new USTs for fuel oil are proposed for the future improvements.

The current UST near Building A should follow EPA guidelines of Subchapter IX: Regulation of Underground Storage Tanks. The following are a few guidelines from EPA that the UST needs to follow:

- “Set operating requirements and technical standards for tank design and installation, leak detection, spill and overfill control, corrective action, and hank closure.”
- “Added new leak detection and enforcement provision.”
- “Adding periodic operation and maintenance requirements for UST systems.”

The UST should also follow HAR Title 11, Chapter 281 pertaining to UST containments maintenance, and operations. The follow are a few examples that should be enforced:

- Secondary Containment (HAR 11-281-17)
- Operator Training (HAR 11-281-46)
- Permit required (HAR 11-281-23, 24, 25
- Under dispenser containment, and Spill and overfill control (HAR 11-281-19, 41)
- Spill and overfill prevention equipment (HAR 11-281-14)

5.7 Solid Waste and Medical/Hazardous Waste

This section describes solid waste and medical/hazardous waste in the project area, including the affected environment and potential impacts and mitigation measures.

5.7.1 Affected Environment

Solid waste collection and disposal is currently contracted out and managed by Rolloffs Hawai‘i LLC. Rolloffs Hawai‘i provides 15 front-end loading (FEL) disposal containers that are located on site for solid waste disposal. Four of these containers have a capacity of 3 cubic yards (yd^3) and 11 of these containers have a capacity of 6 yd^3, allowing for a maximum solids waste capacity of 78 yd^3 at any given point on site. Figure 5-33 provides an example of a 3 yd^3 container and a 6 yd^3 container. Rolloffs Hawai‘i LLC services its containers twice per week, on Mondays and Thursdays.

Figure 5-33. A 6 yd^3 FEL container (left) and a 3 yd^3 FEL container (right)

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The average amount of waste generated per each HSH staff and patient can be roughly estimated using the known solids waste handling capacity of the campus. Assuming that the containers reach only an average of 50 percent capacity, or approximately 39 yd^3, and that all 562 HSH staff and patients are present on the campus on a daily basis, the amount of solid waste generated per person per week was calculated to be around 0.14 yd^3. This estimate is likely on the high end as many staff members do not go on campus on the weekends. Medical waste is defined separately from solid waste and includes materials that have been contaminated by potentially infectious bodily fluids. These contaminated materials range from bandages and soiled laundry to sharp objects such as needles and broken glass. Medical waste disposal is contracted out through NCNS Environmental Inc., which services the campus every Wednesday.

The medical waste that is generated from HSH is placed in red biohazard bags, sharps containers, or blue biohazard laundry bins as shown in Figure 5-34. The largest bag and container size is approximately 18 inches by 12 inches by 12 inches. Soiled items such as bandages, clothes, plastics, and other non-sharp objects are placed inside of the red biohazard bags. Sharp objects such as needles, cannulas, and butterflies are discarded in a sharps container. Laundry that is soiled is placed in the blue biohazard laundry bin.

Figure 5-34. Typical examples of a red biohazard bag (left), sharps container (center), and biohazard laundry bin (right)

Medical waste is collected by grounds personnel and consolidated inside of green medical disposal containers (Figure 5-35). The green medical disposal container is stored in a designated locked room in the Guensberg building.

Currently, HSH has 178 patients and one green medical disposal container. The green container's volume is about 0.7 yd^3 at full capacity. It is assumed the only about 80 percent of the container will be filled when being disposed. With 178 patients, the total amount of medical waste that is generated is approximately less than 0.6 yd^3 (~0.55 yd^3). Therefore, it is estimated that each patient generates about 0.003 yd^3 per person per week.

Figure 5-36 shows the existing locations of the solid and medical waste containers around the campus.

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Figure 5-35. Green medical disposal container

5.7.2 Potential Impacts and Mitigation Measures

By assuming that the generation of solid and medical waste will follow a linear pattern, and that the SNF’s solid and medical waste will be combined with HSH’s solid and medical waste, the amount of solid and medical waste that will be generated with the completion of first phase and overall campus buildout of improvements was extrapolated.

With the first phase (NPF) completed, the expected total amount of solid waste and medical waste that will be generated is approximated to be 135 yd^3 per week and 0.97 yd^3 per week, respectively. With the overall campus buildout of improvements (including SNF) completed, the expected total amount of solid waste and medical waste that will be generated is approximated to be 267 yd^3 per week and 2 yd^3 per week, respectively.

To accommodate the projected amount of additional solids and medical waste that will be generated, first phase and the full buildout will incorporate the following mitigation measures:

- In completion of first phase:
  - Purchase eight new 6 yd^3 solid waste containers
  - Purchase three new 3 yd^3 solid waste containers
  - Purchase one new 0.7 yd^3 medical waste container
- In completion of the overall campus buildout of improvements:
  - Purchase 20 new 6 yd^3 solid waste containers
  - Purchase four new 3 yd^3 solid waste containers
  - Purchase two new 0.7 yd^3 medical waste containers

Figures 5-37and 5-38 show where the solid and medical disposal bins will be located in the future. These mitigation measures will allow for safe handling and disposal of the projected additional waste from construction of the first phase and overall campus buildout of improvements.

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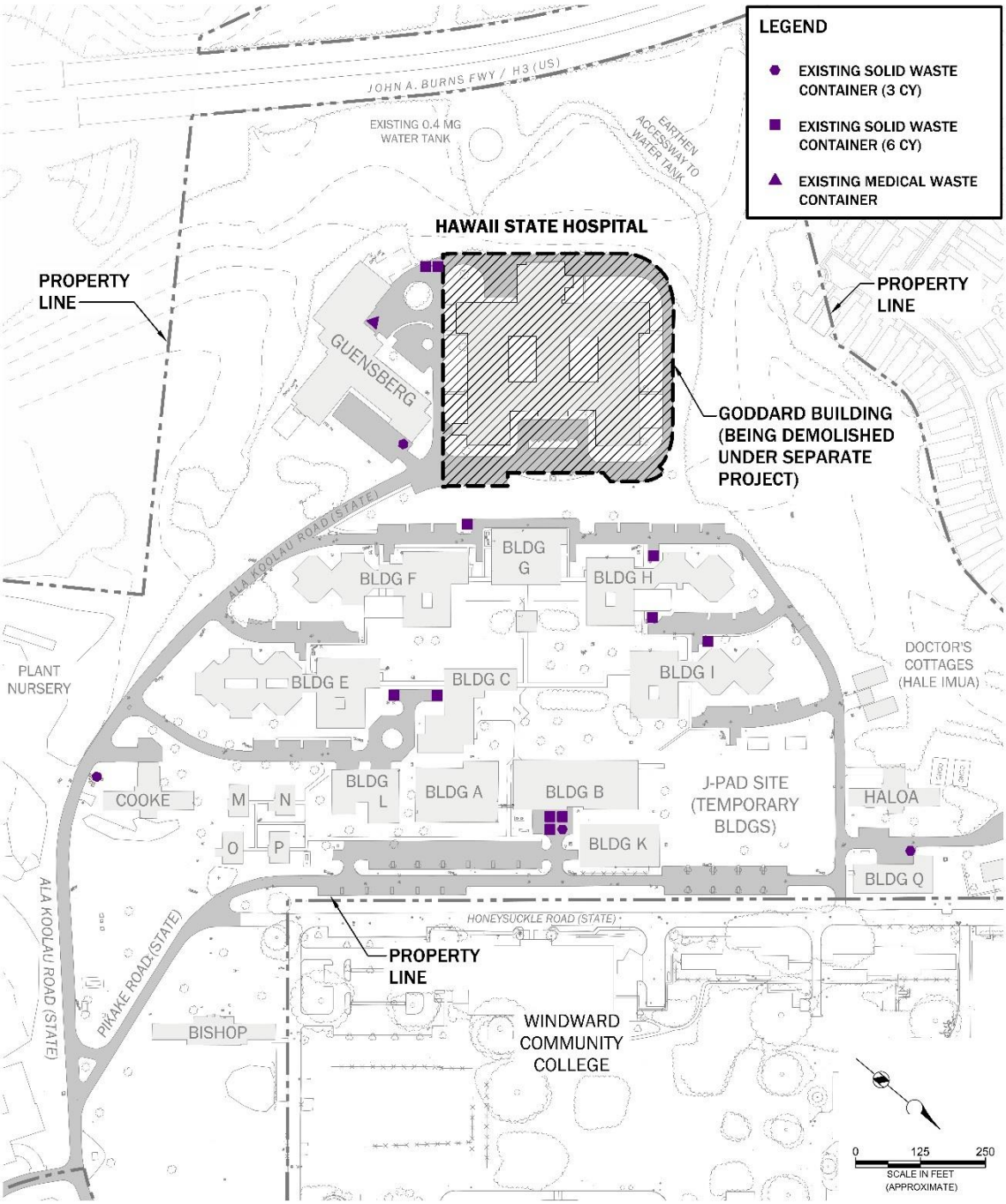

Figure 5-36. Existing solid and medical waste containers

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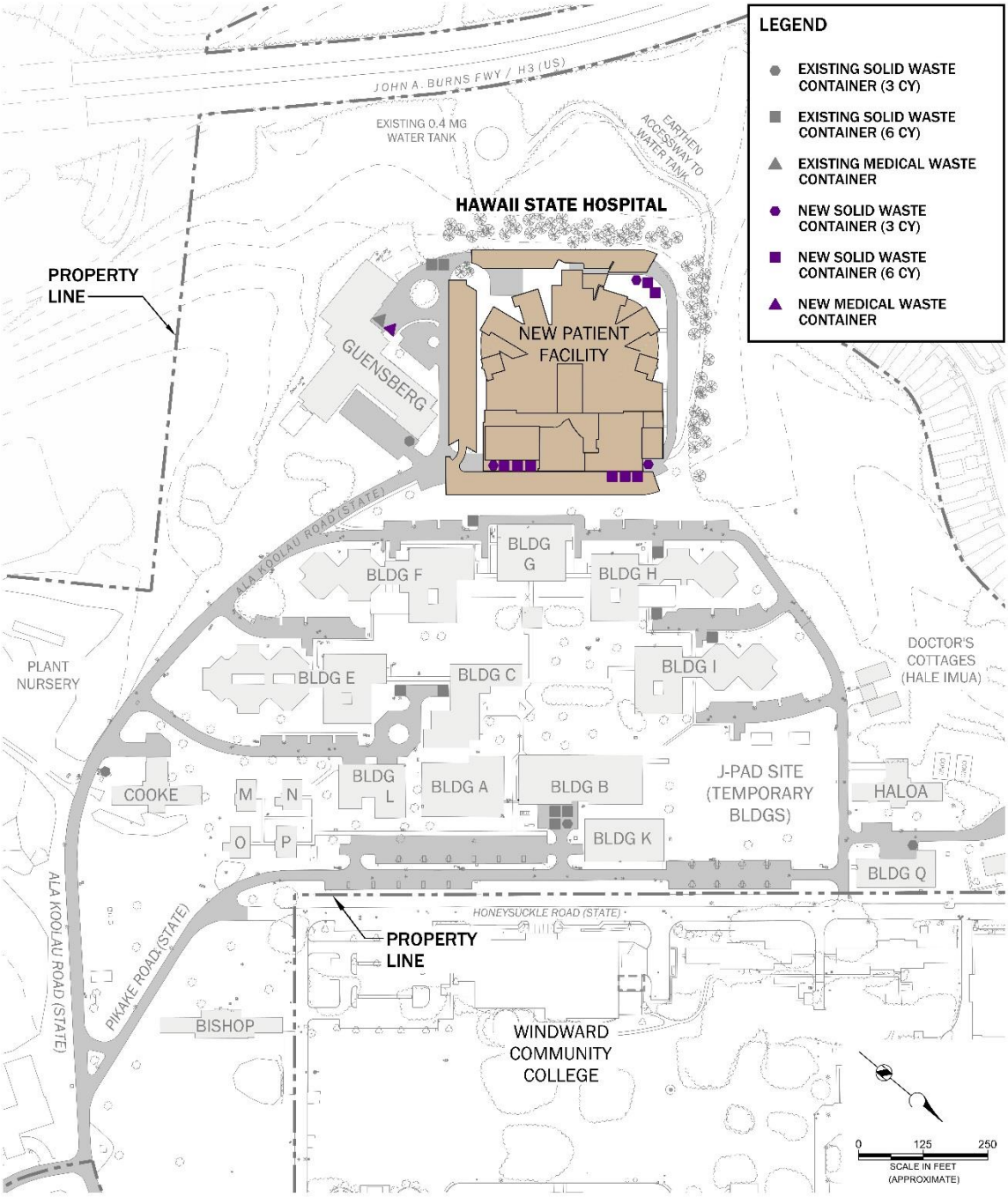

Figure 5-37. Solid and medical waste containers for first phase

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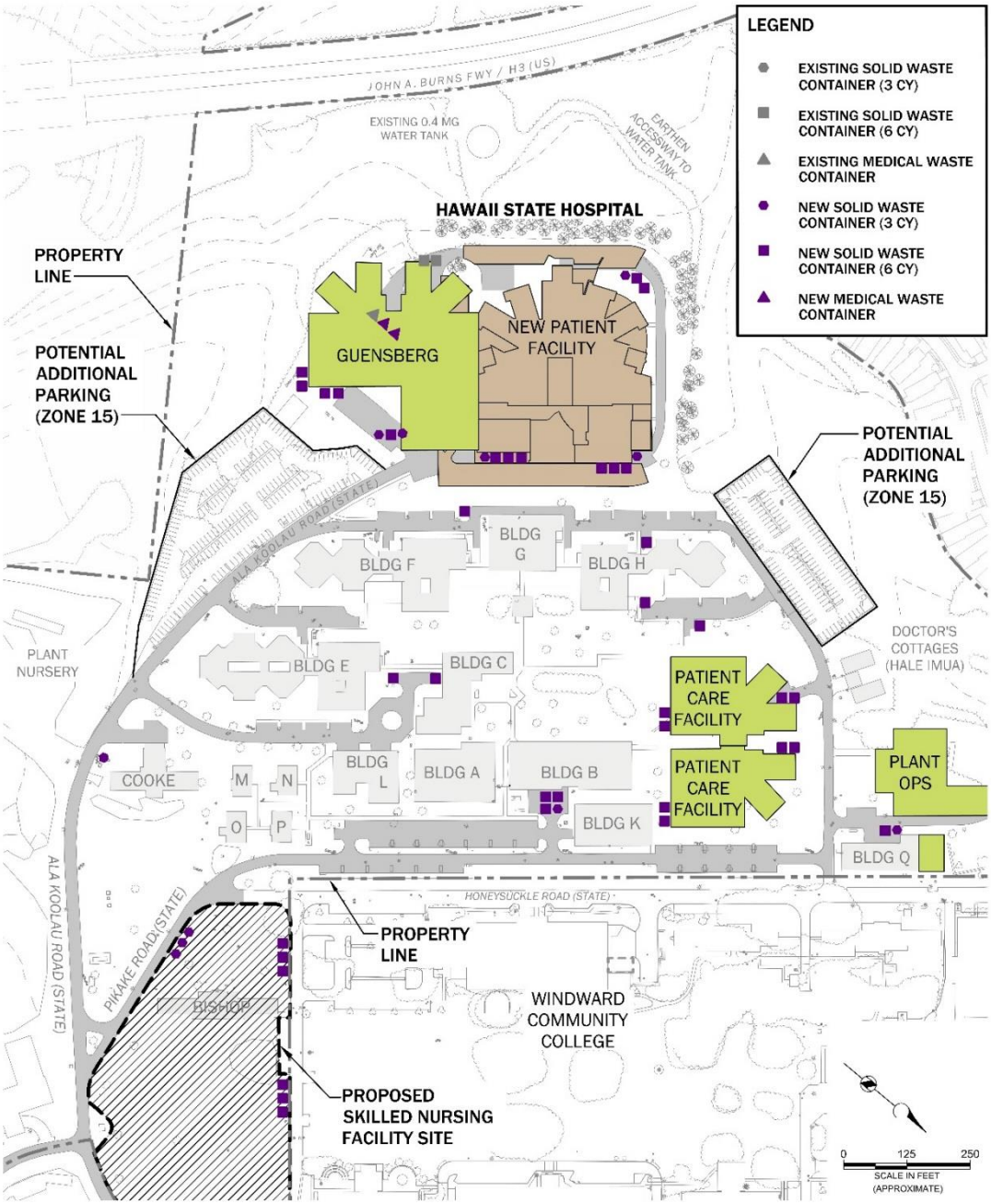

Figure 5-38. Solid and medical waste containers for full buildout of site improvements

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5.8 Electrical Power Supply and Lighting Systems

This section describes the electrical power supply and light systems at HSH, including the primary electrical power supply, standby generator, and site lighting system.

This section also describes potential impacts to the electrical power supply and lighting systems at HSH due to this project, including the primary electrical power supply, standby generator, and site lighting system, and addresses potential mitigation measures.

5.8.1 Affected Environment

This section describes the affected environment related to electrical power supply and lighting systems in the project area, including the primary electrical power supply, standby generator, and site lighting system.

5.8.1.1 Primary Electrical Power Supply

HSH currently has two separate electrical service feeds from HECO, one operating at 4.16 kilovolts (kV) and a second at 12.47 kV. HECO is the exclusive utility supplying electricity to the site. The 4.16 kV service is an older service that supplies only a few buildings on the campus. HSH is in the process of phasing out this service in favor of the newer 12.47 kV service, which supplies most of the buildings at the site. Each service is individually metered, and both enter the site via overhead lines. A single 12.47 kV distribution circuit (originating at a HECO substation located on Kea‘ahala Road between Kea‘ahala Place and Ano‘i Road) supplies both the 12.47 kV service and the 4.16 kV service to HSH. The 12.47 kV overhead service is tapped and transformed down to 4.16 kV via pole-mounted transformers located along Kea‘ahala Road to supply HSH’s 4.16 kV system. HECO’s 12.47 kV circuit also supplies the WCC campus; however, WCC’s service connection is independent of HSH’s service.

The 4.16 kV service currently feeds the Guensberg building, Cooke building, Aloha Gardens, and Plant O&M Yard, and formerly fed the Goddard building prior to its abandonment in 1990. The 4.16 kV service is routed to the existing 4.16 kV standby generator located near the intersection of Kea‘ahala Road and Po‘okela Street. The 4.16 kV service splits at this point, with one set of overhead lines entering the main HSH site along Banyan Drive and the second set providing power to the Plant O&M Yard located at the northern edge of the WCC campus. The service to the main HSH facility transitions to two underground feeders at two poles located along Banyan Drive near the entrance to Aloha Gardens. These underground feeders supply the Guensberg and Cooke buildings via a network of handholes and underground conduits. A third pole in the same area provides 4.16 kV overhead service to the Aloha Gardens facility.

A project to install a central 12.47 kV standby generator and upgrade the facility electrical system (DAGS Job 12-20-2662) is currently under way and will connect the Guensberg building, Cooke building, and Aloha Gardens to HSH’s 12.47 kV distribution system and remove the 4.16 kV underground feeders from the main HSH site. The Plant O&M Yard will remain on the existing 4.16 kV service until that facility is relocated under future phases of improvements as outlined in the 2015 MPU.

The 12.47 kV service is HSH’s primary service and currently feeds most of the buildings on its campus via an underground loop distribution system. The 12.47 kV service enters the HSH site via Po‘okela Street and Banyan Drive and transitions to dual underground service feeders at a riser pole near HSH’s primary switchgear; these dual feeders supply HSH’s primary switchgear. From the switchgear, 12.47 kV feeders are routed to the various buildings on the site through a network of handholes and underground conduits, which compose the underground infrastructure for the

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distribution loop. The loop is used to provide two pathways between the primary switchgear and the pad-mounted transformers located at each building or group of buildings. This allows one or more buildings to be isolated from the primary switchgear for maintenance and provides the ability to quickly restore power to buildings if a section of the loop is accidentally broken. The loop is separated into an “upper” loop (which typically feeds Buildings A, C, E, F, and G) and a “lower” loop (which typically feeds Buildings B, H, I, K, L, Q, Hāloa, and ‘Iolani). Switching between the upper and lower loops is performed at the transformers.

HSH’s electrical service and distribution system is identified in Figure 5-39.

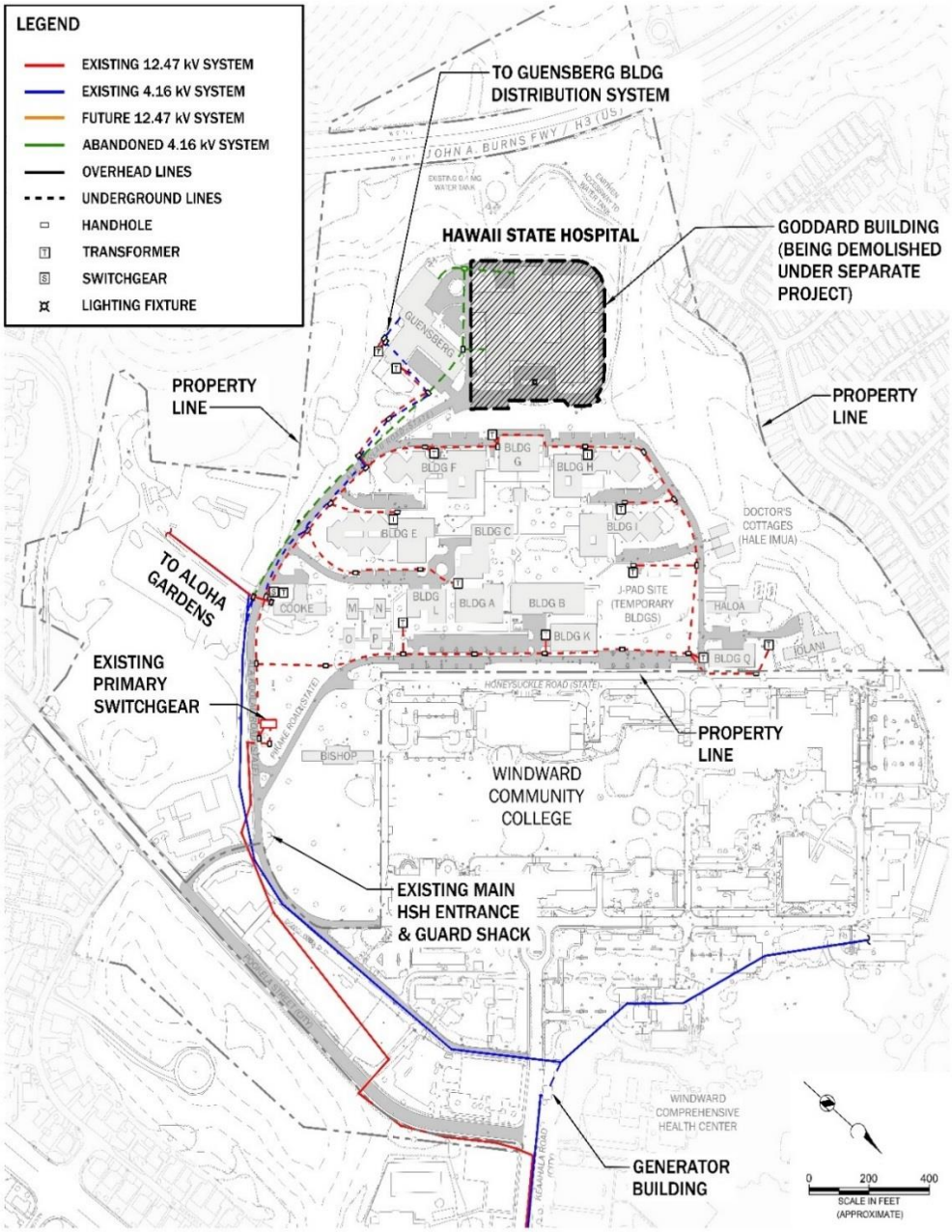

Figure 5-39. Existing overall electrical lines

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5.8.1.2 Standby Generator

Standby power generation provisions for the HSH site include a centralized generator that serves the entire 4.16 kV system and distributed stationary diesel generators located at each of the buildings served by the 12.47 kV system. The central 4.16 kV generator is located along Kea‘ahala Road near the intersection of Po‘okela Street inside a large corrugated metal building. The central generator is no longer operational and there are currently no plans to repair it. Distributed stationary generators serve critical 480/277-volt (V) and 208/120 V loads at each building and range in size from 20 kilowatts (kW) to 50 kW.

A project (DAGS Job 12-20-2662) is currently under way to install a central 2,500 kW, 12.47 kV diesel standby generator in a new building just west of the facility primary switchgear. The generator will be connected to the underground distribution loop and will be capable of providing electricity to all buildings connected to the distribution loop. HSH personnel have indicated that the generator fuel tank is sized to provide 5 to 7 days' continuous runtime. The existing generator for the 4.16 kV system will remain to serve the Plant O&M Yard. The existing distributed stationary generators at each building will be disconnected and salvaged under this same project, with some being retained as portable trailer-mounted generators for use as needed. This project will also provide new permanent 50 kW generators to serve critical loads at Buildings A and B in the event that the central generator is unable to serve these loads.

5.8.1.3 Site Lighting System

The existing site lighting system consists of pole-mounted fixtures along roadways and in the parking lots and common areas. Fixtures mounted on the exteriors of the buildings provide area lighting around buildings. All site lighting is generally fed from electrical distribution panels located in the nearest building. HSH's head electrician has expressed a desire to convert site lighting to LED lamps in the future to reduce energy consumption. Since the abandonment of the Goddard building in 1990 and disconnection of its electrical service, HSH's head electrician has installed floodlights around the building to maintain area lighting for security and operations purposes.

Existing lighting in the area of the Goddard building is identified in Figure 5-39.

5.8.2 Potential Impacts and Mitigation Measures

This section describes potential impacts and mitigation measures related to electrical power supply and lighting systems in the project area, including the primary electrical power supply, standby generator, and site lighting system.

5.8.2.1 Primary Electrical Power Supply

Preliminary estimates indicate that the first phase of the project will increase the total electrical load by approximately 650 kilovolt-amperes (kVA). HECO has reviewed this information and tentatively confirmed that the existing electrical service currently has the capacity to support this increase. Therefore, no upgrades are anticipated for the incoming HECO infrastructure to support the construction of the proposed NPF. The increased electrical demand will reduce HECO's spare capacity and may impact its ability to provide power to new customers or facility upgrades in the future.

The 2005 MP suggested that the 12.47 kV distribution loop be revised to include new HECO switchgear located at a Central Utility Building and two new primary switches (one at the existing switchgear, one at the new switchgear). Since that time the primary switchgear has been replaced and revisions to the distribution loop are currently under way. These modifications are similar to the 2005 MP recommendations and eliminate the need to add these items into a Central Utility Building.

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Underground electrical infrastructure improvements within the site will be required to serve the proposed facility. The 12.47 kV underground electrical distribution loop will be extended to incorporate the proposed NPF in this system. This will require trenching and installation of underground conduits and cables to the nearest loop access point for connection, which currently appears to be the electrical handholes in the region of the Guensberg building. Alternate access points for connection include the electrical handholes located at Buildings F, G, and H; however, these locations would require considerably longer underground conduit and cable runs. The existing 12.47 kV distribution loop covers most of the main HSH campus and has limited spare capacity for future expansion. Where feasible, future electrical upgrades may use the existing network of electrical ducts before considering installation of new underground infrastructure.

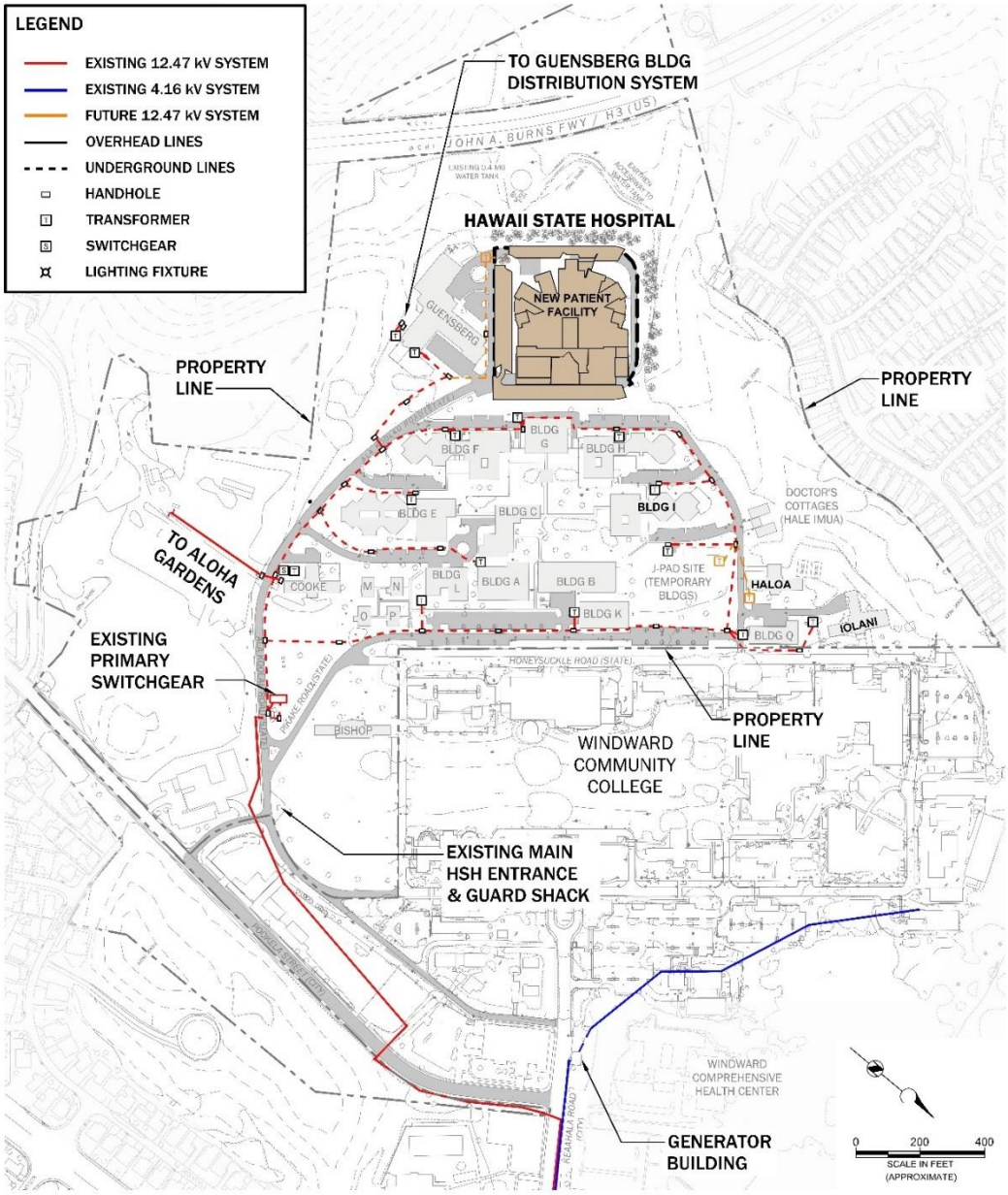

Figure 5-30. Electrical system for first phase

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It is assumed that the proposed SNF will have an independent connection to HECO services and will not use the HSH distribution loop. Future phases of construction described in the 2015 MPU will require demolition of existing facilities and may present further increases in electrical load and require additional modifications to the site electrical infrastructure. HECO electrical transmission and distribution infrastructure will most likely need to be upgraded to accommodate future phases of improvements. Planning for these future improvements will need to be coordinated closely with HECO to ensure that electrical service modifications account for HSH's long-term expansion plans.

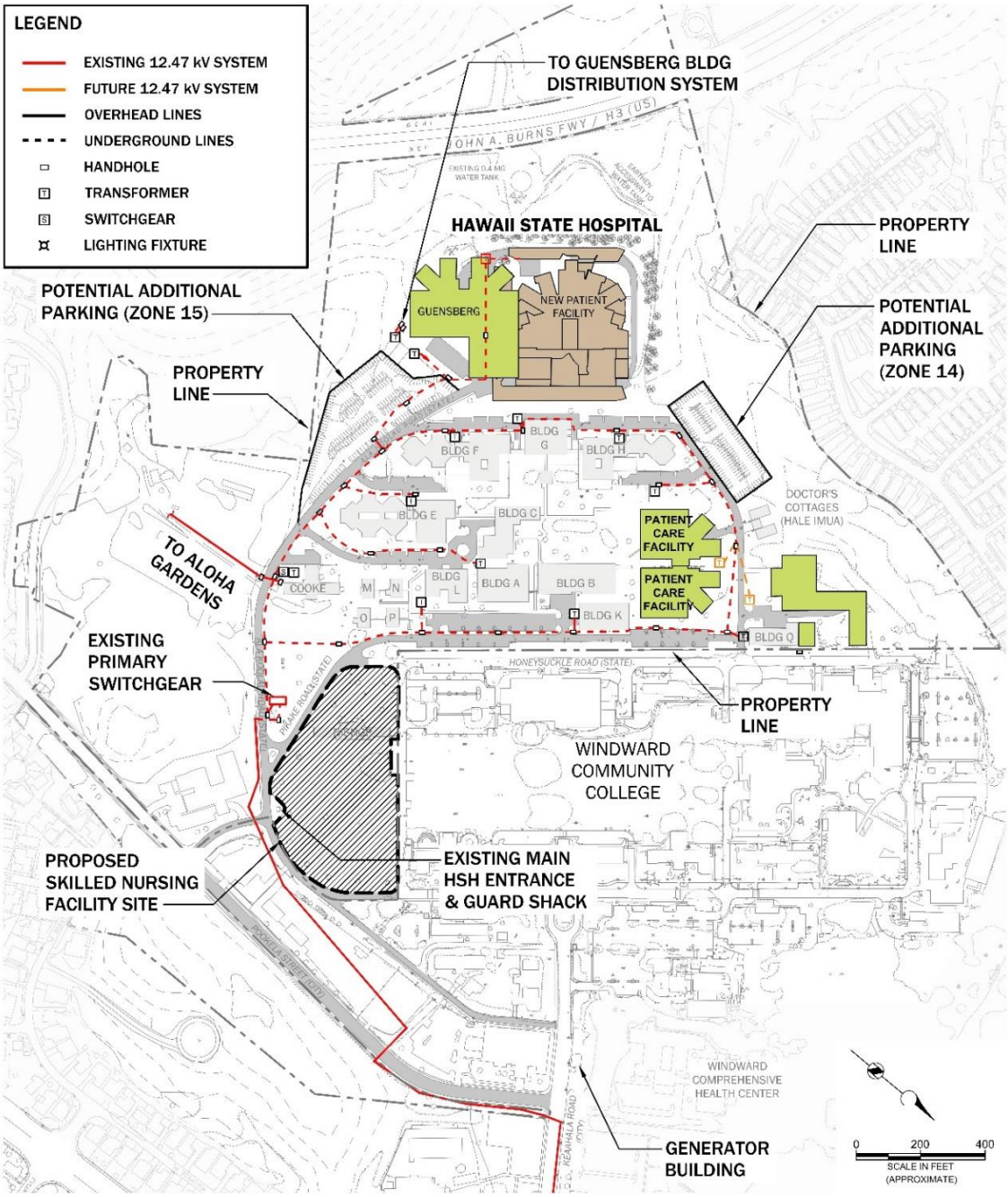

Figure 5-31. Electrical system for overall campus buildout of improvements

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5.8.2.2 Standby Generator

The 2005 MP recommended a centralized standby generator system located at the proposed Central Utility Building and tied into the distribution loop with new HECO switchgear. As described in Section 5.8.1.2, a 2,500 kW standby generator is currently being installed at the site that is capable of providing centralized standby power to HSH's 12.47 kV distribution system. Based on the preliminary load estimates it appears that the standby generator will be able to provide standby power to the proposed NPF. However, the new campus generator will not be relied upon to feed the NPF, and a new generator will be installed as recommended.

The proposed SNF will not be connected to the HSH electrical distribution loop and therefore will not be fed from the HSH standby generator. As discussed above, the increase in electrical load due to future construction phases will sometimes be accompanied by demolition of existing facilities. However, given the extent of future expansion proposed in the 2015 MPU, it will most likely be necessary to expand the total standby generation capacity of the HSH campus during future phases.

5.8.2.3 Site Lighting System

Pole-mounted and exterior wall-mounted fixtures will be installed around and on the proposed NPF to provide lighting for accessways, parking areas, security, and operations. Proposed pole-mounted lights will be powered from the building distribution system, which will require trenching for underground ducts and wiring. LED light fixtures will be used for exterior lighting to reduce energy consumption.

Site lighting levels will be provided in accordance with industry standards for security and application-specific lighting, including guidelines and recommendations developed by the Illuminating Engineering Society (IES). Shielded full-cutoff light fixtures will be used to limit nuisance lighting of adjacent lots and excess glare and light pollution.

Future phases of improvements will follow the same guidelines established during this project.

5.9 Communication, Security, and Alarm Systems

This section describes the communication, security, and alarm systems in the project area, including the affected environment and potential impacts and mitigation measures.

5.9.1 Affected Environment

This section describes the affected environment related to communication, security, and alarm systems at HSH, including telephone and data service, security and alarm systems, and cable television (CATV).

5.9.1.1 Telephone and Data Service

Telephone and data service to HSH is provided by Hawaiian Telcom. Hawaiian Telcom's incoming service terminates at the main telecommunications equipment located in the security and telecom room in Building A. A network of communication handholes and underground conduits carries telephone, data, and security cables around the HSH campus and connects each building to the central telecommunications system located in Building A. Communications and security cables are kept separated in parallel underground conduits from Building A to all other buildings. Hawaiian Telcom has indicated that it plans to phase out the existing copper wire communications systems and install a new fiber-optic network within the site that will increase available bandwidth. The exact

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time frame for this upgrade is currently unknown; however, it is expected that this infrastructure replacement will be completed prior to any work for the proposed NPF.

5.9.1.2 Security and Alarm Systems

The site security, access control, and fire alarm systems are provided by SimplexGrinnell, which installs and maintains video cameras, access control, and fire alarm hardware and software. Components of the system communicate back to the security and telecom office via dedicated underground cables provided by Hawaiian Telcom. Security and alarm cables are run in dedicated conduits parallel to the telephone cables.

5.9.1.3 Cable Television

Based on an assessment of existing electrical and communication systems performed for the 2005 MP, it is believed that many of the active buildings on the HSH campus are provided with CATV via satellite dish systems, including Buildings B, C, E, F, G, H, I, K, and L. Other buildings on the site do not appear to be provided with CATV systems. Oceanic Time Warner Cable provides an underground feed to the security and telecom office in Building A.

5.9.2 Potential Impacts and Mitigation Measures

This section describes potential impacts of this project to the communication, security, and alarm systems at HSH, including telephone and data service, security and alarm systems, and CATV, and also describes potential mitigation measures. The proposed SNF will be provided with separate telecommunications, security, and alarm systems and will not be connected to HSH systems.

5.9.2.1 Telephone and Data Service

As discussed in Section 5.9.1.1, Hawaiian Telcom’s plan to replace the copper wire network with a fiber-optic network should allow additional connections without significant expansion of the existing underground infrastructure. However, the proposed NPF will require extension of the site’s data and communications infrastructure to incorporate the proposed building in the system. Underground conduits and fiber-optic cable will be installed to the building for telephone and data service to connect to the existing central telecommunications equipment in Building A. The tie-in point for the new telecommunications ducts to the proposed NPF will be the nearest communications handhole. Underground conduits will be routed with other underground utilities where appropriate to minimize the amount of trenching required during construction.

Future phases of improvements will be able to use the existing communications infrastructure to tie into the underground communications duct network with relatively little new underground installation. The future fiber-optic network should be capable of supporting the long-term master plan of the HSH with minimal upgrades to the existing underground infrastructure. Short- and long-term impacts to neighboring telecom customers as a result of this project will be minimal.

5.9.2.2 Security and Alarm Systems

Perimeter security will consist of a security fence around the entire facility with an outrigger at the top containing three electrified wires of increasing intensity. Some sections of fencing will include a security mesh at the top to catch objects that may be thrown over the fence. Breaks in the fence will occur at a vehicle intake/transfer sally port and the secured service yard. At these locations a motorized gate controlled from a central control room will be used to allow vehicles to enter and exit the facility. An additional 20-foot “no visual obstruction” zone around the facility will ensure that personnel on the patrol road can visually check on the condition of the fence and ensure that the

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area is secure. A mix of fixed and PTZ high-definition video cameras will be used around the facility to monitor entrance and exit points, recreational yards, and perimeter activity.

All security and access control devices for the NPF will be integrated into a system that is monitored and controlled from a central control room within the building. System monitoring can also be replicated at the existing security and telecom room in Building A.

Construction of the NPF will increase the number of surveillance, access control, and fire alarm devices that interface with the existing security and alarm systems. New underground infrastructure will be required to connect the proposed building with the existing central security system located in the existing security and telecom room in Building A. The security and alarm conduit and cable system will share a common pathway with the data and telephone system; therefore, only one shared trench will be required for the installation.

Successful incorporation of the proposed security and fire alarm systems with the existing systems is critical to maintaining a safe and effective facility environment. SimplexGrinnell will be consulted during the design phase to integrate the new security devices into the existing system.

Similarly, future phases of improvements will require expansion of the site security and alarm systems to allow effective monitoring and response from a central location. Those phases involving proposed patient care facilities similar to the proposed Goddard Facility will have the greatest impact on the site security and alarm systems. Given the projected increase in the population of the HSH, expansion and improvements for the site security system will be necessary to maintain the safety of the neighborhood.

5.9.2.3 Cable Television

As described in Section 5.9.1.3, it is believed that buildings on the site that are currently provided with CATV are served by satellite dish systems. Oceanic Time Warner Cable currently has a service to the administration building, which can be extended to the proposed NPF if CATV service is necessary. The underground cable system will share a common pathway with the data, telephone, and security systems. Short- and long-term impacts to neighboring CATV customers as a result of this project will be minimal.

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Section 6

Socioeconomic Environment: Description of Affected Environment, Potential Impacts, and Mitigation Measures

HSH is located in a socioeconomically diverse area of Kāneʻohe, which includes abutting residential suburban neighborhoods, WCC, WCHC, the Kāneʻohe District Courthouse, and Kāneʻohe District Park. The bustling town center of Kāneʻohe includes a business district that is centered along Kamehameha Highway, which includes a regional shopping mall. The surrounding Kāneʻohe area includes retirement communities; schools including preschools, primary, secondary, and higher education; public services including police, fire, and medical services; and recreational facilities and open areas including public/private golf courses, parks, and beaches.

This section describes the affected socioeconomic resources, and the potential impacts and mitigation measures, of the proposed work on these natural environmental resources. The socioeconomic resources covered in this section include demographics; land ownership; land use; public services, including school facilities and emergency services; and public safety and life-safety.

6.1 Demographics

This section describes the demographics of the state, county, and local census tracts that HSH is encompassed by, and the demographics within HSH, which include the existing and projected populations (patients, staff, and visitors) for the proposed NPF and the full buildout of improvements at the HSH campus.

6.1.1 Affected Environment

The section describes the affected environment related to demographics in the project area, including the state, county, and local population; HSH campus population; and environmental justice (EJ).

6.1.1.1 State, County, and Local Population

The State DBEDT, *State of Hawaiʻi Data Book 2014*, summarizes data gathered from the following principal sources (including DBEDT):

- Federal-State Cooperative Program for Population Estimates (annual estimates)
- State Department of Education
- State DOH (Hawaiʻi Health Survey conducted regularly since 1969)
- Hawaiʻi Tourism Authority's Tourism Research (ongoing series on visitors present and residents absent)
- Office of Immigration Statistics (tabulations on immigration and naturalization)

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- Private universities and colleges
- UH
- U.S. Census Bureau (decennial population censuses and the annual American Community Survey)
- Other federal, state, and local agencies and private entities

According to *State of Hawai‘i Data Book 2014*, the resident population of the Ko‘olaupoko District (which encompasses the project site) has fluctuated over the past couple of decades—it grew from about 117,694 in April 1990 to approximately 117,994 in April 2000 (0.3 percent increase), and then dropped to about 115,164 in April 2010 (2.4 percent decrease). Nonetheless, the overall population of Honolulu County has grown steadily from about 836,231 in April 1990 to approximately 876,156 in April 2000 (4.8 percent increase compared to a 0.9 percent increase for the entire state), and to approximately 953,207 in April 2010 (8.8 percent increase compared to a 1.2 percent increase for the overall state).

Visitor arrivals staying overnight or longer in the state of Hawai‘i totaled approximately 6,723,531 (about 154,516 per day) in 1990, 6,948,595 (168,637 per day) in 2000, 6,916,894 (177,949 per day) in 2010, 8,003,474 (about 202,876 per day) in 2013, and 8,183,671 (205,433 per day) in 2014. Of these visitors, approximately 5,044,276 (about 96,054 per day) visited O‘ahu in 2013, which slightly increased to 5,176,858 (96,013 per day) in 2014—roughly 63 percent for each year.

In 2010 (as indicated in the State DBEDT *State of Hawai‘i Data Book 2011*), Honolulu County had a population of 645,808 persons 25 years old and over and, of this population, 89.9 percent was a high school graduate or higher, and 31.9 percent had received their bachelor’s degree or higher. In 2013, Honolulu County had a population of 666,172 persons 25 years old and over and, of this population, 90.5 percent was a high school graduate or higher, and 33.4 percent had received their bachelor’s degree or higher. The population for Honolulu County in 2010 was 955,775 (U.S. Census Bureau, 2010 Population Census, July 1, 2010) and population projections for Honolulu County include 976,190 for 2015, 1,003,710 for 2020, 1,029,410 for 2025, 1,052,130 for 2030, 1,071,220 for 2035, and 1,086,710 for 2040.

Based on 2010 U.S. Census data, Tract 105.03 (“Kāne‘ohe District Park,” previously “Kāne‘ohe Playground”) primarily encompasses HSH and its *makai* areas, while Tracts 103.06, 103.08, 105.04, 105.07, 105.08, 106.01, and 9808 make up the Kāne‘ohe neighborhood that adjoins and surrounds the HSH site. These areas had a combined population of 28,196 in 2010.

2010 U.S. Census tract delineations deviated slightly from the 2000 U.S. Census tract demarcations (Figure 6-1), and the approximate equivalent areas are summarized in Table 6-1.

Table 6-1. Comparison of Approximately Equivalent 2000 and 2010 Kāne‘ohe Census Tracts

2000 Census Tract	2010 Census Tract
103.02	103.08 + 9808
103.06	103.06
105.03	105.03
105.04	105.04
105.06	105.07 + 105.08
106.01	106.01

Source: 2000/2010 Population Census.

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The population change (decrease) from 2000 to 2010 is relatively substantial considering that the overall county population change (increase) is 8.8 percent. Relevant project site and surrounding area census tract population characteristics are shown in Table 6-2.

The resident population in the project and surrounding area census tracts can be characterized as slightly older than that of the county as a whole, and household size is generally larger than that of the overall county on average. The tracts are also above the county average of 2.95 persons per household.

Table 6-2. Kāne‘ohe Population Characteristics

Characteristic	Hawai‘i State Hospital	Surrounding Areas	Total Tract Population	Honolulu County
Census tracts	Tract 105.03	Multiple tracts	-	-
2010 population	1,980	26,216	28,196	953,207
2000 population	1,991	26,264	28,255	876,156
Percent change	(-)0.6	(-)0.2	(-)0.2	8.8
2010 median age	39.9	42.9 (average of tract medians)	41.4	37.8
2010 household size	3.23	2.75 (average of tract averages)	2.99	2.95

Source: 2000/2010 U.S. Census.

According to DBEDT, the U.S. Census Bureau released its 2015 county and Metropolitan Statistical Area (MSA) population estimates on March 24, 2016, and on December 22, 2015, it released its 2015 state population estimates. The Honolulu County/Urban Honolulu MSA population estimate for July 2015 was 998,714, and the Hawai‘i state population estimate for July 2015 was 1,431,603. Between July 1, 2010, and July 1, 2015, statewide population grew at approximately a 1 percent annual rate. Growth rates for all of the neighbor island counties were similar—growing at about 1.2 percent per year. The Honolulu County rate was slightly lower, at roughly 0.9 percent. The growth of the resident population between July 1, 2010, and July 1, 2015, was mainly due to natural increase (birth less death) and international migration.

In 2000, Honolulu County had 286,450 households accommodating a population of 845,211 for an average of 2.95 persons per household. By 2010, the number of households increased to 311,047, which accommodated a population of 917,907 for an unchanged average of 2.95 persons per household. The median household income for Honolulu County was $70,779 in 2012 and $72,649 in 2013. The average per capita incomes for Honolulu County were $30,963, $45,202, $48,250, and $48,798 for 2000, 2010, 2012, and 2013, respectively.

The civilian labor force of Honolulu County went from approximately 409,000 persons in 1990 to about 430,900 in 2000, to 446,200 in 2010, to 463,550 in 2014. Of this force, about 400,200, 413,000, 419,650, and 444,700 persons, respectively, were employed; and about 8,800 (2.1 percent), 17,750 (4.1 percent), 26,550 (6.0 percent), and 18,900 (4.1 percent) persons were unemployed. Total civilian jobs for Honolulu County in 2010 were 562,820 and projections were 611,770, 653,450, and 690,360 for 2020, 2030, and 2040, respectively. This compares to the overall state civilian jobs of 792,057 in 2010 and projections were 881,410 in 2020, 964,600 in 2030, and 1,044,900 in 2040.

In 2012, Honolulu County contained 21,190 business establishments with 340,759 employees. The payroll for this year was $13.854 billion, with $3.369 billion in the first quarter. In 2013, Honolulu

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County contained 21,173 business establishments with 347,954 employees, and had first-quarter and annual payrolls of $3.549 billion and $14.466 billion, respectively.

6.1.1.2 HSH Campus Population

Currently, the HSH campus has 178 licensed patient beds on site and 40 additional patients housed offsite at Kāhi Mōhala. Patient census on the HSH campus can change daily and occasionally exceeds the number of licensed patient beds (up to 210 patients, according to sample daily records provided by HSH administration) because of issues referred to in the introduction of this DEIS.

HSH staff are generally categorized into two types of staff: 24-hour staff and daytime staff. 24-hour staff are essential personnel who need to be on campus during the day and night, which include direct patient contact nursing personnel, security personnel, and on-call operations personnel. According to the sample daily records from HSH administration, three shifts of 24-hour staff generally operate across the HSH campus daily, every day of the year. These shifts are from 7 a.m. to 3 p.m., 3 p.m. to 11 p.m., and 11 p.m. to 7 a.m., each shift requiring overlap of approximately half an hour to allow for proper transitioning and coverage of 24-hour staff. Daytime staff are personnel who are typically not necessary through the night and overnight hours, which include administration, specialized treatment personnel (i.e., psychiatrists, psychologists, social workers, therapists, and counselors), housekeeping personnel, clerks, and O&M personnel. The daytime staff typically works at the same time as the 7 a.m. to 3 p.m. shift of the 24-hour staff, making the 7 a.m. to 3 p.m. shift the largest shift, in terms of total staffing, throughout a weekday. The 7 a.m. to 3 p.m. and 3 p.m. to 11 p.m. shifts are the two shifts of the day when the most HSH staff are on campus, resulting in the 3 p.m. transition representing the time of day when the most HSH staff are on the campus at one time during a typical weekday. It is estimated, based on interviews conducted in preparation of the 2015 MPU as well as selected samples of daily records provided by HSH administration during the preparation of this DEIS, that there are, at maximum, approximately 374 HSH staff on campus at the 3 p.m. shift change.

According to the 2015 MPU, it is estimated that there are approximately 10 visitors to the HSH campus during unspecified peak periods on a daily basis. Considering the current estimated maximum number of patients, HSH staff, and visitors on the HSH campus at one time, the existing total HSH population is 594, which is summarized in Table 6-3.

Table 6-3. Existing HSH Population

Patients	HSH Staff	Visitors	Total
210 [a]	374 [b]	10 [c]	594

a. *Number of patients based on sample daily record provided by HSH administration as opposed to licensed patient beds at HSH campus.*

b. *Number of HSH staff based on maximum staff assumed on HSH campus at one time, including 24-hour and daytime staff.*

c. *Number of visitors based on 2015 MPU.*

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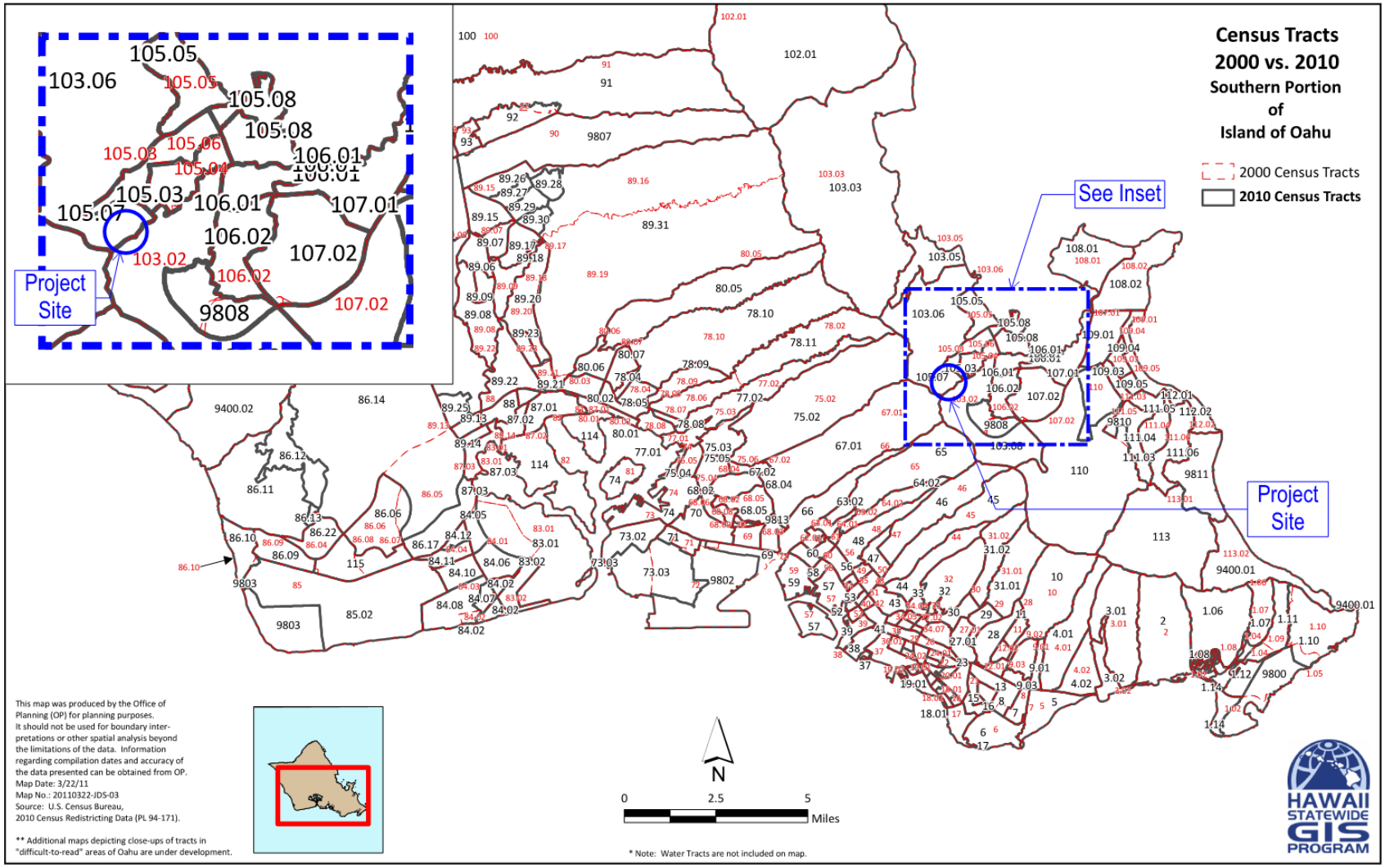

Figure 6-1. 2000 and 2010 U.S. Census tracts, southern portion of O‘ahu

Source: U.S. Census Bureau through the State Office of Planning.

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6.1.1.3 Environmental Justice

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* was issued by President William J. Clinton in 1994. The purpose of the EO is to focus the attention of federal agencies on the environmental and human health effects of federal actions on minority and low-income populations with the goal of achieving environmental protection for all communities. The EO requires that federal agencies take into consideration disproportionately high and adverse environmental effects of governmental decisions, policies, projects, and programs on minority and low-income populations, and to identify alternatives that could mitigate such impacts.

The EPA has an online EJ mapping and screening tool called EJSCREEN, which displays environmental and demographic indicators that are combined to display EJ indexes. There are 11 environmental indicators that provide quantitative information on potential exposure to pollutants to environmental media including air, dust, lead paint, waste, and water, and six demographic indicators that provide a quantitative identification of communities that may be more susceptible to the types of potential environmental pollutant exposure. The demographic indicators are factored into each of the 11 environmental indicators to create the 11 EJ indexes, which compare the environmental susceptibility of these population sample sizes to the state (Hawai‘i), EPA region (EPA Region 9), and the United States.

Minority populations are identified by the U.S. Census Bureau as Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, Hispanic or Latino, and persons of two or more races. According to CEQ’s *Environmental Justice Guidance Under the National Environmental Policy Act,* minority populations should be identified where either the minority population of the affected area exceeds 50 percent, or the minority population percentage of the affected area is meaningfully greater than that of the general population or other appropriate unit of geographic analysis. EPA’s draft technical guidance, *EJSCREEN Environmental Justice Mapping and Screening Tool,* issued June 2016, defines low-income as the number or percent of a block group’s population in households where the household income is less than or equal to twice the federal “poverty level.” The preliminary estimate of weighted average poverty annual income thresholds for 2015 from the U.S. Census Bureau, as of January 26, 2016, are $12,085 for an individual, $15,397 for a family of two, and $24,259 for a family of four; however, it should be noted that these 2015 income thresholds are not the federal “poverty levels” that are used to calculate the low-income household thresholds used by EJSCREEN.

The census block that encompasses the entire HSH campus (block group 150030105031) also encompasses WCC, Kāne‘ohe District Park, Kāne‘ohe Community Park, and a small swath of neighborhood homes *makai* of Kahekili Highway. To broaden the population sample of the communities surrounding HSH and the first phase of site improvements, a 2-mile radius buffer area from the proposed NPF was used in EJSCREEN in addition to the HSH census block in order to evaluate the existing EJ conditions at HSH and the surrounding communities. Maps of the HSH census block and the 2-mile radius buffer area along with their associated EJSCREEN raw data are included in Appendix S.

According to the data compiled and reported in EJSCREEN (Tables 6-4 and 6-5), 82 percent of the population living within the HSH census block and 77 percent living within a 2-mile radius from the proposed NPF are minority populations according to the U.S. Census Bureau; however, these values are relatively close to the state average of 77 percent, which indicates that minorities near HSH are not disproportionally susceptible compared to other populations to any possible environmental pollutants. To the same end, 27 percent of the population living within the HSH census block and 26

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percent living within a 2-mile radius from the proposed NPF are low-income populations according to the U.S. Census Bureau; however, these values are relatively close to the state average of 26 percent, which indicates that low-income populations near HSH are not disproportionally susceptible compared to other populations to any possible environmental pollutants.

Table 6-4. EJ Environmental and Demographic Indicators

Environmental/Demographic Indicators	HSH Census Block	2-mile radius from Proposed New Patient Facility	State Average	EPA Region 9 Average	U.S. Average
Environmental indicators					
Particulate matter ($PM_{2.5}$ in µg/m³)	N/A	N/A	N/A	N/A	N/A
Ozone (ppb)	N/A	N/A	N/A	N/A	N/A
NATA diesel PM (µg/m³)	0.131	0.155	0.149	0.978	0.937
NATA cancer risk (lifetime risk per million)	36	36	34	43	40
NATA respiratory hazard index	1.1	1.1	1	2	1.8
Traffic proximity and volume (daily traffic count/distance to road)	150	520	990	1,100	590
Lead paint indicator (% pre-1960 housing)	0.47	0.18	0.16	0.24	0.3
NPL proximity (site count/km distance)	0.054	0.053	0.098	0.15	0.13
RMP proximity (facility count/km distance)	0.072	0.071	0.19	0.57	0.43
TSDF proximity (facility count/km distance))	0	0	0	0.11	0.072
Water discharger proximity (facility count/km distance)	0.18	0.24	0.34	0.2	0.31
Demographic indicators					
Demographic Index	55%	52%	52%	47%	36%
Minority population	82%	77%	77%	58%	37%
Low income population	27%	26%	26%	36%	35%
Linguistically isolated population	0%	6%	6%	9%	5%
Population with less than high-school education	12%	9%	9%	17%	14%
Population under 5 years of age	7%	6%	6%	7%	6%
Population over 64 years of age	8%	15%	15%	13%	14%

Source: EPA, compiled from EJSCREEN, June 30, 2016.

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Table 6-5. EJ Indexes			
EJ Indexes	State Percentile	EPA Region 9 Percentile	U.S. Percentile
EJ indexes for census block (block group 150030105031)			
EJ index for $PM_{2.5}$	N/A	N/A	N/A
EJ index for ozone	N/A	N/A	N/A
EJ index for NATA diesel PM	41	39	61
EJ index for NATA air toxics cancer risk	25	44	66
EJ index for NATA respiratory hazard index	30	42	65
EJ index for traffic proximity and volume	45	51	72
EJ index for lead paint indicator	65	65	79
EJ index for proximity to NPL sites	44	50	71
EJ index for proximity to RMP sites	26	41	63
EJ index for proximity to TSDFs	100	47	68
EJ index for proximity to major direct dischargers	31	53	69
EJ indexes for 2-mile radius from proposed New Patient Facility			
EJ index for $PM_{2.5}$	N/A	N/A	N/A
EJ index for ozone	N/A	N/A	N/A
EJ index for NATA diesel PM	63	43	64
EJ index for NATA air toxics cancer risk	44	52	72
EJ index for NATA respiratory hazard index	52	49	70
EJ index for traffic proximity and volume	67	67	85
EJ index for lead paint indicator	59	62	76
EJ index for proximity to NPL sites	51	55	75
EJ index for proximity to RMP sites	37	44	66
EJ index for proximity to TSDFs	100	47	68
EJ index for proximity to major direct dischargers	50	67	78

Source: EPA, compiled from EJSCREEN, June 30, 2016.

6.1.2 Potential Impacts and Mitigation Measures

The section describes potential impacts and mitigation measures related to demographics in the project area, including the state, county, and local population; HSH campus population; and EJ.

6.1.2.1 State, County, and Local Population

The populations and their projected growths of the state, Honolulu County, and surrounding areas of HSH are not anticipated to be significantly affected by the first phase of improvements, which will neither inhibit nor encourage population change; however, any possible short-term, long-term, and cumulative adverse effects to the state, county, and local populations due to the overall campus

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buildout of improvements at the HSH will need to be evaluated when more information is available and the timing and details of future phases are known.

6.1.2.2 HSH Campus Population

The section describes potential impacts and mitigation measures related to demographics within the HSH campus population, including the proposed NPF and overall campus buildout of improvements.

6.1.2.2.1 Proposed New Patient Facility

The project will increase patient bed capacity at HSH through the first phase of improvements with the addition of 144 beds at the proposed NPF. While currently licensed for only 178 beds with an approximate census of 210 patients, it is assumed that the excess 32 patients, regardless of the classification of the patients and in which specific buildings the patients are housed, will result in a net increase of 112 for a total of 322 patients on the HSH campus upon completion of the NPF.

The HSH administration estimates that for the expansion of the 144-bed NPF, HSH will require approximately 248 more staff (24-hour staff and daytime staff) to be on the HSH campus at one time during the staff change at 3 p.m., which represents the time when there is the maximum number of HSH staff on campus at any time during the day or night. This estimated expansion of staff is in addition to the 374 HSH staff that is currently estimated to be on campus at the 3 p.m. shift change, for an estimated maximum total of 622 staff on campus upon completion of the NPF.

Based on the assumption in the 2015 MPU that there are 10 visitors on the HSH campus at an unspecified peak time and a proportional ratio of the existing visitors and existing beds to the projected total visitors and proposed total beds after the NPF is completed, it is estimated that 18 visitors will be on campus at an unspecified peak time upon completion of the NPF. Considering the estimated maximum number of patients, HSH staff, and visitors on the HSH campus at one time, the estimated total HSH population is 962 upon completion of the first phase of site improvements, which is summarized in Table 6-6.

Table 6-6. Estimated HSH Population Upon Completion of First Phase of Site Improvements at HSH

Patients	HSH Staff	Visitors	Total
322 [a]	622 [b]	18 [c]	962

a. *Number of patients based on assumed existing number of patients (not patient beds) at the HSH campus (210 patients), in addition to the net increase in patient beds due to the proposed NPF (144 beds less 32 excess patients, equaling 112 patients).*

b. *Number of HSH staff based on assumed existing maximum staff on HSH campus at one time, including 24-hour and daytime staff (374 staff), in addition to 248 staff to operate the proposed NPF, estimated by HSH administration.*

c. *Number of assumed existing number of visitors (10 visitors), in addition to 8 visitors, estimated by proportional extrapolation.*

The expansion of the NPF will directly impact the local population with the increased bed capacity, hiring of additional staff, and additional visitors anticipated with an increased patient population within the HSH campus; however, in order to accommodate the existing and forecasted needs for ABH patient beds across the state, HSH must expand in order to provide appropriate facilities to continue serving the entire state as the only hospital in Hawai‘i that is “dedicated solely to patients with serious mental illnesses.” The increased number of ABH patients at HSH has the possibility of increasing the apprehension and public safety concerns of the surrounding communities, in turn,

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possibly affecting the population of the surrounding communities themselves (e.g., residents moving away, etc.); however, the NPF and the improvements associated with the first phase of work will improve and expand security measures, commensurate with the increasing patient population, for the surrounding communities and visitors while also improving workplace safety for HSH staff. Mitigative measures to address public safety concerns, thus addressing possible demographic effects, are proposed in Section 6.5.2.

With the anticipated number of patients increasing with the proposed NPF, the number of HSH staff to support these patients is also anticipated to grow, possibly increasing the demand for housing, but not the population, in the surrounding communities and the windward side of the island so that the HSH staff and their families can be closer to the workplace. Even if some HSH staff were to move closer to the HSH campus, it is not anticipated that the increased HSH staff will significantly increase the use of public transportation or alternative transportation to personal vehicles because of the relative isolation of the campus and ability to expand on-campus parking; therefore, the vehicular traffic will increase on and near the HSH campus. The anticipated impacts to traffic and parking and the mitigative measures to address these impacts are discussed in Sections 4.6 and 5.1.

6.1.2.2.2 Overall Campus Buildout of Improvements

According to the 2015 MPU, it is proposed that the full buildout of the site improvements at HSH will increase the bed capacity from 178 to a net total of 666. The overall campus buildout of improvements, including the 144 beds from NPF, comprises an additional 144-bed patient care facility, a 150-bed SNF, and two additional 72-bed patient care facilities. The additional 144-bed patient care facility is proposed in the area where the existing Guensberg building is currently operating and housing 70 patients. Following demolition of the existing Guensberg building, the additional patient care facility will be built, yielding a net increase of 74 patients. The 150-bed SNF is proposed to be built on the existing Bishop building site. The two additional 72-bed patient care facilities are proposed to each be built on the existing J-Pad site and in the area where the existing Building I is currently operating and housing 24 patients. The net additional patient bed capacities and patient population for the proposed NPF and the proposed improvements of the full buildout that are anticipated to increase patient bed capacity are summarized in Table 6-7. Any possible short-term, long-term, and cumulative adverse effects due to the increase in patients for the full buildout of site improvements at the HSH will need to be evaluated when more information is available and the timing and details of these future phases are known.

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Table 6-7. Proposed Patient Bed Capacity and Patient Population

Improvement Phase		Proposed Number of Added Patient Beds	Proposed Number of Lost Patient Beds	Net Number of Patient Beds
Existing				178
NPF (first phase)		144		144
Full buildout of site improvements	SNF	150		150
	144-bed patient care facility on Guensberg building site	144	70	74
	72-bed patient care facility on J-Pad site	72		72
	72-bed patient care facility on Building I site	72	24	48
Total				666

Based on the HSH administration estimate that 248 more staff (24-hour staff and daytime staff) will be required for the expansion of the 144-bed NPF, for the purposes of conservatively estimating the number of HSH staff that may be required for the full buildout of site improvements at HSH, the 248-staff to 144-bed ratio was applied to the additional 344 beds that are anticipated to be added in addition to the proposed NPF (Table 3-10 of the 2015 MPU). It is estimated and assumed that HSH will require approximately 592 more staff (24-hour staff and daytime staff) to be on the HSH campus at one time during the staff change at 3 p.m., which represents the time when there is the maximum number of HSH staff on campus at any time during the day or night. This estimated expansion of staff is in addition to the 622 HSH staff that is estimated to be on campus at the 3 p.m. shift change upon completion of the first phase of site improvements, for an estimated maximum total of 1,214 staff on campus upon full buildout of site improvements at HSH.

Based on the assumption in the 2015 MPU that there are 10 visitors on the HSH campus at an unspecified peak time and a proportional ratio of existing visitors and existing beds to the projected total visitors and proposed total beds after the full buildout of site improvements is completed, it is estimated that 37 visitors will be on campus at an unspecified peak time upon completion of the full buildout of site improvements. Considering the estimated maximum number of patients, HSH staff, and visitors on the HSH campus at one time, the estimated total HSH population is 1,917 upon completion of the full buildout of site improvements, which is summarized in Table-6-8.

Table 6-8. Estimated HSH Population Upon Completion Full Buildout of Site Improvements at HSH

Patients	HSH Staff	Visitors	Total
666 [a]	1,214 [b]	37 [c]	1.917

a. *Refer to Table 6-7.*

b. *Number of HSH staff based on assumed existing maximum staff on HSH campus at one time, including 24-hour and daytime staff (374 staff), in addition to 248 staff to operate the proposed NPF and 592 staff to operate the proposed SNF, additional 144-bed patient care facility, and two additional 72-bed patient care facilities, based on estimates by HSH administration.*

c. *Number of assumed existing number of visitors (10 visitors), in addition to 27 visitors, estimated by proportional extrapolation.*

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6.2 Land Ownership

This section describes land ownership in the project area, including the affected environment and potential impacts and mitigation measures.

6.2.1 Affected Environment

HSH encompasses a total of approximately 92 acres, which is owned entirely by the State.

6.2.2 Potential Impacts and Mitigation Measures

The land on which the proposed NPF and its associated supporting infrastructure will be constructed will not change ownership from DOH; therefore, no significant impact to land ownership is anticipated, and no mitigation measures are proposed.

The land ownership for future improvement phases will be evaluated when the timing and details of these phases are known.

6.3 Land Use

This section describes land use in the project area, including the affected environment and potential impacts and mitigation measures.

6.3.1 Affected Environment

As shown in Figure 6-2, the entire site is zoned AG-2 “General Agricultural” use by the City, and designated to be an “Urban” District by the DBEDT Land Use Commission, as shown in Figure 6-3. Figure 6-4 illustrates that the project site is not located within a City-established SMA.

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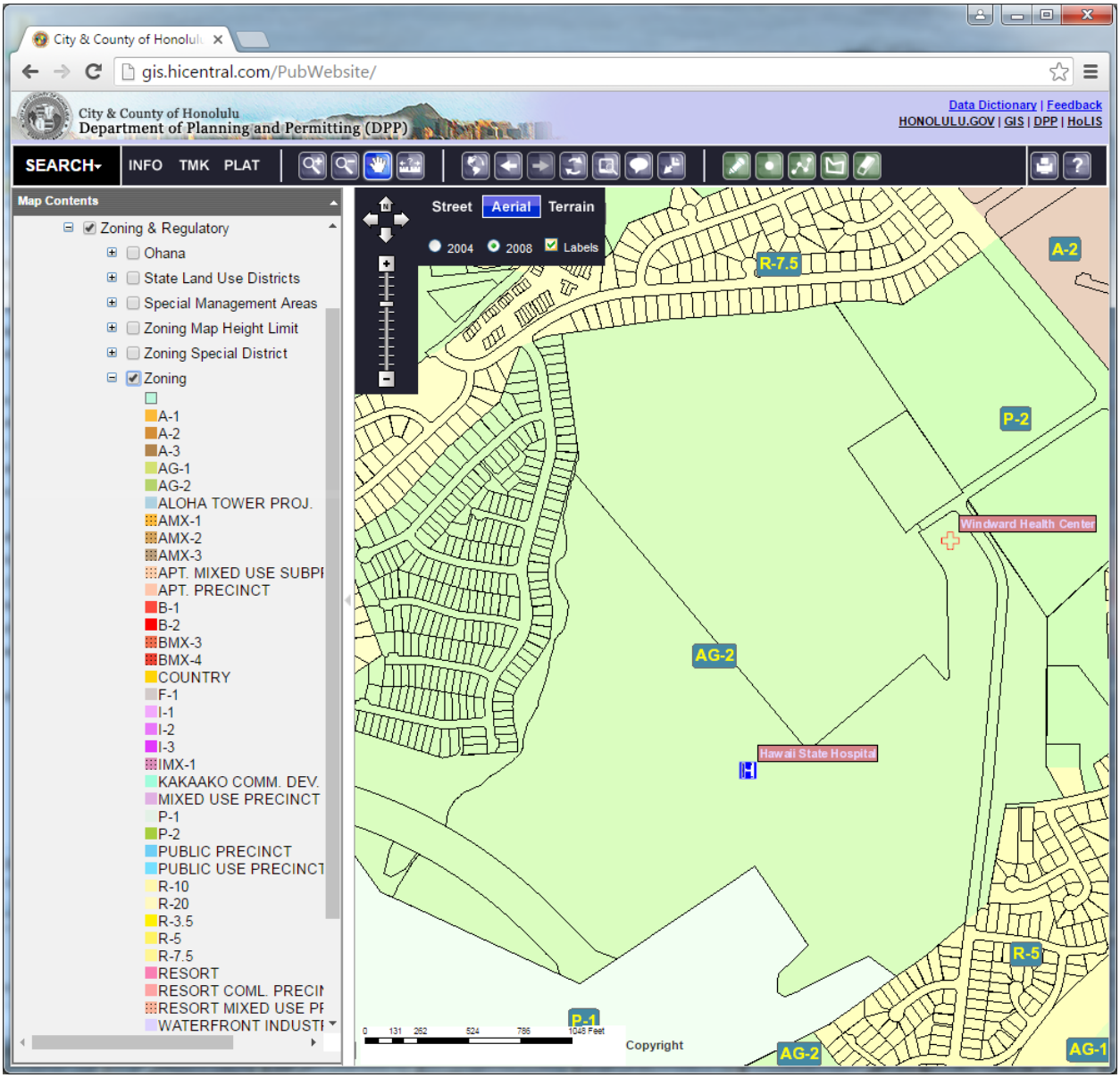

Figure 6-2. City and County of Honolulu, land use zoning map

Source: City and County of Honolulu, Department of Planning and Permitting, Honolulu Land Information System (HoLIS).

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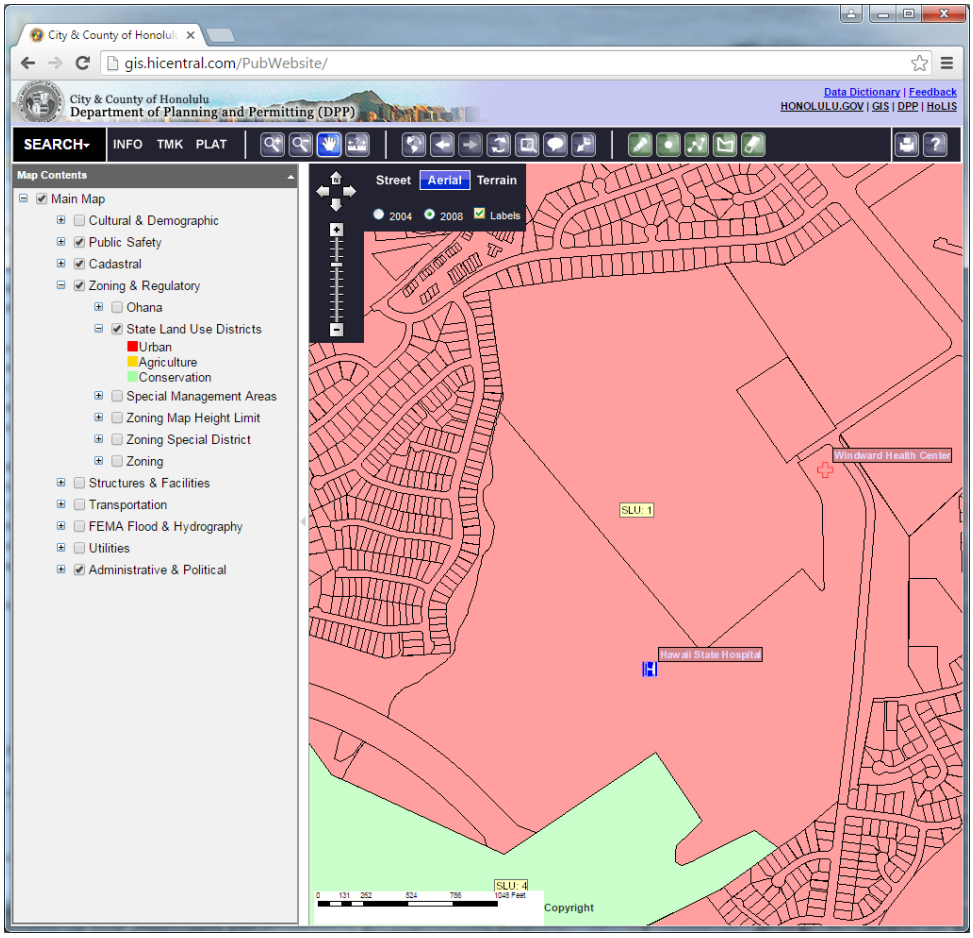

Figure 6-3. State land use map

Source: City and County of Honolulu, Department of Planning and Permitting, Honolulu Land Information System (HoLIS).

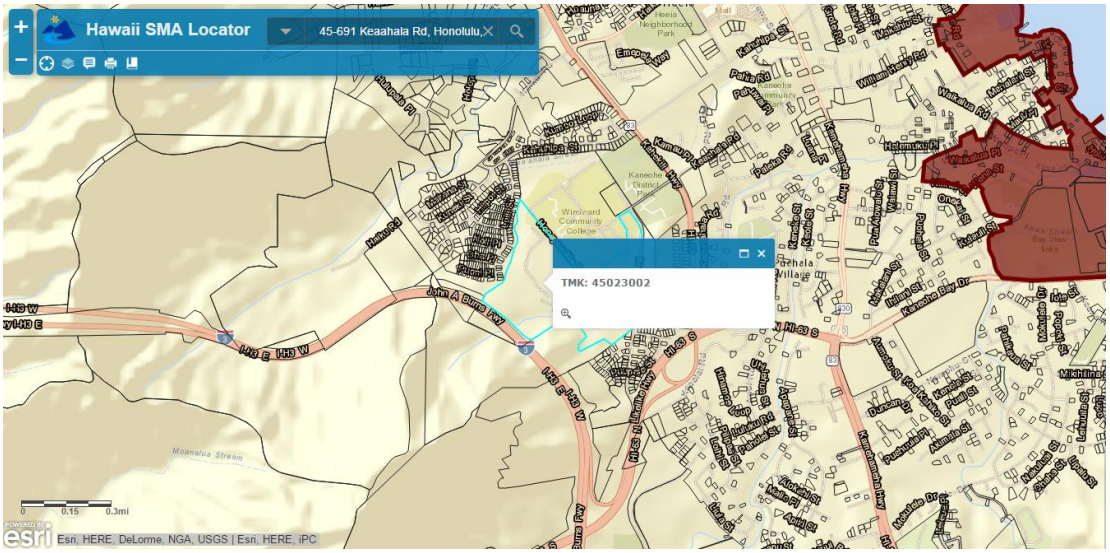

Figure 6-4. Special Management Area map

Source: OP, Hawai‘i SMA Locator.

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The DPP *LUO* specifies the development standards for AG-2 Districts, as summarized in Table 6-9.

Table 6-9. AG-2 District Development Standards

Development Standard		AG-2 District
Minimum lot area (acres)		3 for major livestock production, 2 for all other uses
Minimum lot width and depth (feet)		150
Yards (feet)	Front	15
	Side and rear	10
Maximum building area (percent of zoning lot)		10 (for nonagricultural structures)
Maximum height (feet)		15–25 (15 for nonagricultural structures and dwellings; up to 25 if height setbacks are provided)
Height setbacks		Any portion of a structure exceeding 15 feet shall be set back from every side and rear buildable area boundary line 1 foot for each 2 feet of additional height above 15 feet

Source: City and County of Honolulu, Department of Planning and Permitting, Land Use Ordinance, December 2008.

Furthermore, permitted uses and structures and development standards shall be as enumerated in Tables 21-3 and 21-3.1, respectively, of the LUO.

6.3.2 Potential Impacts and Mitigation Measures

The project improvements are anticipated to deviate from LUO thresholds. Thus, a PRU Application will be processed with the City, DPP, LUPD for approval by the Honolulu City Council after the FEIS is completed and accepted, in accordance with Chapter 46 of the HRS, Chapter 9 of the 1973 Revised City Charter (1994 Edition), and Chapter 21, *LUO*, *ROH* (1990).

6.3.3 Ha‘ikū Stairs

Ha‘ikū Stairs, or Stairway to Heaven, is a popular hike previously discussed in Section 4.9.1. Access to the hike from Kāne‘ohe is officially closed for safety and liability concerns, in addition to complaints from nearby residents. Because of the popularity of the hike with the public, the Ha‘ikū Stairs Working Group (HSWG) was assembled to review potential action with regard to the future of Ha‘ikū Stairs and identify viable public accessibility to the hike. HSWG identified that if Ha‘ikū Stairs were reopened, the best access point to the hike would be through WCC and HSH via a newly created path specific for the trail.

As part of the planning for NPF and overall campus buildout of improvements, the option was discussed among DOH/DAGS. It was determined that an access path through the HSH campus would not be feasible because of safety concerns. The safety of patients, visitors of patients, hospital staff, and the general public is a high priority for HSH. The hospital security staff currently monitors public entry onto the campus for this reason. As such, any thoroughfare through the property by the general public, with or without monitoring, would become problematic as the security, use, and maintenance of the trail could become an issue for HSH to address, which would take away from the focus to treat the patients for mental health.

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6.4 Public Services

This section describes public services in the project area, including the affected environment and potential impacts and mitigation measures.

6.4.1 Affected Environment

This section describes the affected environment related to public services in the project area, including school facilities and emergency services.

6.4.1.1 School Facilities

Public schools in the Hawai‘i Public Schools Windward O‘ahu District are shown in Figure 6-5; the following primary and secondary public schools serve the project area:

- Kapunahala Elementary School
- Ben Parker Elementary School
- Puohala Elementary School
- He‘eia Elementary School
- Kāne‘ohe Elementary School
- S.W. King Intermediate School
- Castle High School

The following public charter schools serve the project area:

- Hakipu‘u Learning Center (grades 4 through 12)
- Ke Kula ‘o Samuel M. Kamakau, LPCS (pre-kindergarten through grade 12)

The following private schools serve the project area:

- Kamehameha Schools Preschool at He‘eia
- Kāne‘ohe Preschool: Kama‘āina Kids
- Rainbow School Kāne‘ohe (preschool)
- Calvary Episcopal Preschool
- Windward Nazarene Academy (preschool through grade 8)
- Saint Mark Lutheran School (kindergarten through grade 8)
- Ko‘olau Baptist Academy (kindergarten through grade 12)

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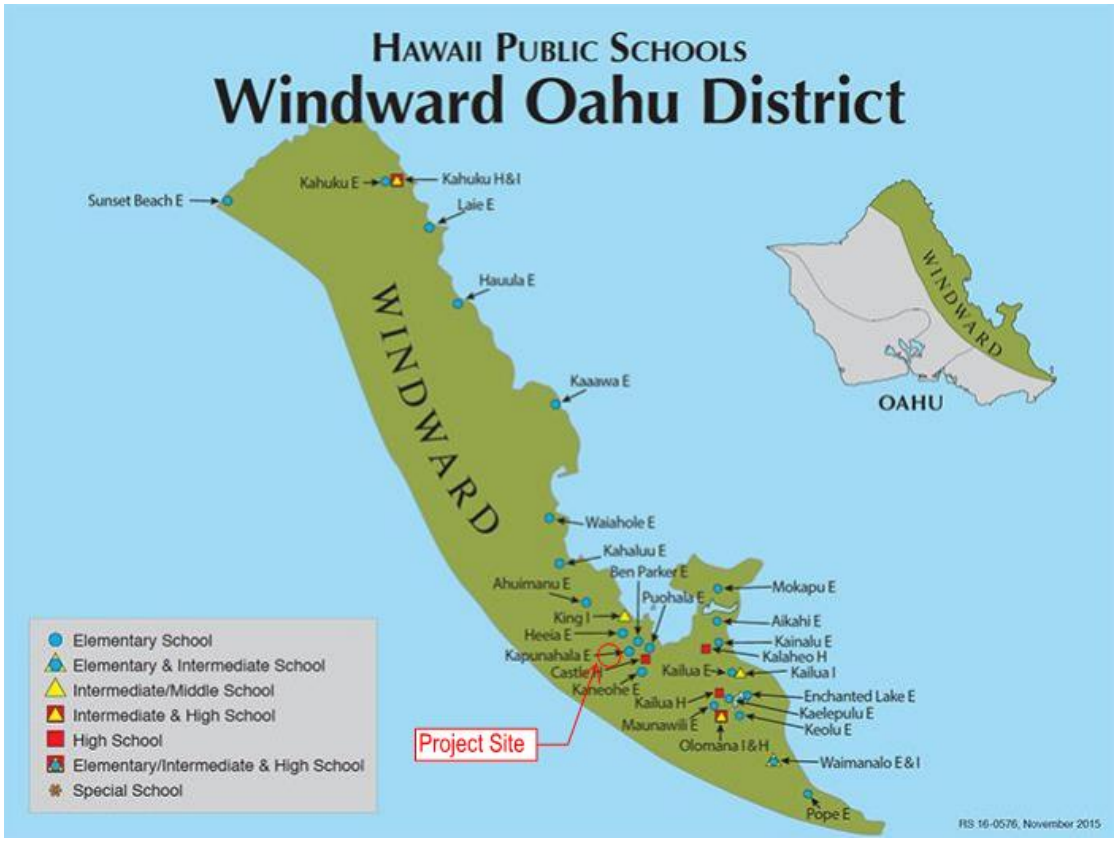

Figure 6-5. Hawai‘i Public Schools Windward O‘ahu District map

Source: State of Hawai‘i, Department of Education, Windward O‘ahu District Map (November 2015).

6.4.1.2 Emergency Services

This section describes emergency services in the area surrounding HSH, including police, fire protection, and medical services.

6.4.1.2.1 Police

The Honolulu Police Department (HPD) was established in 1932. At present, HPD’s jurisdiction encompasses the entire island of O‘ahu, which has a circumference of roughly 137 miles and an area of approximately 596 square miles. HPD comprises 29 divisions and its headquarters is located at 801 South Beretania Street in Honolulu. The island of O‘ahu is divided into eight patrol districts (Figure 6-6) with district stations located in Kalihi, Pearl City, Kapolei, Wahiawa, and Kāne‘ohe and police substations situated in Wai‘anae, Kailua, Kahuku, Waikīkī, and Chinatown.

Police protection services for the project site are provided by HPD, Regional Patrol Bureau District 4, Kāne‘ohe/Kailua/Kahuku. District 4 is HPD’s largest patrol area, extending from Makapu‘u Point to Kawela Bay on the windward side of O‘ahu (Figure 6-7). HSH is located in Sector 3—Kāne‘ohe/Kahalu‘u, which is serviced primarily by the Kāne‘ohe Police Station, 45-270 Waikalua Road, Kāne‘ohe, HI 96744 (phone: 808.723.8640, fax: 808.723.8886).

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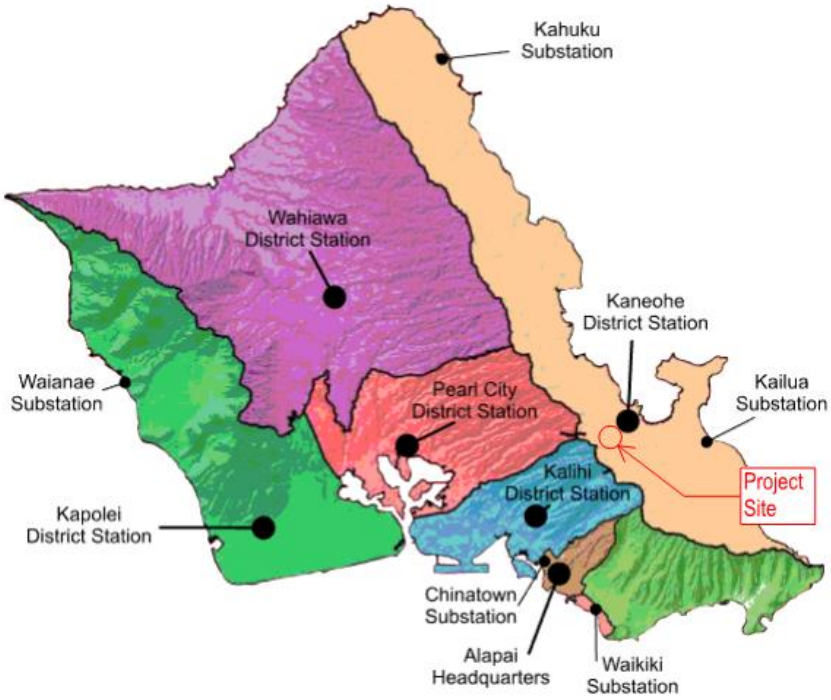

Figure 6-6. Honolulu Police Department O‘ahu stations map

Source: City and County of Honolulu, Honolulu Police Department (2016).

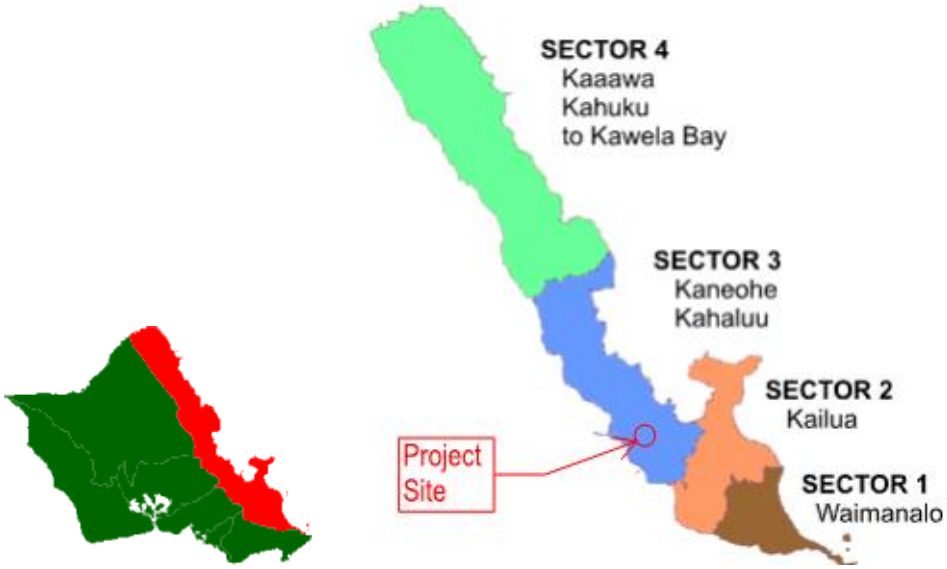

Figure 6-7. HPD Regional Patrol Bureau District 4, Kāne‘ohe/Kailua/Kahuku map

Source: City and County of Honolulu, Honolulu Police Department (2016).

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6.4.1.2.2 Fire Protection

HFD’s mission to save lives and protect property dates back to 1851. At present, the island of O‘ahu is divided into 5 HFD battalions containing 44 fire stations. The total number of companies in a platoon is 43 engine companies, 14 ladder or quint companies, 2 rescue companies, 2 hazardous-materials companies, 2 tower companies, 5 tankers, 2 helicopters, and 1 helicopter tender. Also supporting HFD’s mission are several personal watercrafts and 3 rescue boats (two of which are assigned to the search-and-rescue companies and one to the Waialua Fire Station). HFD firefighters are under the command of the Fire Chief, who is stationed at HFD headquarters located at 636 South Street in Honolulu.

Fire emergency response for the project site is provided primarily through HFD’s two Kāne‘ohe stations—17 and 37—located at 45-910 Kamehameha Highway, Kāne‘ohe, HI 96744 (phone: 808.235.4417) and 47-304 Waihe‘e Road, Kāne‘ohe, HI 96744 (phone: 808.239.6669), respectively.

6.4.1.2.3 Medical Services

Emergency ambulatory service for the project site is provided mainly through HFD’s two Kāne‘ohe stations or private ambulance service providers, such as American Medical Response.

Major medical service facilities in the vicinity of Kāne‘ohe include:

- Straub Clinic & Hospital Family Medicine, located at 46-056 Kamehameha Highway, Kāne‘ohe, HI 96744 (phone: 808.233.6200)
- Castle Medical/Professional Centers, located at 640 ‘Ulukahiki Street, Kailua, HI 96734 (phone: 808.263.5500) and 46-001 Kamehameha Highway, Kāne‘ohe, HI 96744 (phone: 808.235.8000)
- Windward Urgent Care, located at 45-1141 Kamehameha Highway, Kāne‘ohe, HI 96744 (phone: 808.234.1094)
- Kaiser Permanente, located at 45-602 Kamehameha Highway, Kāne‘ohe, HI 96744 (phone: 808.432.3500)

6.4.2 Potential Impacts and Mitigation Measures

This section describes potential impacts of this project to the public services that serve and/or surround HSH, including school facilities and emergency services, and also describes potential mitigation measures.

6.4.2.1 School Facilities

The project is not anticipated to impact the population of students requiring educational services from public primary and secondary, public charter, and private schools in the area. The project’s intent is to increase patient control and reduce the stress on the existing staffing count—improving the safety of the surrounding community, including schools. Thus, no short-term, long-term, or cumulative adverse effects are anticipated on school facilities; therefore, no mitigative measures are proposed.

6.4.2.2 Emergency Services

Access to police, fire, and medical emergency services, both to and from the HSH project site, is not anticipated to be affected by the project work except the possibility of temporary detours or obstructions during construction; however, secondary access will always be maintained by the contractor to all areas of the HSH site. No long-term or cumulative adverse impacts are anticipated on access to emergency services.

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6.5 Public Safety and Life Safety

This section describes public safety and life safety in the project area, including the affected environment and potential impacts and mitigation measures.

6.5.1 Affected Environment

As outlined in the 2005 MP, to create safe navigation throughout the campus with multiple types of users, the proposed campus site development plan is centered on clearly designated zones throughout the HSH campus. The campus is proposed to be reorganized into public, patient, staff, and service zones that could each encompass a cluster of buildings rather than having, for example, individual patient buildings spread across the entire campus, which requires greater controls when moving patients from building to building. If all of the patient buildings were to be clustered together, patient-escape prevention measures, among other redundant HSH assets, could be consolidated to improve safety for visitors, patients, and ward and operations staff. In the 2005 MP, the zone for patients was to include consolidated support services for both low-risk and high-risk patients, which was called the “1-Hospital” concept.

Six user groups were identified and involved in the 2015 MPU planning process: Administrative, Clinical Services, Dietary, Nursing, Facilities, and Rehab Treatment Mall. After user group discussions were held during the MPU’s planning process, it was decided by the user groups that the 2005 MP 1-Hospital concept be modified to separate the low-risk patients from the high-risk patients into two patient zones, or a “2-Hospital” concept. The proposed NPF will be the high-security patient zone for the campus’s high-risk patients and their associated HSH staff, while the other types of lower-risk patients and their own HSH staff will be located on the central and lower parts of campus.

6.5.2 Potential Impacts and Mitigation Measures

The project’s intent is to increase patient control and reduce the stress on the existing staffing count—improving the safety on the HSH campus, as well as the surrounding community. Thus, no short-term, long-term, or cumulative adverse effects are anticipated on public safety and the safety of patients, staff, and visitors.

6.5.2.1 Internal Safety Proposals

Discussions, both on an individual and mixed-group basis, involving all of the aforementioned user groups will continue during the EIS process to address HSH safety concerns internal to the visitors, patients, and ward and operations staff. A planning goal identified in the 2005 MP is to create a patient-/family-friendly health care facility environment that will provide appropriate security for the safety of visitors, patients, and staff. In addition to optimizing the processes and workflows that staff follows, the new and existing facilities shall be coordinated with these processes and workflows to improve efficiency and separation between staff and patients when necessary. Secured secondary access for ingress and egress to individual facilities, as well as the HSH campus as a whole, shall also be considered during the design phases of this project.

The proposed NPF shall be integrated into HSH’s existing access control and card swipe, fire alarm, CCTV, and recently upgraded facility-wide duress alarm systems.

6.5.2.2 Public Safety Proposals

Safety in the surrounding communities of the HSH campus is a priority consideration that will be addressed throughout the planning, programming, design, and permitting processes. Given the relatively close proximity of residential communities, public spaces, heavily vegetated areas, and WCC, heavy emphasis shall be placed on escape prevention including access control internal and

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external to facilities, security fencing, adequate lighting, emergency procedures and egress security, and staff and patient monitoring systems. The EIS will include a program, concurrently developed by an ABH specialist, to address public-safety measures for the proposed NPF.

Community input and comments shall be solicited throughout the development permitting process.

6.6 Hawai‘i State Hospital-Related Employment and Economic Activity

Each phase of the project will generate new employment opportunities for construction-related work for the 2- to 3-year duration of improvement activities, in addition to permanent employment positions for the operation of the proposed facilities.

6.6.1 Affected Environment

The construction of NPF is anticipated to take 2 to 3 years, which will provide construction jobs in various fields and trades for this duration for the prime contractor, specialty subcontractors, and suppliers. Similarly, the construction of future phases is anticipated to take roughly 2 to 3 years each to complete, depending on their extents and details.

As detailed in section 6.1 above, staff forecasts for the HSH is anticipated to increase from an existing 374 personnel, to about 622 in the first phase (NPF) and approximately 1,214 for the overall campus buildout of improvements. Thus, an additional 248 and 840 permanent employment positions are expected to be needed for the operation and maintenance of NPF and the overall campus buildout of improvements, respectively.

6.6.2 Potential Impacts and Mitigation Measures

Construction materials, supplies, equipment and vehicles associated with the 2- to 3-year construction of NPF and subsequent improvements is anticipated to stimulate business and work for their local vendors, suppliers, manufacturers, and maintenance service providers for their construction timeframes and durations.

The approximate 248 and 840 added employment positions anticipated to be required for NPF and the overall campus buildout of improvements, respectively, could potentially result in increased real estate, rental and residential development activity in Kāne‘ohe as people and their families move into the area to fill these positions rather than commuting from afar. However, the overall population of the area surrounding the HSH as a whole is anticipated to remain relatively steady over the next decade as mentioned earlier since the numbers of people moving in is estimated to approximately offset forecasted decreases in the population.

The facility is anticipated to offer a wide range of jobs from security personnel, to electronics and information technology system engineers, to ABH patient care specialists, to facility maintenance personnel. Some of these positions could have higher-education and/or training needs or compensation amounts, which could boost local school and college enrollment and possibly increase quality of life and lifestyles in the area. In turn, this could provide a general overall boost to, and stimulate and foster improved commerce at, nearby shopping centers, eateries, grocery stores, car dealerships, gas stations, car repair shops, daycares and generate increased positions for teachers, police officers, fire response personnel, etc. within the entire community encompassing the area.

The current employment and economic activity and their projected growths of the state, Honolulu County, and surrounding areas of HSH are not anticipated to be significantly adversely affected by the first phase of improvements, and could possibly enhance the local conditions near the site. As needed, any possible short-term, long-term, and cumulative adverse effects to the state, county, and

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local employment and economic activity due to the overall campus buildout of improvements at the HSH may be evaluated when more information is available and the timing and details of future phases are known.

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Section 7

Summary of Impacts

Sections 3 through 6 provide the details of the existing conditions of the affected environment and impacts evaluation from NPF and long-term MP implementation for resource areas related to the natural environment, human environment, infrastructure and utilities, and socioeconomic environment, respectively. As shown below in Table 7-1, most of the impacts (see Figure 7-1), whether adverse or beneficial, are expected to be measurable but localized to a small area, have low intensity, or be temporary. Impacts that are likely to be more substantial include demographics, public services, and HSH-related employment and economic activity. All of these more substantial impacts are considered to be beneficial and adverse.

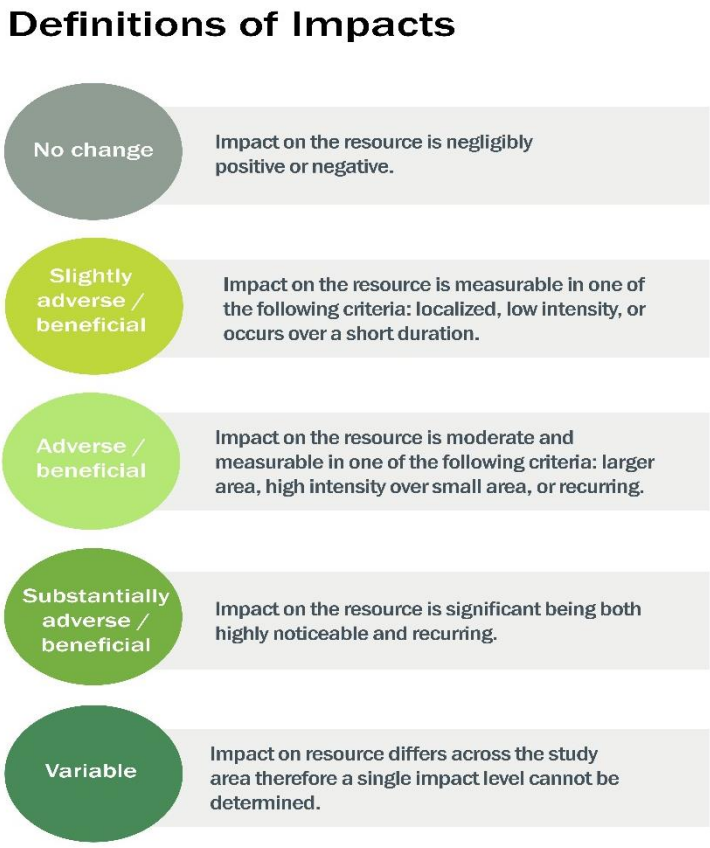

Figure 7-1. Definitions of impacts

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Table 7-1. Overall Hawaii State Hospital Potential Impacts

Resource Area		Impact				
		New Patient Facility	Overall Campus Building of Improvements	Improvement/Mitigation	Permanent	Temporary
Natural environment	Topography and geology	No change	Slightly adverse	Because finish grades are anticipated to be similar to existing, no mitigation measures are proposed.		✓
	Surface water	No change	Slightly adverse	BMP approaches will be used to minimize change in runoff patterns.	✓	✓
Human environment	Noise	Slightly adverse	Slightly adverse	As noise levels generated by construction-related activities are anticipated to exceed allowable limits, a permit must be obtained from the DOH-IRHB in compliance with Title 11, HAR, DOH, Chapter 46, Community Noise Control. DOH may grant permits to operate vehicles, construction equipment, and power tools that emit noise levels in excess of allowable limits.		✓
	Light emissions	Beneficial	Beneficial	Additional lights will increase visibility and pedestrian travel on the campus and provide increased security for the HSH campus and to the surrounding community.	✓	
	Air quality	Slightly adverse	Slightly adverse	Air pollution control measures will be used during construction.		✓
	Vehicular traffic	Slightly adverse	Adverse	The proposed expansion of Kahekili Highway and Ha‘ikū Road will decrease congestion. Also, the campus will examine incentivized alternative transportation options to minimize the increase in traffic.	✓	
	HSH campus vehicular traffic	Slightly beneficial	Slightly beneficial	Expansion and repaving of roads and parking lots will improve traffic patterns on the campus.	✓	✓
	Pedestrian and bicycle access	Slightly beneficial	Slightly beneficial	Development of pedestrian walkways and bicycle lanes will increase functionality, accessibility, and relaxed environment at HSH.	✓	
	Open-space, recreational, and visual resources	Slightly adverse	No change	Visual impact assessment will show projected building height with impact to scenic resources.	✓	
Infrastructure and utilities	Roadways, parking, and fire truck maneuverability	Slightly beneficial	Slightly beneficial	Repaving and increased size of roadways will make them more accessible and fire truck maneuverable in certain areas.	✓	

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Table 7-1. Overall Hawaii State Hospital Potential Impacts

Resource Area		Impact				
		New Patient Facility	Overall Campus Building of Improvements	Improvement/Mitigation	Permanent	Temporary
	Potable and fire water	Slightly beneficial	No change	Increased number of fire pumps and hydrants near the proposed NPF.	✓	
	Wastewater	No change	Slightly adverse	Recommendations for replacement of defected segments.	✓	
	Chilled water	Slightly beneficial	No change	The proposed NPF will have its own chiller plant.	✓	
	Stormwater	No change	Slightly adverse	Low-impact design techniques will be examined to minimize change in stormwater patterns.	✓	
	Fuel sources	Slightly beneficial	Slightly beneficial	The proposed NPF will install a new 499-gallon LPG tank. The overall campus improvements will increase capacities by replacing the 499-gallon LPG tank with 1,150-/2,000-gallon LPG tanks and adding a new 250-gallon LPG tank and four 199,000 Btuh instant gas water heaters.	✓	
	Solid waste and medical/hazardous waste	Slightly beneficial	Slightly beneficial	The increased waste being generated will increase the collection containers and services provided around the HSH campus.	✓	
	Electrical power supply and lighting systems	Slightly beneficial	Slightly adverse	The proposed NPF will increase the total electrical load to HSH, but the overall campus improvements may reduce HECO’s capacity to provide power to new customers.	✓	
	Communication, security, and alarm systems	Substantially beneficial	Substantially beneficial	Improved security and alarms will foster a sense of enhanced safety and quality of life on the HSH campus and in the community.	✓	
Socioeconomic Environment	Demographics	Slightly beneficial	Beneficial	The larger HSH facility will alleviate overcrowding of patients in other ABH institutions. This expansion will increase the number of staff potentially living in the area.	✓	
	Land use	Variable	No change	The land use will differ from the LUO thresholds; therefore, a PRU application will be processed after the FEIS.	✓	

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Table 7-1. Overall Hawaii State Hospital Potential Impacts

Resource Area		Impact				
		New Patient Facility	Overall Campus Building of Improvements	Improvement/Mitigation	Permanent	Temporary
	Public services	Beneficial	Beneficial	Increased safety on the HSH campus will reduce stress on the schools in the community.	✓	
	Public safety and life safety	Substantially beneficial	Substantially beneficial	Increased access control, card swipes, fire alarms, CCTV, and facility-wide alarm systems will increase public safety.	✓	
	HSH-related employment and economic activity	Beneficial	Beneficial	The development of HSH will increase employment opportunities for individuals in the construction and medical fields. Because of the increase in power, food, and water required by HSH, economic activities will increase.	✓	✓

Climate, soils, hydrogeology, tsunami, hurricanes, earthquakes, flora and fauna, archaeological and historic resources, cultural practices and conditions, and land ownership are not listed in this table because the impact categorization is considered “no change.”

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Section 8

Cumulative Impacts

This section describes the potential cumulative impacts of NPF and long-term plan implementation at HSH as they relate to the consistency between the proposed action and land use plans, policies, and controls, and other relevant projects in the area. These plans and projects combined with NPF or the future phases of the overall campus buildout of improvements at HSH could have adverse or beneficial cumulative impacts to the natural, human, infrastructure, and socioeconomic environments that would otherwise be measured by each project individually. The projects and plans described in the following section are the best representation of the major projects and plans known to be currently established that impact the local area to HSH, the Kāneʻohe area, the Koʻolaupoko district/ahupuaʻa (also referred to as Koʻolaupoko by others), the island of Oʻahu, and the entire state of Hawaiʻi. Projects or plans that are speculative are not included in this cumulative impacts assessment.

8.1 Plans

This section outlines plans that have been developed for the region that relate to the natural or human environment, address infrastructure or utilities improvements for the region, or focus on sustainability or community improvements. Overall, NPF and the future phases of the overall campus buildout of improvements at HSH adhered to these plans during the planning stages in the master plans and during design milestones. As final designs are developed, these plans will continue to be adhered to and coordination with the agencies responsible for the plans will be conducted.

8.1.1 Koʻolaupoko Watershed Management Plan

Published in September 2012 by Townscape, Inc. for HBWS and DPP, the KWMP is a 20-year plan to the year 2030 with the following objectives:

- Promote sustainable watersheds
- Protect and enhance water quality and quantity
- Protect Native Hawaiian rights and traditional and customary practices
- Facilitate public participation, education, and project implementation
- Meet future water demands at reasonable costs

HSH, which is located within the Keaʻahala watershed, Koʻolaupoko Planning District of the Oʻahu Water Management Plan, is in consultation with USACE and DOH-CWB to verify potential impact to nearby streams and to minimize or prevent any impact to the water resources of the watershed. An Archaeological Evaluation and Cultural Impact Assessment have been performed as part of this DEIS in order to identify any potential impacts to the traditional and customary practices of Native Hawaiians. Any possible future increase in the demands for potable water for the expansion of HSH are addressed in this DEIS through the use of LID techniques and following LEED principles in design of water-use fixtures.

8.1.2 Koʻolaupoko Sustainable Communities Plan

Published in April 2016 by the City DPP, the KSCP is a vision to the year 2035 for the protection of the communities' natural, scenic, cultural, historic, and agricultural resources while addressing the

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needs to improve and replace, as necessary, the region's aging infrastructure systems. Key elements of the vision are:

- Adapt the concept of *ahupuaʻa* in land use and natural resource management
- Preserve and promote open-space and agricultural uses
- Preserve and enhance scenic, recreational, and cultural features that define Koʻolaupoko's sense of place
- Emphasize alternatives to the private passenger vehicle as modes for travel
- Protect and enhance residential character while adapting to changing needs
- Define and enhance existing commercial and civic districts
- Maintain the Community Growth Boundary to protect agricultural, open space, and natural resources

HSH, which is located in the Koʻolaupoko region, has been a fixture in the area since before it became built out with residential and commercial centers and is an integral facility by providing unique and specialized services for not only the island of Oʻahu, but the entire state. Although zoned as agricultural use, the HSH campus's historical land use has been as a hospital facility since its opening in 1932.

The short-and long-term HSH MPs address many of the visions outlined in this Plan. With many of the buildings on the campus being out of date, the facility lacks the capacity of taking on more patients and the capability of separating patients based on risk levels. Additionally, the first vision of the Plan is being addressed in the long-term MP of HSH. In Zone 7, a proposed public education center or museum will help preserve the culture and history of the area, while in Zones 9a and 9b, preservation of nature will continue with improvements to the Aloha Gardens and protection of the watershed.

8.1.3 City and County of Honolulu General Plan

Amended in October 2002 by the City DPP, the General Plan Objectives and Policies is a statement of the long-range social, economic, environmental, and design objectives for the general welfare and prosperity of the people of Oʻahu. Of the 11 areas of concern in the City General Plan, the largest area of concern pertaining to this project is health and education, for which the following three policies were developed:

- Encourage the provision of health-care facilities that are accessible to both employment and residential centers
- Encourage prompt and adequate ambulance and first-aid services in all areas of Oʻahu
- Coordinate City and County health codes and other regulations with State and federal health codes to facilitate the enforcement of air-, water-, and noise-pollution controls

The overall development plan for HSH will create the needed facilities that will be able to "protect the health of the people of Oʻahu." Throughout this DEIS, considerations are indicated for air-, water-, and noise-pollution controls and regulations that will be taken in the design and construction phases.

8.1.4 Kāneʻohe Town Plan

Created in November 2009 by Belt Collins Hawaiʻi for the City DPP, the Kāneʻohe Town Plan looks at issues of mobility and connectivity for residents, both town-wide and in the Windward Mall area. The vision for a town center of Kāneʻohe is described in the Kāneʻohe Town Plan as follows:

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> … a gathering place that is accessible, conveniently located, safe, and open to all. It captures and reflects the beauty of Kāne‘ohe and the surrounding Ko‘olau Mountains and Kāne‘ohe Bay. It is both a resource and a place of diverse services and activities for residents and visitors, and attracts a wide range of people that range in age from the very young to the elderly. It incorporates the distinctive community culture (i.e., caring, local, small scale, friendly) and strengthens the spirit of aloha that is Kāne‘ohe.

The Kāne‘ohe Town Plan aims to reintroduce landscaping in existing urbanized environments, improve pedestrian connectivity, and create pedestrian-oriented public spaces as a means to achieve this vision. The goal of the town center focus area is to create a comprehensive and integrated pedestrian district that supports pedestrian activity in public spaces and improved connectivity between the many uses in the area. The Kāne‘ohe Town Plan encourages improved connectivity within both the town center focus area and the larger town-wide study area, as a means to address traffic congestion. The HSH developments align with the vision and plan for Kāne‘ohe Town. The improvements to the safety, security, and pedestrian accessibility of HSH creates an environment that is safe for all. The one area that is adversely impacted by the proposed NPF’s building height is the beauty of the Ko‘olau Mountains. This DEIS addresses this potential concern through a visual impact assessment, which provides a visual model of the proposed building.

8.1.5 Coastal Zone Management

The State OP revised their CZM program in April 2012, to focus on effective management, use, protection, and development of identified coastal zone areas. Table 8-1 below provides a list of the ten key resources focused on by the CZM program, with their associated objectives and policies. Both EPO and OP provided comments during the EISPN phase of this project suggesting project conformance to each of these policies outlined in Table 8-1. This review and coordination with EP and OP will be finalized during the individual design stages of each project element of the overall campus buildout of improvements at HSH. Table 8-1 provides the anticipated or reasonably foreseeable conformance to the ten CZM policies.

Table 8-1. Coastal Zone Management

Resource	Objective	Policies	(Conform, Conflict, or Not Applicable—N/A)
Recreational	Provide coastal recreational opportunities accessible to the public	(A) Improve coordination and funding of coastal recreational planning and management (B) Provide adequate, accessible, and diverse recreational opportunities in the CZM area by:	N/A
Historic	Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the CZM area that are significant in Hawaiian and American history and culture	(A) Identify and analyze significant archaeological resources (B) Maximize information retention through preservation of remains and artifacts or salvage operations (C) Support State goals for protection, restoration, interpretation, and display of historic resources	Conform
Scenic and open space	Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources	(A) Identify valued scenic resources in the CZM area (B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural	Conform

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Table 8-1. Coastal Zone Management			
Resource	Objective	Policies	(Conform, Conflict, or Not Applicable—N/A)
		landforms and existing public views to and along the shoreline (C) Preserve, maintain, and, where desirable, improve and restore shoreline open-space and scenic resources (D) Encourage those developments that are not coastal-dependent to locate in inland areas	
Coastal ecosystem	Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems	(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 (E) Promote water quantity and quality planning and management practices that reflect the tolerance of freshwater and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures	Conform
Economic uses	Provide public or private facilities and improvements important to the state's economy in suitable locations	(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 CZM area (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	N/A
Coastal hazards	Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution	(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	N/A

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Table 8-1. Coastal Zone Management			
Resource	Objective	Policies	(Conform, Conflict, or Not Applicable—N/A)
		(D) Prevent coastal flooding from inland projects	
Managing development	Improve the development review process, communication, and public participation in the management of coastal resources and hazards	(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 (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	N/A
Public participation	Stimulate public awareness, education, and participation in coastal management	(A) Promote public involvement in CZM 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 (C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts	N/A
Beach protection	Protect beaches for public use and recreation	(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 (C) Minimize the construction of public erosion-protection structures seaward of the shoreline	Conform
Marine resources	Promote the protection, use, and development of marine and coastal resources to ensure their sustainability	(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 their 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 (E) Encourage research and development of new, innovative technologies for exploring, using, or	Conform

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Table 8-1. Coastal Zone Management			
Resource	Objective	Policies	(Conform, Conflict, or Not Applicable—N/A)
		protecting marine and coastal resources. [L 1977, c 188, pt of §3; am L 1993, c 258, §1; am L 1994, c 3, §1; am L 1995, c 104, §5; am L 2001, c 169, §3]	

8.1.6 Bike Plan Hawaii

Revised in 2003 by the State DOH, the *Bike Plan Hawaii Master Plan* focuses on enhancing the bicycling environment and facilities. The *Bike Plan Hawaii Master Plan* stems off of the OP's Hawai‘i State Plan and DOT's *Hawaii Statewide Transportation Plan* (HSTP). Listed below are some of the objectives of these two preceding plans. Transportation objectives established in the Hawai‘i State Plan include the following:

- Section 226-17(a)(1): An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economic, safe, and convenient movement of people and goods
- Section 226-17(b)(1): Design, program, and develop a multi-modal system in conformance with desired growth and physical development
- Section 226-17(b)(11): Encourage safe and convenient use of low-cost, energy-efficient, nonpolluting means of transportation

Improved bicycle and pedestrian access is addressed in the 2005 MP, which states that bicycle circulation will likely be limited primarily to HSH employees and will be within existing roadways, using striping or signage, or where walkways are widened to a minimum of 8 feet. Because 8-foot-wide walkways are not practical, the most likely improvement will require roadway markings, indicating bicycle routes and that the roadway is shared for both vehicular and bicycle traffic. Bicycle parking is identified in the 2005 MP as paved areas with bicycle racks in strategic locations, like at the entryways to buildings. This is all in line with the *Bike Plan Hawaii Master Plan* and should meet up with the existing bicycle lanes on Kea‘ahala Road and Kahekili Highway, as identified in the *Bike Plan Hawaii Master Plan* and as shown in the TIAR.

8.1.7 Hawaii Statewide Transportation Plan

In 2011, the DOT developed the HSTP to establish the framework used in planning the future of the system. The HSTP was prepared to "provide the keys to the development of an integrated, multi-modal transportation system for the safe, efficient and effective movement of people and goods throughout Hawaii" (DOT 2011). The goals of the HSTP and how improvements at HSH adhere to these goals are outlined in Table 8-2.

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Table 8-2. Goals of Hawai‘i Statewide Transportation Plan	
Goal	**How HSH Improvements Meet Goal**
Goal I: Create and manage an integrated multi-modal transportation system that provides mobility and accessibility for people and goods.	Planned HSH improvements include the installation of bike lanes and walkways/sidewalks to onsite accessways where they do not exist to interconnect key buildings and facilities, and provide HSH staff and visitors with options for alternate means of transportation within the campus other than cars, trucks and motorized carts. Existing onsite shuttle service is anticipated to be continued and expanded to transport HSH personnel from various locations on campus and parking areas. Furthermore, the DOH may consider implementing carpool incentive programs, such as, possibly providing parking stalls closer to the NPF reserved for staff who carpool. These improvements may encourage DOH employees and HSH visitors to use alternate means of transportation offsite to access the site since they would be able to continue bicycling or walking within the campus as well. The HSH campus is accessible via existing City bus (TheBus) lines, regional bicycle lanes and routes, and walkways from major local routes. Identified improvements to the visibility and awareness of HSH campus bicycle routes and improvements to the walkways and sidewalks on campus may potentially reduce personal vehicle use by encouraging multi-modal transportation within the HSH campus, which will connect to already adequate localized multi-modal transportation infrastructure. Thus, the project supports HSTP goal I.
Goal II: Enhance the safety of the air, land, and water transportation systems.	While air and water transportation systems are not applicable to or affected by the scope of campus improvements, the enhancement of the safety of land transportation systems will be accomplished by the project with its installation and identification of onsite bicycle routes, which will make them more visible, remind vehicular traffic (both onsite and as they are leaving the site) that roadways are shared with bicycles, and encourage drivers to drive with increased caution. Planned walkways/sidewalks in areas where the currently do not exist will increase the safety of pedestrians and encourage alternatives to personal vehicular transportation. Thus, the project supports HSTP goal II.
Goal III: Ensure the secure operation and use of the air, land, and water transportation systems.	The project will improve public safety by minimizing the chance of patient elopement, which could possibly result in disruption or damage to transportation systems and challenges in their secure operation. Thus, the project supports HSTP goal III.
Goal IV: Protect Hawai‘i’s unique environment and quality of life and mitigate any negative impacts.	As summarized in Section 7 of this EIS, minimal to no adverse impacts are anticipated to occur on the natural environment or quality of life for the surrounding community. Thus, the project supports HSTP goal IV.
Goal V: Ensure that the air, land, and water transportation facility systems support Hawai‘i’s economy and future growth objectives	HSH improvements will expand patient capacity and employment of the facility to support overall population and economy growth of the State as HSH serves the entire State. The installation of bike lanes and walkways/sidewalks of the planned HSH improvements will complement existing and planned offsite transportation systems as they will encourage their use. Thus, the project supports HSTP goal V.
Goal VI: Support the State’s energy goal of 70% clean energy, which includes 40% produced by renewable energy and 30% from increased energy efficiency, enhancing the reliability and security of energy sources.	As discussed earlier in this EIS, the HSH improvements will incorporate LEED green/sustainability elements, low-impact development and best management practices to the maximum extent practical. This entails potentially installing energy-efficient fixtures in improvements or completing energy-efficiency upgrades to existing buildings (replacement of incandescent lighting with compact fluorescent luminaries and ballasts or LEDs, water conservation (low-flow fixtures) recycling and reuse, evaluating the use of different building materials to reduce cooling loads and require less energy, etc. As HSH is in continuous operation year round, the implementation of renewable energies is limited. Furthermore, for security reasons, reliable energy sources are required to power the facility in case of emergencies. Unfortunately, renewable sources of energy on a scale commensurate with powering a critical facility campus are not reliable enough to implement significantly at this time; however, as technology improves (such as, backup batteries for solar and wind power sources) and the timing and details of future overall campus buildout of improvements become known, the use of renewable energies to primarily power or provide emergency power will be re-evaluated. On a smaller scale, however, the installation of bike lanes and walkways/sidewalks will encourage alternate means of transportation to and from the facility that will reduce transportation-related greenhouse gas emissions and, in part, reliance on foreign oil. Thus, the project supports HSTP goal VI.
Goal VII: Create secure, flexible, and sustainable revenues and funding sources for transportation needs.	Bike lanes and walkways/sidewalks to be installed on the HSH campus by the planned improvements will support, continue, and encourage use and expansion of existing and planned multi-modal transportation systems offsite to access the facility; and, existing onsite shuttle

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Table 8-2. Goals of Hawai‘i Statewide Transportation Plan	
Goal	**How HSH Improvements Meet Goal**
	service is anticipated to be continued and expanded to transport HSH personnel from various locations on campus and parking areas. These improvements may encourage DOH employees and HSH visitors to use alternate means of transportation offsite to access the site since they would be able to continue bicycling or walking within the campus as well. In turn, this may foster employee purchasing of bus passes and bicycle registration and licensing. Thus, the project supports HSTP goal VII.
Goal VIII: Implement a statewide planning process that correlates land use and transportation while supporting decision making and programming for Hawai‘i’s integrated, comprehensive, multi-modal transportation systems.	Bike lanes and walkways/sidewalks to be installed on the HSH campus by the planned improvements will support, continue, and encourage use and expansion of existing and planned multi-modal transportation systems offsite to access the facility, as coordinated with the master and development plans for these modes. Thus, the project supports HSTP goal VIII.

8.1.8 State Office of Planning Low-Impact Development

Created in June 2006 by the State OP CZM Program, *Low Impact Development, A Practitioner’s Guide* focuses on more sustainable land development patterns than the conventional method currently used in most areas. It incorporates a suite of landscaping and design techniques known as “Better Site Design” that attempt to maintain the natural, pre-development hydrology of a site and the surrounding watershed. LID also integrates a range of structural BMPs for road design and stormwater and wastewater management systems that minimize environmental impacts. The aim of LID is to reduce the environmental impact “footprint” of the site while retaining and enhancing the owner/developer’s purpose and vision for the site. The goals of LID include:

- Prevent environmental impacts rather than having to mitigate for them
- Manage water (quantity and quality) as close to the source as possible and minimize the use of large or regional collection and conveyance
- Preserve natural areas and native vegetation and reduce the impact on watershed hydrology
- Use natural drainage pathways as a framework for site design
- Use less complex, non-structural methods for stormwater/wastewater management that are lower-cost and lower-maintenance than conventional structural controls
- Create a multifunctional landscape

The DEIS addresses many BMPs and LID techniques that can be used in construction and design of HSH. With the incorporation of these techniques and practices the stormwater and wastewater patterns will not be affected or will have minimal impact.

As stated in Section 2, sustainable design measures being considered in the design of NPF will follow the 2012 IBC and LEED with the goal of becoming LEED Silver-accredited. Design elements will be included for the building construction and interior design, landscaping elements, water usage, and O&M efficiencies. However, because of the security provisions required for public safety, these elements will have to be integrated without a negative impact to safety. DOH will work closely with the City during the PRU approval process to maximize sustainable design elements to the extent practical.

8.1.9 WCC Master Plan

The current version of the WCC Master Plan was published in 1989. With the many improvements and changes since then, WCC is currently working on updating its Master Plan. Based on the 1989

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plan and ongoing improvements at WCC, there are several areas where NPF and long-term MP implementation could affect the surrounding community, including:

- **Boundary between HSH and WCC:** There is no boundary line between the WCC and HSH campuses. The proposed 6-foot-high chainlink fence, integrated with an appealing landscape appearance, will serve as the boundary between the two campuses.
- **Landscaping aesthetics:** Based on a questionnaire survey taken in 2013, the natural landscape beauty of the WCC campus was the most mentioned topic in WCC's responses. Based on the potential adverse visual impact caused by the proposed NPF, the visual impact statement captures the impact to the Ko‘olau Mountain range from the WCC campus.
- **Parking:** Based on preliminary concerns, some HSH personnel are currently parking on the WCC campus. This problem will be addressed with the proposed NPF and long-term MP. The incorporation of additional parking stalls near buildings, parking lots, and incentivized alternative transportation forms will alleviate the potential parking problem on the WCC campus.
- **Faculty, staff, and student safety:** With the current HSH boundaries and safety measures in place, WCC has safety concerns regarding HSH patients entering the WCC campus. Both the proposed NPF and long-term MP will significantly improve the safety of the WCC campus. The proposed security and safety measures at NPF, including more camera surveillance, lighting, fencing, and ingress/egress to the facility, will minimize safety concerns. In addition, the long-term MP proposes that the boundary between the WCC and HSH campuses and more controlled entrance HSH guard shack will further improve the safety of the WCC campus.
- **Maintenance Yard:** The HSH Maintenance Yard located on the northernmost corner of the WCC campus is dilapidated and its building program is outdated and decreases the aesthetics of WCC in this area. The long-term MP addressed this concern by proposing to relocate the Maintenance Yard onto the HSH campus and returning that area of land back to WCC.

8.1.10 Windward Comprehensive Health Center Master Plan

Created in 2009 by the State Health Planning and Development Agency, the State of Hawai‘i Health Services and Facilities Plan aims to increase cost-effective access to necessary healthcare services, promote financial viability of the health care delivery system, encourage optimization of services and expensive technology, and promote regionalization of services where appropriate. The Health Services and Facilities Plan addresses and reflects the current issues in Hawai‘i's healthcare environment. In the State of Hawai‘i Health Services and Facilities Plan, the Windward Subarea Health Planning Council listed its topic priorities as the following:

- **Improve bed availability:** Improve hospital bed availability through timely transfer of ready patients to appropriate levels of care
- **Adequate access:** Have adequate access to and from the facilities of care or to medical information using emerging technologies
- **Education and prevention:** Through collaborative partnerships, improve health with easily accessible education and prevention

With the expansion and furthering of capabilities of HSH, both the proposed NPF and long-term MP conform to the high priorities of the Windward Subarea Health Planning Council. The HSH improvements will improve the number of available beds and promote better accessibility both on and off the HSH campus. The improvements at HSH will provide cost-effective access to necessary health care services for its patients.

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8.1.11 Congruence with the Hawai‘i 2050 Sustainability Plan

Created in January 2008 by the State's Hawai‘i 2050 Sustainability Task Force, the Hawai‘i 2050 Sustainability Plan gives guidance on how the State can respect island communities; meet the needs of future generations without compromising current ones; and balance economic, social, and environmental priorities. The five goals for the Hawai‘i 2050 Sustainability Plan are as follows:

- Living sustainably is part of our daily practice in Hawai‘i
- Our diversified and globally competitive economy enables us to meaningfully live, work, and play in Hawai‘i
- Our natural resources are responsibly and respectfully used, replenished, and preserved for future generations
- Our community is strong, healthy, vibrant, and nurturing, providing safety nets for those in need
- Our Kanaka Maoli and island cultures and values are thriving and perpetuated

NPF and the long-term MP implementation at HSH adhere to these goals. The facilities are being designed to be sustainable to the extent practical and will not impact the surrounding environment or community.

8.1.12 Water Master Plan

Published in July 2016 by CDM Smith for HBWS, the 30-year Public Draft Water Master Plan has the following objectives:

- Assess existing conditions of pipes, pumps, reservoirs, wells, treatment plants, and other facilities
- Develop and compare projections of future (2040) needs with existing water supplies and infrastructure
- Identify needs for future supplies and improvements to existing facilities
- Develop capital improvement program (CIP) projects and a prioritized 30-year CIP (with a more detailed focus on the first 10 years) based on risks to the system and providing reliable service to customers
- Develop a comprehensive plan to implement improvements, including priorities, schedules, costs, financing, and rates, in conjunction with the CIP

Throughout the draft report the graphs and tables support that no growth in water demand is expected in the Ko‘olaupoko region in the next 30 years. As of 2010, the region's water demand was 15.9 mgd, which is a decrease of 1 percent from 16.0 mgd in 1980. With a similar projection and an actual demand of 18.4 mgd in 2012, a 17 percent decrease is projected by 2040, resulting in 15.3 mgd demand. In addition, over the 30 years the population is projected to decrease by 2,800, from 108,500 to 105,700, which is a 3 percent decrease. HBWS tables show that the per capita demand will be constant at about 145 gallons per capita daily (gpcd).

Overall the increase in number of patients and staff being accommodated at the proposed NPF and long-term MP implementation will be mitigated by the decrease in population expected in the area. Therefore, water demands are not expected to be a problem with this project.

8.2 Projects

This section outlines projects that are planned for the region and that relate to the natural or human environment, address infrastructure or utilities improvements for the region, or focus on sustainability or community improvements. Two projects have been identified that may have

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beneficial or adverse impacts and together with the HSH improvements may have cumulative impacts to the surrounding region.

8.2.1 Kāne‘ohe-Kailua Wastewater Conveyance and Treatment Facilities Project

The Kāne‘ohe-Kailua Wastewater Conveyance and Treatment Facilities project will connect the Kāne‘ohe Wastewater Pretreatment Facility to the Kailua Regional Wastewater Treatment Plant via a gravity-fed, 10-foot-diameter wastewater pipe. Figure 8-1 provides a snapshot of the project and its phases. The importance of this wastewater project in correlation to the HSH expansion is that the added pipe will accommodate larger wastewater capacities. The proposed NFP is not expected to make a significant change on the wastewater flows from HSH, but the long-term buildout may have an impact. With the additional patients and facilities at HSH along with development in Kāne‘ohe in the longer term, there is a potential wastewater capacity issue downstream at the pretreatment plant in Kāne‘ohe. However, this Kāne‘ohe-Kailua wastewater pipeline, which is expected to be complete prior to the HSH long-term development, will likely mitigate any capacity problems envisioned by HSH.

Figure 8-1. Kāne‘ohe-Kailua Wastewater Conveyance and Treatment Facilities Project phases

8.2.2 Kahekili Highway Improvements: Ha‘ikū Road to Kamehameha Highway

On September 2, 2015, the State DOT presented about potential improvements to be made on Kahekili Highway from Ha‘ikū Road to Kamehameha Highway in Kahalu‘u. This stretch of highway is approximately 3.3 miles long with one lane going each way just north of the Kahekili Highway/ Ha‘ikū Road intersection. As discussed in the TIAR in this DEIS, there are existing congestion conditions. In the TIAR, models show that predicted traffic only worsens as HSH develops. Based on this meeting and data collected, a majority (61 percent) of survey respondents supported the widening of Kahekili Highway from Ha‘ikū Road to Kamehameha Highway to two lanes going each direction. The community meeting attendees stated that this long stretch of widening would have the greatest positive impact on traffic flow. Similarly, many of the residents expressed concerns that DOT should

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be spending money on widening of roadways rather than contraflow or transportation systems management. A recommendation in the TIAR includes the widening of Kahekili Highway in one of the traffic modeling scenarios, which shows traffic patterns improving significantly if implemented.

8.2.3 Cumulative Impacts by Affected Environment Category

The cumulative impacts from these projects described below, combined with HSH improvements, are not expected to have any significantly adverse impacts to the surrounding community. Below are the impacts summarized by affected environment category.

8.2.3.1 Natural Environment

As described in Section 3, very minimal adverse impacts and no beneficial impacts to the natural environment are expected from NPF and long-term MP implementation. The minimal adverse impacts for water quality will also be controlled with BMPs and good housekeeping during facility operations to control pollutants and stormwater runoff. Additional impacts from the projects listed above will be required to mitigate for increased stormwater runoff and control pollutants as well. As a consequence, there are likely no adverse, substantial or slight, cumulative impacts as a result of NPF or long-term MP implementation.

8.2.3.2 Human Environment

Traffic is a primary concern for adverse impacts to the community by the project. Existing low levels of traffic service (congestion/backup) at nearby street intersections and traffic patterns during peak periods are already an issue; improvements and expansions of HSH and WCC will likely worsen these conditions. As stated above, a recommendation in the TIAR identifies the DOT’s planned widening of Kahekili Highway in one of its traffic modeling scenarios, which anticipates traffic patterns improving significantly if implemented. It is suggested that additional coordination with DOT, City DTS, and WCC; review; and, traffic modeling be conducted in the future at the time WCC improvements and expansions and components of the overall campus buildout of improvements at HSH are done to ascertain whether adverse cumulative impacts will likely still occur from the HSH projects in combination with improvements and expansions at WCC; and, if so, assess the extents of the anticipated impacts.

8.2.3.3 Infrastructure and Utilities

Because the population (and corresponding water demand) of the area encompassing the HSH campus is anticipated to remain unchanged or decrease over the next 30 years, no adverse impacts on the water supply are anticipated, either quality or groundwater aquifer sustainable yield. Growing interest combined with various legal requirements for the incorporation of sustainable, reuse, use minimization, and LEED elements into improvements, design, and construction further suggest limited adverse impacts on these resources/supplies. BMPs, good housekeeping, and integration of LID into the HSH designs will lessen any burden on the stormwater infrastructure. The facility will generate both “standard” solid waste and medical waste (no other hazmat is anticipated). This would entail expanding the agreement with existing contractors that currently collect and haul off the solid and medical waste from the HSH facility to accommodate any increase in these waste streams by NPF (and the remaining buildout of site improvements in the long term).

8.2.3.4 Socioeconomic Environment

The project should not hinder economic or population growth in the Ko‘olaupoko area. Existing lifestyles in the long term should not be impacted by the project. All construction work is anticipated to take place only during normal working hours on weekdays and within the HSH campus; therefore, no socioeconomic short-term or long-term effects resulting from the proposed project are expected.

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If anything, improvements to HSH through NPF and long-term MP implementation will increase employment opportunities for the surrounding community during construction and facility operations, which will have positive cumulative impacts on the community. In addition, HSH has been a fixture in the community for decades and changes to HSH from NPF or long-term MP implementation will not change the setting of HSH within the community.

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Section 9

Alternatives Considered

This section describes the alternatives considered, including the No-Action, Offsite Development, and Contracted Private Facility alternatives. Additionally, a Land Exchange Alternative is presented specifically for the SNF, which is part of the future, overall campus buildout of improvements.

9.1 No-Action Alternative

The No-Action alternative is a continuation of the existing program, which has been neither updated nor implemented significantly since the initial construction of HSH in 1932. A *Long Range Development* Plan was completed in 1968, and a Complex Development Report Update (DAGS Job 02-20-1710) was completed afterward. A CON, EA, and PRU Application were completed in about 1988 to target localized improvements limited mainly to the central portion of the campus, where most administrative and security monitoring operations occur; however, the original patient facilities were not addressed. The 2005 MP was completed to establish and standardize the first overall campus program; however, key elements of this program—especially improvements to patient facilities—were not executed. Additionally, features of the 2005 MP are more than a decade old and already outdated. The No-Action alternative constitutes continued operation of the existing facility without any campus improvements other than routine repair work to maintain the status quo of the existing structures and utilities.

As discussed in the 2015 MPU, the existing facility does not have enough beds and facilities to accommodate the forecasted patient admission population. Patients of different violence levels are unable to be sufficiently and adequately managed and separated, and the safety of patients, DOH personnel, and visitors would continue to be in jeopardy, and could possibly worsen as the facility further ages and the patient population continues to grow. The No-Action alternative does not support DOH's vision for the facility's program of creating a safe, effective ABH facility for all patients, personnel, and visitors, commensurate with the growing population of the state of Hawai‘i.

Any adverse or beneficial impacts that could be mitigated or created by the Proposed Action/Preferred alternative would not be generated. The urgent need for increased HSH capacity while maintaining safety and security requirements eliminates the No-Action alternative from consideration.

9.2 Offsite Development Alternative

DOH has considered alternatives to either subdivide parts of the existing State-owned HSH lot and sell the subdivided land or lease parts of the lot to a residential or healthcare developer. DOH would use the proceeds from the land sale or lease to purchase or lease land at an alternative location to build a new patient care facility like the proposed NPF offsite. However, costs, time, and community impacts for an offsite patient care facility would be greater than those of replacing the existing Goddard building with the proposed NPF.

The need for additional beds for HSH has been well-documented in the April 8, 2016, CON, 2005 MP, and 2015 MPU, noting that the expansion of HSH is overdue. The anticipated process to finalize approvals to rezone, subdivide, solicit a developer, and approve a sale or lease was determined to be time-prohibitive to relieve the critical patient capacity needs of HSH. In addition,

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this lengthy process would have added significant costs to an anticipated inflation-driven growth in construction costs due to the delay in the start of the project.

Locating a site for a new patient care facility that can meet safety and security, privacy, and operability requirements is anticipated to be a lengthy process because of the difficulty of finding a site that is acceptable to the neighboring community; however, because of the self-contained environment that has already been established at its current site, HSH would be better served by retaining all of its services in a single campus. The footprint of the existing HSH campus is able to accommodate new construction and demolition of existing buildings, including the existing Goddard building, while still being operational at HSH's current bed capacity.

As indicated in the 2015 MPU, a new ABH facility to meet the program needs of the existing facility elsewhere in the state would probably be challenged by the receiving community and does not represent a viable option. The time- and cost-prohibitive logistics of establishing a new patient care facility at a different location off campus eliminates the Offsite Development alternative from consideration.

9.3 Contracted Private Facility Alternative

DOH contracts with Sutter Health to use adult beds and mental health services at its Kāhi Mōhala facility in ‘Ewa Beach, and currently 40 of the “lowest-violence-risk” HSH patients fill all of Kāhi Mōhala's available adult capacity. According to its website, Kāhi Mōhala is a not-for-profit organization licensed by the State of Hawai‘i, accredited by the Joint Commission, certified by TRICARE and Medicare/Medicaid, and aligned with National Committee for Quality Assurance standards. Kāhi Mōhala provides classroom instruction for child and adolescent residential programs and is the only private, freestanding psychiatric hospital in Hawai‘i since September 1983. Kāhi Mōhala comprises a five-building campus-style inpatient facility on 14 acres in ‘Ewa Beach—the rural west side of O‘ahu—at the juncture of Old Fort Weaver Road and Farrington Highway, just beyond the town of Waipahu. Its programs support 88 licensed beds in three patient care buildings for outpatient, acute, and residential treatment of children, adolescents, and adults for a full spectrum of psychiatric diagnoses and emotional and behavioral problems that interfere with daily life, relationships, or physical health. Some of Kāhi Mōhala's specialized services include electroconvulsive therapy, eating disorder treatment, adolescent partial hospitalization, and its healing military forces trauma recovery program.

Once HSH patients are transferred to Kāhi Mōhala, they typically are not returned to the HSH campus in Kāne‘ohe because they become acclimatized to their surroundings, making it impractical and difficult to move them for long-term care without adversely affecting their treatment and progress. Because of the difficulty to license other facilities that are able to accept the type of ABH patients that HSH treats, no other facilities have been considered for private contracting other than Kāhi Mōhala and it is not anticipated that other facilities will be considered in the future. Additionally, as the only psychiatric hospital in Hawai‘i is already at capacity, increasing shared and contracted use with Kāhi Mōhala eliminates the Contracted Private Facility alternative from consideration.

9.4 Land Exchange Alternative

WCC had offered to swap the land on which SNF would sit (the area encompassing the existing Bishop building as indicated in the 2015 MPU) with land (“Sherwood Forest”) at the Windward Comprehensive Health Center in the northeastern portion and front of the WCC campus property.

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The proposed land exchange was addressed by DOH in a letter to the University of Hawai‘i on June 22, 2015, which is provided in Appendix B. DOH carefully considered WCC’s offer, but ultimately concluded that it was not feasible due, at least in part, to the following factors:

1. Timing—adverse impacts to the overall implementation schedule incurred by using a site other than the Bishop building location, which may require additional agency coordination, reviews and approvals; permits; etc.
2. Higher, additional costs associated with clearing the alternate location, which is characterized, in general, by dense vegetation and trees.
3. The alternate site is in a relatively low-elevation, potential sump portion of the property, where an apparent storm drain system retention basin and possible existing utility mains are located. Additionally, it is in relatively close proximity to Kea‘ahala Stream.
4. Potential adverse impacts to visual resources—the alternate location is in relatively close proximity to major roadways, residential neighborhoods and Kāne‘ohe District Park; thus, SNF would be more visible to more public viewing vantage points.
5. Potential adverse impacts to traffic and challenges in accessing the site—the alternate location would be accessible from Kea‘ahala Road near entrances to WCC and Kāne‘ohe District Court (Abner Pākī Hale Kāne‘ohe Courthouse), which could create traffic concerns especially during “rush” hours.

Thus, the Land Exchange alternative is eliminated from consideration.

SNF is part of the future, overall campus buildout of improvements, which will be completed on different schedules—undetermined at this time—based on their need and appropriated and available budgets. This EIS is planned to be updated or supplemented, as needed if necessary, as the timing and extents of each long-term improvement are determined. Thus, as needed, this EIS will be updated in the future with a programmatic environmental document to accommodate and address any significant differences from this EIS attributed to the proposed SNF once the planning horizon, scope, timing, appropriated and available budget, and details of SNF components are better defined and established.

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Section 10

List of Preparers and Contributors

Table 10-1 provides a list of preparers and contributors to this DEIS.

Table 10-1. List of Preparers and Contributors to This Report

Discipline	Company
Prime architect	Anbe, Aruga & Ishizu, Architects, Inc.
EIS lead, civil and electrical engineering	Brown and Caldwell
Mechanical engineering	Katayama & Associates
Landscape architecture and irrigation	Brownlie & Lee
Topographic surveying and mapping	ControlPoint Surveying, Inc.
Sewer closed-circuit television	Underground Services, Inc.
Traffic engineering	Austin, Tsutsumi & Associates, Inc.
Archaeological, historic architectural, and cultural assessments	Scientific Consultant Services, Inc.
Faunal survey	Phil Bruner
Floral survey	LeGrande Biological Surveys, Inc.
Certificate of Need	Torkildson, Katz, Moore, Hetherington & Harris

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Section 11

DEIS Distribution List

This section provides tables showing distribution lists for the following entities:

Table 11-1: State of Hawai‘i

Table 11-2: City and County of Honolulu

Table 11-3: U.S. government

Table 11-4: Elected and Other Officials

Table 11-5: Consulted Parties and Commenters Under HAR 11-200-15, HAR (CP)

Table 11-6: Utility Companies

Table 11-7: News Media

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Table 11-1. State of Hawai‘i Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
State of Hawai‘i Abner Paki Hale Kāne‘ohe [District] Court DeeDee Letts	45-939 Po‘okela Street Kāne‘ohe, HI 96744	Deedee.D.Letts@Courts.Hawaii.Gov	808.534.6300	✓	✓		✓	
State of Hawai‘i Department of Agriculture Scott Enright	1428 South King Street Honolulu, HI 96814	HDOAInfo@Hawaii.Gov	808.973.9550	✓			✓	
State of Hawai‘i Department of Business, Economic Development and Tourism	P.O. Box 2359 Honolulu, HI 96804	HTTP://DBEDT.Hawaii.Gov/Overview/About Webmaster@DBEDTHawaii.Gov	808.586.2355	✓				✓
State of Hawai‘i Department of Business, Economic Development and Tourism, Strategic Industries Division	Leiopapa A Kamehameha Building (State Office Tower) 235 South Beretania Street 5th Floor Honolulu, HI 96813	EnergyOffice@DBEDT.Hawaii.Gov	808.587.3812 808.587.3807	✓				✓
State of Hawai‘i Department of Business, Economic Development and Tourism Office of Planning	Leiopapa A Kamehameha Building (State Office Tower) 235 South Beretania Street 6th Floor Honolulu, HI 96813	Joshua.K.Hekekia@Hawaii.Gov	808.587.2846	✓		✓	✓	
State of Hawai‘i Department of Defense	3949 Diamond Head Road Honolulu, HI 96816	Neal.S.Mitsuyoshi@Hawaii.Gov	808.733.4258	✓			✓	
State of Hawai‘i Department of Education	P.O. Box 2360 Honolulu, HI 96804	HTTP://WWW.HawaiiPublicSchools.Org/Pages/Home.ASPX DOE_Info@HawaiiDOE.Org	808.586.3310 808.586.3230	✓		✓		
State of Hawai‘i Department of Education, Hawai‘i State Library, Hawai‘i Documents Center Linda Sueyoshi	478 South King Street Honolulu, HI 96813	LindaSueyoshi@LibrariesHawaii.Org	808.586.3535 808.586.3555 808.586.3550	✓	✓	✓	✓	
State of Hawai‘i Department of Education, Hawai‘i State Library, Kāne‘ohe Public Library	45-829 Kamehameha Highway Kāne‘ohe, HI 96744	OKNCirc@LibrariesHawaii.Org	808.233.5674 808.233.5676	✓	✓		✓	

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State of Hawai‘i Department of Hawaiian Home Lands Kaleo Manuel	P.O. Box 1879 Honolulu, HI 96805 Hale Kalaniana‘ole 91-5420 Kapolei Parkway Kapolei, HI 96707	Kaleo.L.Manuel@Hawaii.Gov	808.620.9501 808.620.9500 808.620.9590	✓	✓		✓	
State of Hawai‘i Department of Health, Director of Health Dr. Virginia Pressler, M.D. Janice Okubo, Communications Director John Messina, Capital Improvements Coordinator	P.O. Box 3378 Honolulu, HI 96801 Director's Office Kīna‘u Hale Building Room 325 1250 Punchbowl Street Honolulu, HI 96813	HTTP://Health.Hawaii.Gov Ginny.Pressler@DOH.Hawaii.Gov Laurie.Nagai-Morgan@DOH.Hawaii.Gov Janice.Okubo@DOH.Hawaii.Gov John.Messina@DOH.Hawaii.Gov	Dr. Virginia Pressler, M.D. Ph.D. 808.586.4410 808.586.4445 808.586.4560	✓	✓	✓	✓	✓
State of Hawai‘i Department of Health, Adult Mental Health Division Lynn N. Fallin, Deputy Director	P.O. Box 3378 Honolulu, HI 96801 Kīna‘u Hale Building Room 325 1250 Punchbowl Street Honolulu, HI 96813	HTTP://Health.Hawaii.Gov/AMHD Lynn.Fallin@DOH.Hawaii.Gov	808.586.4416 808.586.4686	✓	✓	✓	✓	✓
State of Hawai‘i Department of Health, Adult Mental Health Division Dr. Mark A. Fridovich, Ph.D., M.P.A., Administrator	P.O. Box 3378 Honolulu, HI 96801 Kīna‘u Hale Building Room 256 1250 Punchbowl Street Honolulu, HI 96813	HTTP://Health.Hawaii.Gov/AMHD Mark.Fridovich@DOH.Hawaii.Gov Cheryl.Higa@DOH.Hawaii.Gov DOH.AMHDSecretary@DOH.Hawaii.Gov	808.586.4770 808.586.4686	✓	✓	✓	✓	✓
State of Hawai‘i Department of Health, Clean Water Branch Alec Wong, Chief	P.O. Box 3378 Honolulu, HI 96801 919 Ala Moana Boulevard Room 301 Honolulu, HI 96814	HTTP://Health.Hawaii.Gov/CWB Alec.Wong@DOH.Hawaii.Gov CleanWaterBranch@DOH.Hawaii.Gov	808.586.4309	✓	✓		✓	

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State of Hawai‘i Department of Land and Natural Resources Susan Case	P.O. Box 621 Honolulu, HI 96809	HTTP://DLNR.Hawaii.Gov DLNR@Hawaii.Gov	808.587.0400	✓		✓		
State of Hawai‘i Department of Land and Natural Resources Division of Forestry and Wildlife	Kalanimoku Building Room 325 1151 Punchbowl Street Honolulu, HI 96813	HTTP://DLNR.Hawaii.Gov/DOFAW David.G.Smith@Hawaii.Gov Sharleen.Y.Lee@Hawaii.Gov	808.587.0166	✓			✓	
State of Hawai‘i Department of Land and Natural Resources State Historic Preservation Division Alan Downer, Ph.D., Administrator	Kakuhihewa Building 601 Kamokila Boulevard Suite 555 Kapolei, HI 96707	Alan.S.Downer@Hawaii.Gov	808.692.8015	✓			✓	
State of Hawai‘i Department of Transportation Ford Fuchigami	869 Punchbowl Street Room 509 Honolulu, HI 96813	Ford.N.Fuchigami@Hawaii.Gov	808.587.2150	✓				✓
State of Hawai‘i Department of Transportation Highways Division, Planning Branch Nami Wong	Ali‘iaimoku Hale, 3rd Floor 869 Punchbowl Street, Room 301 Honolulu, HI 96813	Ken.Tatsuguchi@Hawaii.Gov	808.587.1830	✓				✓
State of Hawai‘i Hawai‘i State Hospital Citizen Advisory Board William May	45-710 Kea‘ahala Road Kāne‘ohe, HI 96744	William.May@DOH.Hawaii.Gov	808.236.8237	✓	✓		✓	✓
State of Hawai‘i Hawai‘i State Judiciary—District Court	Kauikeaouli Hale 1111 Alakea Street Honolulu, HI 96813	HTTP://WWW.Courts.State.HI.Us/	808.538.5629	✓	✓	✓		
State of Hawai‘i University of Hawai‘i at Mānoa Water Resources Research Center Darren Lerner, Interim Director	2540 Dole Street, Holmes Hall 283 Honolulu, HI 96822	WRRCDir@Hawaii.Edu	808.956.7847	✓			✓	

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State of Hawai‘i University of Hawai‘i at Mānoa Environmental Center Environmental Studies Program John Cusick, Assistant Specialist	2500 Dole Street Krauss Annex 19 Honolulu, HI 96822	HTTP://WWW.Hawaii.Edu/EnvCtr/EVS/Index.HTML JCusick@Hawaii.Edu	808.956.7362	✓	✓	✓		
State of Hawai‘i University of Hawai‘i at Mānoa Thomas H. Hamilton Library University of Hawai‘i at Mānoa Library Hawaiian Collection	2550 McCarthy Mall Honolulu, HI 96822	HTTP://Library.Manoa.Hawaii.Edu Library@Hawaii.Edu	808.956.8264 808.956.7214 808.956.7203 808.956.7205 808.956.5968 (fax)	✓	✓	✓		
State of Hawai‘i University of Hawai‘i System, Community Colleges Facilities and Environmental Health Denise F. Yoshimori-Yamamoto, AIA, NCARB, LEED AP, DARCH, Director	2010 East West Road Honolulu, HI 96822 2327 Dole Street Honolulu, HI 96822	DFYoshim@Hawaii.Edu	808.956.8373 808.956.0863 808.956.0865 (fax)	✓	✓		✓	
State of Hawai‘i, University of Hawai‘i Windward Community College (WCC) Windward CC-Admin Administrative Services Douglas Dykstra, Chancellor	Hale Alaka‘i, 119A 45-720 Kea‘ahala Road Kāne‘ohe, HI 96744	HTTPS://Windward.Hawaii.Edu Dykstra@Hawaii.Edu WCCInfo@Hawaii.Edu	808.235.7402 808.235.7400 808.247.5362 (fax)	✓	✓		✓	
State of Hawai‘i University of Hawai‘i at Mānoa Center for Conservation Research and Training (CCRT), Hawai‘i Biodiversity and Mapping Program (HBMP)—(formerly Hawai‘i Natural Heritage Program, HINHP) Jennifer H. Ho, Data Manager & Administrative Officer Linda A. Koch, GIS Environmental Data Manager	3050 Maile Way Gillmore Hall, Room 406 Honolulu, HI 96822	HTTP://WWW.Hawaii.Edu/CCRT HTTP://HBMPWeb.PBRC.Hawaii.Edu/CCRT JHHo@Hawaii.Edu LKoch@Hawaii.Edu	808.956.7395 808.956.7184 808.956.3743 808.956.2647 (fax)	✓	✓		✓	

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State of Hawai‘i Office of Hawaiian Affairs Dr. Kamanā‘opono Crabbe & OHA Compliance	Na Lama Kukui (formerly Gentry Pacific Design Center) 560 North Nimitz Highway Suite 200 Honolulu, HI 96817	HTTP://WWW.OHA.Org KamanaoC@OHA.Org KCrabbe@OHA.Org Info@OHA.Org	808.594.1835 808.594.1865 (fax)	✓			✓	✓
State of Hawai‘i Legislative Reference Bureau Library	State Capitol 415 South Beretania Street Room 005 Honolulu, HI 96813	LRB@Capitol.Hawaii.Gov	808.587.0690	✓	✓	✓	✓	
State of Hawai‘i Department of Accounting & General Services Brian Isa, Project Engineer	P.O. Box 119 Honolulu, HI 96810	Brian.S.Isa@Hawaii.Gov DAGS@Hawaii.Gov	808.586.0400	✓	✓	✓		✓
State of Hawai‘i Department of Accounting & General Services Archives Division	P.O. Box 119 Honolulu, HI 96810	Archives@Hawaii.Gov	808.586.0310	✓	✓		✓	
State of Hawai‘i, Department of Education, Hawai‘i State Library, Kaimukī Regional Library	1041 Koko Head Avenue Honolulu, HI 96813	HTTP://WWW.LibrariesHawaii.Org/Locations/Index.HTM	808.733.8422	✓	✓	✓		
State of Hawai‘i, Department of Education Hawai‘i State Library, Pearl City Regional Library	1138 Waimano Home Road Pearl City, HI 96782	HTTP://WWW.LibrariesHawaii.Org/Locations/Index.HTM	808.453.6566	✓	✓	✓		
State of Hawai‘i, Department of Education, Hawai‘i State Library, Hawai‘i Kai Regional Library	249 Lunalilo Home Road Honolulu, HI 96825	HTTP://WWW.LibrariesHawaii.Org/Locations/Index.HTM	808.397.5833	✓	✓	✓		
State of Hawai‘i, Department of Education Hawai‘i State Library, Hilo Regional Library	300 Waianuenue Avenue Hilo, HI 96720	HTTP://WWW.LibrariesHawaii.Org/Locations/Index.HTM	808.933.8888	✓	✓	✓		
State of Hawai‘i, Department of Education, Hawai‘i State Library, Kahului Regional Library	90 School Street Kahului, HI 96732	HTTP://WWW.LibrariesHawaii.Org/Locations/Index.HTM	808.873.3097	✓	✓	✓		
State of Hawai‘i, Department of Education Hawai‘i State Library, Līhu‘e Regional Library	4344 Hardy Street Līhu‘e, HI 96766	HTTP://WWW.LibrariesHawaii.Org/Locations/Index.HTM	808.241.3222	✓	✓	✓		
State of Hawai‘i, Department of Health, Environmental Health Administration	P.O. Box 3378 Honolulu, HI 96801	Laura.Mcintyre@DOH.Hawaii.Gov	808.586.4424	✓	✓	✓	✓	

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Table 11-1. State of Hawai‘i Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
State of Hawai‘i, University of Hawai‘i Office of Capital Improvement	1960 East-West Road Biomed B-102 Honolulu, HI 96822	HTTP://WWW.Hawaii.Edu/OCI	808.956.7935	✓		✓		
State of Hawai‘i, University of Hawai‘i Marine Program	2450 Campus Road Dean Hall 105A Honolulu, HI 96822	ManoaMOP@Hawaii.Edu	808.956.8433	✓			✓	
State of Hawai‘i, University of Hawai‘i at Hilo Edwin H. Mo‘okini Library	200 West Kāwili Street Hilo, HI 96720	HTTP://Library.UHH.Hawaii.Edu/Index.HTML	808.974.7346	✓	✓	✓		
State of Hawai‘i, University of Hawai‘i Maui College Library	310 Ka‘ahumanu Avenue Kahului, HI 96732	ShavonN@Hawaii.Edu	808.984.3233	✓	✓		✓	
State of Hawai‘i, University of Hawai‘i Kaua‘i Community College Library	3-1901 Kaumuali‘i Highway Līhu‘e, HI 96766	HTTP://Info.KauaiCC.Hawaii.Edu/Library/	808.245.8233	✓	✓			✓

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Table 11-2. City and County of Honolulu Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
City and County of Honolulu Board of Water Supply	630 South Beretania Street Honolulu, HI 96813	HTTP://WWW.BoardOfWaterSupply.Com/CSSWeb/	808.748.5000	✓			✓	
City and County of Honolulu Department of Community Services	715 South King Street Room 311 Honolulu, HI 96813	HTTP://WWW1.Honolulu.Gov/DCS/	808.768.7760	✓	✓			✓
City and County of Honolulu Department of Customer Services Municipal Reference Center	558 South King Street Honolulu, HI 96813	HTTP://WWW.Honolulu.Gov/CSD/MRC.HTML	808.768.3765	✓		✓		✓
City and County of Honolulu Department of Design and Construction Robert Kroning	650 South King Street 11th Floor Honolulu, HI 96813	CFraticelli@Honolulu.Gov	808.768.8480	✓			✓	
City and County of Honolulu Department of Environmental Services Jack Pobuk	1000 Ulu‘ōhi‘a Street Suite 308 Kapolei, HI 96707	HTTP://WWW.Honolulu.Gov/ENV.HTML	808.768.3486	✓				✓
City and County of Honolulu Department of Facility Maintenance Division of Road Maintenance	99-999 Iwaena Street Aiea, HI 96701	HTTP://WWW.Honolulu.Gov/DFM/Default.HTML	808.768.3600 808.768.3343	✓				✓
City and County of Honolulu Department of Parks and Recreation John Reid	1000 Ulu‘ōhi‘a Street Suite 309 Kapolei, HI 96707	HTTP://WWW.Honolulu.Gov/Parks.HTML	808.768.3017 808.768.3001	✓				✓
City and County of Honolulu Department of Planning and Permitting	650 South King Street, 7th Floor Honolulu, HI 96813	HTTP://WWW.HonoluluDPP.Org/	808.768.8000	✓	✓	✓		✓
City and County of Honolulu Department of Planning & Permitting Land Use Permits Division Zoning Regulations & Permits Branch Ms. Ardis Shaw-Kim Ms. Malynne Simeon	650 South King Street 7th Floor Honolulu, HI 96813	AShaw@Honolulu.Gov MSimeon@Honolulu.Gov	808.768.8021 808.768.8023 808.768.8022	✓	✓	✓	✓	✓

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Table 11-2. City and County of Honolulu Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
City and County of Honolulu Department of Planning and Permitting Site Development Division Wastewater Branch (WWB)	650 South King Street 1st Floor Honolulu, HI 96813	SGushi@Honolulu.Gov	808.768.8198 808.523.4429	✓		✓		
City and County of Honolulu Department of Transportation Services	650 South King Street Floor 3 Honolulu, HI 96813	HTTP://WWW.Honolulu.Gov/DTS.HTML	808.768.8303	✓				✓
City and County of Honolulu Honolulu Fire Department Manuel Neves	636 South Street Honolulu, HI 96813	HTTP://WWW.Honolulu.Gov/HFD.HTML	808.723.7139	✓		✓		✓
City and County of Honolulu Police Department Louis Kealoha	801 South Beretania Street Honolulu, HI 96813	HTTP://HonoluluPD.Org/	808.723.3475 808.529.3111	✓		✓		

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Table 11-3. Federal Government Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
U.S. Department of Agriculture National Resources Conservation Service	Pacific Islands Area Office P.O. Box 50004 Honolulu, HI 96850	Anthony.Ingersoll@HI.USDA.Gov	808.541.2600	✓			✓	
U.S. Department of the Army Army Corps of Engineers Honolulu District	USACE-Honolulu District Building 230 Fort Shafter, HI 96858	HTTPS://Safe.AMRDEC.Army.Mil/Safe/	808.835.4310	✓			✓	
U.S. Department of Commerce National Marine Fisheries Service	Pacific Islands Regional Office 1611 Kapi‘olani Boulevard Suite 1110 Honolulu, HI 96814	PIROHonolulu@NOAA.Gov	808.944.2300	✓			✓	
U.S. Department of Homeland Security Coast Guard	Commander, 14th Coast Guard District 300 Ala Moana Boulevard Room 9-204 Honolulu, HI 96850-4982	HTTP://WWW.USCG.Mil/D14/	800.818.8724	✓		✓		
U.S. Department of the Interior Fish and Wildlife Service	Box 5088 300 Ala Moana Boulevard Room 3-122 Honolulu, HI 96850-0056	Aaron_Nadig@FWS.Gov	808.792.9400	✓		✓	✓	
U.S. Department of the Interior Geological Survey Pacific Islands Water Science Center Steven Anthony	1845 Wasp Boulevard Building 176 Honolulu, HI 96818	SAnthony@USGS.Gov	808.690.9601 808.587.2400	✓			✓	✓
U.S. Department of the Interior National Parks Service	Pacific Islands Support Office 300 Ala Moana Boulevard Room 6-226 Honolulu, HI 96850	Melia_Lane-Kamahele@NPS.Gov	808.541.2693	✓			✓	
U.S. Department of the Navy	Pacific Division Naval Facilities Engineering Command 258 Makalapa Drive, Suite 100 Pearl Harbor, HI 96860-3130	Andy.Huang@Naval.Mil	808.472.1000	✓		✓		
U.S. Department of Transportation Federal Aviation Administration	300 Ala Moana Boulevard Honolulu, HI 96850	ManuelLara@FAA.Gov	808.541.1232	✓			✓	
U.S. Department of Transportation Federal Highways Administration Meesa Otani	Hawai‘i Division, Box 50206 300 Ala Moana Boulevard Room 3306 Honolulu, HI 96850	Meesa.Otani@DOT.Gov	808.541.2700	✓		✓	✓	

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Table 11-4. Elected and Other Officials Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
County Council Representative for Kāne‘ohe Ikaika Anderson	City Council Info Office City and County of Honolulu Honolulu Hale, Room 203 Honolulu, HI 96813	IAnderson@Honolulu.Gov	808.768.5003	✓	✓	✓	✓	✓
Neighborhood Board Representative Neighborhood Board No. 30—Kāne‘ohe Maurice “Mo” Radke (Chair)	45-674 ‘Āpuakea Street Kāne‘ohe, HI 96744	MoRadke@GMail.Com	(H) 808.254.1828 (C) 808.386.3500	✓	✓		✓	
State Representative Ken Ito	Hawai‘i State Capitol Room 432 415 South Beretania Street Honolulu, HI 96813	RepIto@Capitol.Hawaii.Gov	808.586.8470	✓	✓	✓		
State Representative Sylvia Luke	Hawai‘i State Capitol Room 306 415 South Beretania Street Honolulu, HI 96813	RepLuke@Capitol.Hawaii.Gov	808.586.6200	✓	✓		✓	
State Representative Della Au Belatti	House District 24 Hawai‘i State Capitol Room 426 415 South Beretania Street Honolulu, HI 96813	RepBelatti@Capitol.Hawaii.Gov	808.586.9425	✓	✓		✓	
State Representative Karl Rhoads	House District 29 Hawai‘i State Capitol Room 302 415 South Beretania Street Honolulu, HI 96813	RepRhoads@Capitol.Hawaii.Gov	808.586.6180	✓	✓		✓	
State Representative Jarrett Keohokalole	House District 48 Hawai‘i State Capitol Room 310 415 South Beretania Street Honolulu, HI 96813	RepKeohokalole@Capitol.Hawaii.Gov	808.586.8540	✓	✓		✓	

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Table 11-4. Elected and Other Officials Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
State Senator Jill Tokuda	Hawai‘i State Capitol Room 207 415 South Beretania Street Honolulu, HI 96813	SenTokuda@Capitol.Hawaii.Gov	808.587.7215	✓	✓		✓	
State Senator Josh Green	Senate District 3 Hawai‘i State Capitol Room 407 415 South Beretania Street Honolulu, HI 96813	SenGreen@Capitol.Hawaii.Gov	808.586.9385	✓	✓		✓	
State Senator Gilbert Keith-Agaran	Senate District 5 Hawai‘i State Capitol Room 221 415 South Beretania Street Honolulu, HI 96813	SenKeithAgaran@Capitol.Hawaii.Gov	808.586.7344	✓	✓		✓	
U.S. House of Representatives Office of the First District of Hawai‘i	300 Ala Moana Boulevard Room 4-104 Honolulu, HI 96850	Riley.Fujisaki@Mail.House.Gov	808.541.2570	✓	✓		✓	✓
U.S. Representative Tulsi Gabbard	300 Ala Moana Boulevard 5-104 Prince Kūhiō Building Honolulu, HI 96850	HTTP://Gabbard.House.Gov/Index.PHP/Contact	808.541.1986	✓	✓	✓		
U.S. Senator Mazie Hirono	300 Ala Moana Boulevard Room 3-106 Honolulu, HI 96850	HawaiiOffice@Hirono.Senate.Gov	808.522.8970	✓	✓		✓	
U.S. Senator Brian Schatz	300 Ala Moana Boulevard Room 7-212 Honolulu, HI 96850	HTTPS://WWW.Schatz.Senate.Gov/Contact	808.523.2061	✓	✓	✓		

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Table 11-5. Consulted Parties and Commenters Under Section 11-200-15, HAR (CP) (unless otherwise indicated under another category)

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
UNITE HERE, Local 5 Benjamin Sadoski	1516 South King Street Honolulu, HI 96826	BSadoski@UniteHere5.Org	808.941.2141	✓	✓		✓	

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Table 11-6. Utility Companies Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
Hawai‘i Gas Ricky Martin	O‘ahu Office: Hawai‘i Gas 515 Kamake‘e Street Honolulu, HI 96814	RMartin@HawaiiGas.Com	808.594.5510	✓	✓		✓	
Hawaiian Electric Company Rouen Liu	P.O. Box 2750 WA2-BA Honolulu, HI 96813	HTTPS://WWW.HawaiianElectric.Com/	808.548.7311	✓	✓	✓		
Hawaiian Telecom Jimmy Fung	1177 Bishop Street Honolulu, HI 96813	Jimmy.Fung@HawaiianTel.Com HTTP://WWW.HawaiianTel.Com/Default.ASPX	808.643.3456	✓	✓	✓	✓	
Oceanic Time Warner Cable Raymond Lam	P.O. Box 30050 Honolulu, HI 96820-0050	HTTP://WWW.TimeWarnerCable.Com/EN/Residential.HTML	800.892.4357	✓	✓		✓	

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Table 11-7. News Media Distribution List

Agency	Mailing Address	Electronic Mail or Internet Address	Telephone	DEIS	FEIS	Hardcopy	PDF: Emailed Hyperlink	PDF: CD
The Garden Island	P.O. Box 231 Līhu‘e, Hawai‘i 96766	Neagle@TheGardenIsland.Com	808.245.3681	✓	✓		✓	
Hawai‘i Tribune Herald	P.O. Box 767 Hilo, Hawai‘i 96721	JHansel@HawaiiTribune-Herald.Com	808.930.7324	✓	✓		✓	
Honolulu Civil Beat		News@CivilBeat.Org Business@CivilBeat.Org	808.737.2300 808.737.2310 (fax)	✓	✓		✓	
Honolulu Star-Advertiser Lucy Young-Oda, Editorial Page Editor Sophie Cocke, Reporter	Restaurant Row 7 Waterfront Plaza, Suite 210 500 Ala Moana Boulevard Honolulu, Hawai‘i 96813	LYoungOda@StarAdvertiser.Com SCocke@StarAdvertiser.Com CityDesk@StarAdvertiser.Com	808.529.4831 808.295.1851 808.529.4747	✓	✓		✓	
Maui News	100 Mahalani Street Wailuku, Hawai‘i 96793	Legals@MauiNews.Com	808.244.3981	✓	✓		✓	
Moloka‘i Dispatch	P.O. Box 482219, Kaunakakai, Hawai‘i 96748	Editor@TheMolokaiDispatch.Com	808.552.2781	✓	✓		✓	
West Hawai‘i Today	P.O. Box 789 Kailua-Kona, Hawai‘i 96745-0789	WHT@Aloha.Net	808.329.9311	✓	✓		✓	

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Section 12

Pre-consultation List

This section presents a pre-consultation list:

- HBWS
- City DPP LUPD, Zoning Regulations and Permits Branch
- City DPP, Wastewater Branch
- Hawaiʻi Gas
- HECO
- Hawaiian Telecom
- Hina Mauka
- Kāneʻohe Neighborhood Board, c/o Mr. Maurice "Mo" Radke (Chair)
- Oceanic Time Warner Cable
- State of Hawaiʻi DAGS, Public Works Division
- State of Hawaiʻi DBEDT, Office of Planning
- State of Hawaiʻi DOH, Adult Mental Health Division
- State of Hawaiʻi DOH, Clean Water Branch
- State of Hawaiʻi DOH, OEQC
- State of Hawaiʻi DLNR, Division of Forestry and Wildlife
- State of Hawaiʻi DOT, Highways Division
- State of Hawaiʻi UH, CCRT, HBMP
- State of Hawaiʻi UH, Community Colleges
- State of Hawaiʻi UH, WCC
- USACE, Honolulu District
- USFWS, Pacific Island Fish and Wildlife Office

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Section 13

Site Photographs

This section presents photographs of the HSH site (Figures 13-1 through 13-8).

Figure 13-1. View of existing Goddard building (under demolition) and Ko‘olau mountains west of HSH campus

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Figure 13-2. View of front of existing Goddard building (under demolition)

Figure 13-3. View of HSH central campus facing north

Figure 13-4. View of HSH lower campus facing west from the WCC

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Figure 13-5. View facing south from HSH guard shack

Figure 13-6. View of HSH entrance and guard shack facing north

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Figure 13-7. View facing southeast from existing Goddard building site

Figure 13-8. View of HSH Aloha Gardens facing south from Ala Ko‘olau Road

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Section 14

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Section 15

Limitations

This document was prepared solely for the State of Hawai‘i, Department of Accounting and General Services in accordance with professional standards at the time the services were performed and in accordance with the contract between Anbe, Aruga & Ishizu, Architects, Inc. and Brown and Caldwell dated March 16, 2016. This document is governed by the specific scope of work authorized by the State of Hawai‘i, Department of Accounting and General Services and Anbe, Aruga & Ishizu, Architects, Inc.; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the State of Hawai‘i, Department of Accounting and General Services, Anbe, Aruga & Ishizu, Architects, Inc. and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

This document sets forth the results of certain services performed by Brown and Caldwell with respect to the property or facilities described therein (the Property). The State of Hawai‘i, Department of Accounting and General Services and Anbe, Aruga & Ishizu, Architects, Inc. recognize and acknowledge that these services were designed and performed within various limitations, including budget and time constraints. These services were not designed or intended to determine the existence and nature of all possible environmental risks (which term shall include the presence or suspected or potential presence of any hazardous waste or hazardous substance, as defined under any applicable law or regulation, or any other actual or potential environmental problems or liabilities) affecting the Property. The nature of environmental risks is such that no amount of additional inspection and testing could determine as a matter of certainty that all environmental risks affecting the Property had been identified. Accordingly, THIS DOCUMENT DOES NOT PURPORT TO DESCRIBE ALL ENVIRONMENTAL RISKS AFFECTING THE PROPERTY, NOR WILL ANY ADDITIONAL TESTING OR INSPECTION RECOMMENDED OR OTHERWISE REFERRED TO IN THIS DOCUMENT NECESSARILY IDENTIFY ALL ENVIRONMENTAL RISKS AFFECTING THE PROPERTY.

Further, Brown and Caldwell makes no warranties, express or implied, with respect to this document, except for those, if any, contained in the agreement pursuant to which the document was prepared.

All data, drawings, documents, or information contained in this report have been prepared exclusively for the person or entity to whom it was addressed and may not be relied upon by any other person or entity without the prior written consent of Brown and Caldwell unless otherwise provided by the Agreement pursuant to which these services were provided.

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

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DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

Appendix A: Comment Form for DEIS

Hawai‘I State Hospital DEIS Comment Form

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

Comment Form for
Draft Environmental Impact Statement (EIS)

State of Hawai‘i, Department of Accounting and General Services, Job No. 12-20-2701

State of Hawai‘i, Department of Health
Hawai‘i State Hospital, New Patient Facility and Campus Master Plan Development
Kāne‘ohe (Ko‘olaupoko), O‘ahu, Hawai‘i

The State of Hawai'i, Department of Accounting and General Services encourages comments on the Hawai‘i State Hospital (HSH), New Patient Facility (NPF) and Campus Master Plan (MP) Development Project. The 60-day Draft EIS comment period opened with the notice of availability published in the OEQC *Environmental Notice*, on Tuesday, November 8, 2016. Comments are required to be submitted or postmarked by Monday, January 9, 2017. Comments can be submitted via electronic mail to: Brian.S.Isa@Hawaii.Gov, or by mailing written comments to the address on this form. This form is provided for convenience only; to submit this form by mail, please fold and staple or single tape at top, and affix proper postage (see reverse side for guide). Any letter or other printed comments not using this form are also welcomed.

All comments received will be responded to individually with both the comment and responses included in the Final EIS.

Name: _____ **Address:** _____

Phone: _____ _____

Email: _____ _____

Comments: _____

_____

_____

_____

_____

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(use additional sheets if appropriate)

Fold Here

Return Address:

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_____

Place
Postage
Here

STATE OF HAWAI'I
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
c/o Brian Isa, Project Engineer
P.O. BOX 119, HONOLULU, HAWAI'I, 96810-0119

STAPLE OR TAPE HERE

Appendix B: Preconsultation and EISPN Comments Received and Responses

EISPN Comment and Response:

- HBWS
- City DPP-LUPD-ZRPB
- HECO
- Oceanic Time Warner Cable
- State DOH-CWB
- DOH-EPO
- State DLNR-DOFAW
- State DOT
- State Office of Planning
- UNITE HERE, Local 5
- USACE, Honolulu District
- WCC

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

Mark Ohigashi

From: Sumon Kanpirom
Sent: Wednesday, June 22, 2016 3:50 PM
To: Michael Nishimura; Mark Ohigashi
Subject: FW: EISPN - Hawaii State Hospital Patient Facility Project

Below is FYI…
She will send her review comments to DAGS.

From: Zoll, Marigold S [mailto:marigold.s.zoll@hawaii.gov]
Sent: Wednesday, June 22, 2016 2:13 PM
To: Sumon Kanpirom
Subject: RE: EISPN - Hawaii State Hospital Patient Facility Project

Hi Sumon,
I did a quick review of the document and it seems as though the footprint of the project is within an already developed area. If indeed this is correct, below are my initial thoughts:

- Implement best management practices to mitigate any runoff into the stream,
- Implement BMPs to avoid introduction or spread of invasive plant or animal species into the project or surrounding area
- If any listed plants or animals are discovered during the project, contact us immediately.

Thanks,
Marigold S Zoll

Oahu NEPM Program Manager
DLNR Division of Foresty and Wildlife
2135 Makiki Heights Drive
Honolulu, HI 96822
Mobile: (808) 286-6378
Office: (808) 973-9783
Marigold.S.Zoll@hawaii.gov

From: Sumon Kanpirom [mailto:SKanpirom@BrwnCald.com]
Sent: Tuesday, May 10, 2016 2:07 PM
To: Zoll, Marigold S
Subject: EISPN - Hawaii State Hospital Patient Facility Project

A file has been sent to you via **Hightail**.

Download the file - 2016-04-27_DAGS_12-20-2701_HI-StateHospPatientFac-EISPN.pdf

Your file will expire after 14 days.

Hi Marigold, please see attached EISPN for your review and reference, and let me know if you have any questions. Thanks, Sumon

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

(P)1293.6

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

MEMORANDUM

TO: The Honorable Suzanne Case, Chairperson
Board of Land and Natural Resources

ATTENTION: Ms. Marigold S. Zoll (Oahu NEPM Program Manager)
Division of Forestry and Wildlife

FROM: Audrey Hidano
Deputy Comptroller

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMK: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant)
Kaneohe, Island of Oahu, Hawaii

Thank you for your June 22, 2016, email offering comments on the EISPN for the subject project. This response has been coordinated with the Department of Health and we provide a response to your comments as it relates to the upcoming draft EIS. Both comments and the response are noted below.

Comments:

I did a quick review of the document and it seems as though the footprint of the project is within an already developed area. If indeed this is correct, below are my initial thoughts:

- *Implement best management practices to mitigate any runoff into the stream.*
- *Implement best management practices (BMPs) to avoid introduction or spread of invasive plant or animal species into the project or surrounding area.*
- *If any listed plants or animals are discovered during the project, contact us immediately.*

Response: The draft EIS will include a discussion about the BMPs during the construction to mitigate any storm water runoff into nearby streams and to avoid the spread of invasive plant or animal species into the project or surrounding area.

If you have any further questions regarding this EISPN, your staff may call Mr. Brian Isa of the Public Works Division at 586-0484.

LM BI JL 6/3

OFFICE OF PLANNING
STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

LEO R. ASUNCION
DIRECTOR
OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

RECEIVED BY DAGS DIV. OF PUBLIC WORKS
2016 JUN -2 AM 10: 15

RECEIVED
JUN 2 2016
DIVISION OF PUBLIC WORKS
PLANNING BRANCH

Ref. No. P-15175

June 1, 2016

To: James K. Kurata, Administrator
Department of Accounting & General Services
Public Works Division

From: Leo R. Asuncion, Director

Subject: Environmental Impact Statement Preparation Notice (EISPN), Hawaii State Hospital, Patient Facility, Kaneohe, Oahu; DAGS Job No. 12-20-2701; TMK: (1) 4-5-023:002, 4-5-023:016 (remnant), and 4-5-023:017 (remnant)

Thank you for the opportunity to provide comments on the EISPN request for the Hawaii State Hospital's plan to improve their adult behavior health facility. The EISPN letter and supporting review document was transmitted to our office via letter dated April 27, 2016.

It is our understanding that, to address patient overcrowding issues, the Hawaii State Hospital has undertaken a project to relieve this problem in both the short-and long-term. Hawaii State Hospital patients are committed and discharged according to judicial order, thus the Hawaii State Hospital has no control over its patient numbers.

Additionally, since the last hospital expansion in 1988, buildings have deteriorated and acute staff shortages have put a strain on existing operations and security, thus the need exists for a new patient facility. In the long-term this project proposes a slow buildout of campus improvements. In the short-term, it solves patient overcrowding with the creation of the proposed Goddard Patient Care Facility, Rehabilitation Mall, and supporting infrastructure.

The Office of Planning (OP) has reviewed the transmitted material and has the following comments to offer:

1. Pursuant to the Hawaii Administrative Rules § 11-200-17(h) – relationship of the proposed action to land use plans, policies, and controls for the affected area; this project must demonstrate that it is consistent with a number of state environmental, social, economic goals, and land-use policies. OP provides technical assistance to state and county agencies in administering the statewide planning system listed in Hawaii Revised Statutes (HRS) Chapter 226, the Hawaii State Plan. The Hawaii State Plan provides goals, objectives, policies, and priority guidelines for growth, development, and the allocation of resources throughout the State. It includes diverse objectives and policies of state interest including but not limited to the economy,

agriculture, the visitor industry, federal expenditure, the physical environment, facility systems, socio-cultural advancement, climate change adaptation, and sustainability.

The Draft Environmental Impact Statement (Draft EIS) should include an analysis on how the proposed project conforms to or is in conflict with the goals, objectives, policies, and priority guidelines listed in the HRS Chapter 226. This analysis should address all of the themes stated in the Hawaii State Plan. If any of these are not applicable, the Draft EIS should state that these themes are "not applicable." Listing these in tabular form is often the most efficient method to do so.

2. The coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" (see HRS § 205A-1, definition of the "coastal zone management area").

   HRS Chapter 205A requires all State and county agencies to enforce the coastal zone management (CZM) objectives and policies. The Draft EIS should include an assessment as to how the proposed project conforms to the CZM objectives and its supporting policies set forth in HRS § 205A-2. These objectives and policies include recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources. The assessment on compliance with HRS § 205A-2 is an important component for satisfying the requirements of HRS Chapter 343.

3. Section 3.1.4.1, Streams, page 3-8 of the EISPN states that a U.S. Army Corps of Engineers (USACE), Section 404, Clean Water Act (CWA) and/or a Rivers and Harbors Act (RHA), Section 10 permit may be required due to the project's proximity to Kapunahala Stream and the adjacent wetlands. If said permits are deemed necessary by the USACE, a Federal Consistency Review may also be required.

   As stated above, this project is within the CZM area of the State of Hawaii. The national Coastal Zone Management Act requires that all Federal actions be consistent with approved state coastal program enforceable policies. Federal actions are defined by this Act as activities performed by a Federal agency; activities not performed by a Federal agency, but require federal permits or approval, or State and local government projects that receive Federal financial assistance.

OP is the lead state agency with the authority to conduct Federal Consistency Reviews. Please contact our office on the policies and procedures for this review.

4. Pursuant to HAR § 11-200-17(i) – probable impact of the proposed action on the environment, and impacts of the natural and human environment; in order to ensure that the coastal resources of Kaneohe Bay remain protected, the negative effects of stormwater inundation, erosion, and sediment loss resulting from development activities should be evaluated in the Draft EIS.

   The EISPN document states the Draft EIS will examine flooding, stormwater impacts, and erosion and land-based pollutant control systems. These issues, and both short and long-term strategies, were briefly examined in the EISPN document in Section 3.1.4, Surface Water, page 3-8; Section 3.3.5, Stormwater, page 3-33; Section 4.1.4, Surface Water and Flood Water Mitigation, page 4-2; and Section 4.3.5, Stormwater Infrastructure, page 4-11.

   OP has created guidance material to assist in your examination of stormwater and flood mitigation. This guidance is intended to ensure appropriate sediment and stormwater control measures are considered on land, thus protecting the nearshore environment from polluted stormwater runoff.

   OP suggests the use of the Stormwater Impact Assessment in your stormwater impact evaluation for this project. This document can be used to identify and evaluate information on hydrology, stressors, sensitivity of aquatic and riparian resources, and management measures to control runoff occurrences. Mitigation measures and best management practices (BMP) listed in this document can be applied to water runoff strategies to prevent damage to coastal ecosystems. This document may assist in integrating stormwater impact assessment within the planning and environmental review process of a project. The document can be found at http://files.hawaii.gov/dbedt/op/czm/initiative/stomwater_imapct/final_stormwater_impact_assessments_guidance.pdf.

5. Section 4.3.5, page 4-12 states the Draft EIS will discuss stormwater management design options that include possible BMPs and low impact development (LID) measures that would limit the impact of increased stormwater volume. OP has developed guidance on LID design strategies that could be utilized on the Hawaii State Hospital campus.

LID design concepts and BMPs that may be considered in the Draft EIS include: the preservation of natural features and conservation design; the reduction of impervious cover; and utilizing natural features and source control for stormwater management. These methods are listed in the Low Impact Development, A Practitioners Guide. For more information on LID – BMPs, please examine Section 1.7, pgs. 1-4 to 1-11. This guidance can be viewed or downloaded from the OP website at: http://files.hawaii.gov/dbedt/op/czm/initiative/lid/lid_guide_2006.pdf

If you have any questions regarding this comment letter, please contact Joshua Hekekia of our office at (808) 587-2845.

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1289.6

MEMORANDUM

TO: Mr. Leo R. Asuncion, Director
Office of Planning
Department of Business, Economic Development and Tourism

FROM: Scott M. Ojiri
Acting Public Works Administrator

SUBJECT: Environmental Impact Statement Preparation Notice for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant), Kaneohe, Island of Oahu, Hawaii

Thank you for your June 1, 2016, letter offering comments on the Environmental Impact Statement Preparation Notice (EISPN) for the subject project. We have coordinated this matter with the Department of Health and provide the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

1. ***Comment:*** *Pursuant to the Hawaii Administrative Rules § 11-200-17(h) - relationship of the proposed action to land use plans, policies, and controls for the affected area; this project must demonstrate that it is consistent with a number of state environmental, social, economic goals, and land-use policies. Office of Planning (OP) provides technical assistance to state and county agencies in administering the statewide planning system listed in Hawaii Revised Statutes (HRS) Chapter 226, the Hawaii State Plan. The Hawaii State Plan provides goals, objectives, policies, and priority guidelines for growth, development, and the allocation of resources throughout the State. It includes diverse objectives and policies of state interest including but not limited to the economy, agriculture, the visitor industry, federal expenditure, the physical environment, facility systems, socio-cultural advancement, climate change adaptation, and sustainability.*

The Draft Environmental Impact Statement (Draft EIS) should include an analysis on how the proposed project conforms to or is in conflict with the goals, objectives, policies, and priority guidelines listed in the HRS Chapter 226. This analysis should address all of the themes stated in the Hawaii State Plan. If any of these are not applicable, the Draft EIS should state that these themes are "not applicable." Listing these in tabular form is often the most efficient method to do so.

Response: The Draft EIS will include an analysis and discussion on how the construction of the proposed project will meet or conflict with the guidelines set forth in HRS Chapter 226 and the Hawaii State Plan.

2. ***Comment:*** *The coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" (see HRS § 205A-1, definition of the "coastal zone management area").*

HRS Chapter 205A requires all State and county agencies to enforce the coastal zone management (CZM) objectives and policies. The Draft EIS should include an assessment as to how the proposed project conforms to the CZM objectives and its supporting policies set forth in HRS § 205A-2. These objectives and policies include recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources. The assessment on compliance with HRS § 205A-2 is an important component for satisfying the requirements of HRS Chapter 343.

Response: The Draft EIS will review and assess how the proposed project will meet the policies of HRS § 205A-2.

3. ***Comment:*** *Section 3.1.4.1, Streams, page 3-8 of the EISPN states that a U.S. Army Corps of Engineers (USACE), Section 404, Clean Water Act (CWA) and/or a Rivers and Harbors Act (RHA), Section 10 permit may be required due to the project's proximity to Kapunahala Stream and the adjacent wetlands. If said permits are deemed necessary by the USACE, a Federal Consistency Review may also be required.*

As stated above, this project is within the CZM area of the State of Hawaii. The national Coastal Zone Management Act requires that all Federal actions be consistent with approved state coastal program enforceable policies. Federal actions are defined by this Act as activities performed by a Federal agency; activities not performed by a Federal agency, but require federal permits or approval, or State and local government projects that receive Federal financial assistance. OP is the lead state agency with the authority

to conduct Federal Consistency Reviews. Please contact our office on the policies and procedures for this review.

Response: Permit determinations and applications will occur during the design phase for the project. If the USACE determines that a Section 404 or Section 10 permit is required for this project, the OP office will be contacted for a Federal Consistency Review.

4. *Pursuant to HAR § 11-200-17(i)- probable impact of the proposed action on the environment, and impacts of the natural and human environment; in order to ensure that the coastal resources of Kaneohe Bay remain protected, the negative effects of stormwater inundation, erosion, and sediment loss resulting from development activities should be evaluated in the Draft EIS.*

The EISPN document states the Draft EIS will examine flooding, stormwater impacts, and erosion and land-based pollutant control systems. These issues, and both short and long-term strategies, were briefly examined in the EISPN document in Section 3.1.4, Surface Water, page 3-8; Section 3.3.5, Stormwater, page 3-33; Section 4.1.4, Surface Water and Flood Water Mitigation, page 4-2; and Section 4.3.5, Stormwater Infrastructure, page 4-11.

OP has created guidance material to assist in your examination of stormwater and flood mitigation. This guidance is intended to ensure appropriate sediment and stormwater control measures are considered on land, thus protecting the nearshore environment from polluted stormwater runoff.

OP suggests the use of the Stormwater Impact Assessment in your stormwater impact evaluation for this project. This document can be used to identify and evaluate information on hydrology, stressors, sensitivity of aquatic and riparian resources, and management measures to control runoff occurrences. Mitigation measures and best management practices (BMP) listed in this document can be applied to water runoff strategies to prevent damage to coastal ecosystems. This document may assist in integrating stormwater impact assessment within the planning and environmental review process of a project. The document can be found at http://files.hawaii.gov/dbedt/op/czm/initiative/stormwater_impact/final_stormwater_impact_assessments_guidance.pdf.

Response: The Stormwater Impact Assessment will be consulted to support the stormwater treatment and mitigation analysis for the Draft EIS.

5. ***Comment***: *Section 4.3.5, page 4-12 states the Draft EIS will discuss stormwater management design options that include possible BMPs and low impact development (LID) measures that would limit the impact of increased stormwater volume. OP has developed guidance on LID design strategies that could be utilized on the Hawaii State Hospital campus.*

   LID design concepts and BMPs that may be considered in the Draft EIS include: the preservation of natural features and conservation design; the reduction of impervious cover; and utilizing natural features and source control for stormwater management. These methods are listed in the Low Impact Development, A Practitioners Guide. For more information on LID - BMPs, please examine Section 1.7, pgs. 1-4 to 1-11. This guidance can be viewed or downloaded from the OP website at: http://files.hawaii.gov/dbedt/op/czm/initiative/lid/lid_guide_2006.pdf

   Response: OP's guide will be consulted.

We appreciate your input for this project. If you have any further questions regarding the EISPN, your staff may contact Mr. Brian Isa of the Planning Branch at 586-0484.

BI:lnn

Sumon Kanpirom

From: Michael Nishimura
Sent: Thursday, April 28, 2016 6:56 AM
To: Bryan Kawamura; Clay Ozaki-Train
Cc: Sumon Kanpirom
Subject: Fwd: EISPN for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)—OTWC
Attachments: image001.gif; image005.gif; image006.gif; image007.png

FYI.

Thanks,
Mike

Sent from my iPhone

Begin forwarded message:

> **From:** "Lam, Raymond" <raymond.lam@twcable.com>
> **Date:** April 28, 2016 at 6:49:09 AM HST
> **To:** Michael Nishimura <mnishimura@BrwnCald.com>
> **Cc:** "Brian Isa (Brian.S.Isa@Hawaii.Gov)" <Brian.S.Isa@Hawaii.Gov>, "Harold Inouye" <Harold.Inouye@AAI-Architects.Com>, Mark Ohigashi <mohigashi@BrwnCald.com>
> **Subject: RE: EISPN for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)—OTWC**
>
> Mike,
>
> Oceanic Time Warner Cable has underground facilities along the proposed new Skilled Nursing Facility Site. Please make sure contractor has area toned (Call One Call) before doing any work in the area.
>
> Thank You,
>
> Raymond Lam
> OSP Engineer
> **Oceanic Time Warner Cable**
> Office: (808)625-8457
> Cell: (808)285-9460
>
> *This E-mail and any of its attachments may contain Time Warner Cable proprietary information, which is privileged, confidential, or subject to copyright belonging to Time Warner Cable. This E-mail is intended solely for the use of the individual or entity to which it is addressed. If you are not the intended recipient of this E-mail, you are hereby notified that any dissemination, distribution, copying, or action taken in relation to the contents of and attachments to this E-mail is strictly prohibited and may be unlawful. If you have received this E-mail in error, please notify the sender immediately and permanently delete the original and any copy of this E-mail and any printout.*

From: Michael Nishimura [mailto:mnishimura@BrwnCald.com]
Sent: Wednesday, April 27, 2016 11:09 PM
To: Lam, Raymond <raymond.lam@twcable.com>
Cc: Brian Isa (Brian.S.Isa@Hawaii.Gov) <Brian.S.Isa@Hawaii.Gov>; Harold Inouye <Harold.Inouye@AAI-Architects.Com>; Mark Ohigashi <mohigashi@BrwnCald.com>
Subject: EISPN for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)—OTWC

Aloha Mr. Lam,

We are pleased to submit to you—on behalf of the State DAGS—the Environmental Impact Statement Preparation Notice (EISPN) for the Hawai‘i State Hospital, Patient Facility, O‘ahu Project that will be published in the upcoming, Sunday, May 8, 2016, edition of the State of Hawai‘i, Department of Health, Office of Environmental Quality Control, *Environmental Notice*.

https://www.hightail.com/download/ZWJYa3NSZEs4aU9Ga2NUQw

Please note that the 30-day public review & comment period on the EISPN commences on this publication date and concludes on Tuesday, June 7, 2016.

Mahalo,
Mike

Should you have any questions, please contact me at the telephone number below.

Michael S. Nishimura, P.E., LEED® AP
Brown and Caldwell | Honolulu, HI
MNishimura@brwncald.com
T 808.523.8499 | **F** 808.533.0226
D 808.203.2682 | **M** 808.258.6453

Pacific Guardian Center—Mauka Tower
737 Bishop Street, Suite 3000
Honolulu, Hawai‘i 96813-3214

From: Hightail [mailto:delivery@yousendit.com]
Sent: Wednesday, April 27, 2016 5:00 PM
To: Michael Nishimura
Subject: File Delivered: EISPN for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)

To: mnishimura@brwncald.com

Subject: EISPN for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)

Message:

Environmental Impact Statement Preparation Notice for DAGS 12-20-2701:

2016-04-27_DAGS_12-20-2701_HI-StateHospPatientFac-EISPN.pdf

Size: 187.48 MB **Expires:** May 11, 2016 19:59 PDT

View File

Here's the link to this file:
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DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1291.6

Mr. Raymond Lam
Oceanic Time Warner Cable
P.O. Box 30050
Honolulu, HI 96820

Dear Mr. Lam:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant), Kaneohe, Island of Oahu, Hawaii

Thank you for your April 28, 2016, email offering comments on the EISPN for the subject project. We have coordinated this matter with the Department of Health (DOH) and provide the following responses below:

Comments: *Oceanic Time Warner Cable has underground facilities along the proposed new Skilled Nursing Facility Site. Please make sure contractor has area toned (Call One Call) before doing any work in the area.*

Response: We will note in the Draft EIS the presence of Oceanic Time Warner Cable's underground facilities along the Skilled Nursing Facility site and will note that the area must be toned and a phone call placed to Hawaii One Call Center before any work is done by the DOH's Developer, Avalon Health Care. Please note that the Skilled Nursing Facility's project-level details will be addressed in future and subsequent environmental documents and are only addressed from a programmatic standpoint as a planned zone of improvement, as part of an overall campus buildout of improvement plan. This Draft EIS will address the project-level construction of the first phase of improvements, which include the New Patient Facility on the existing Goddard building site. This would apply to the construction of the first phase and each subsequent phase of the overall campus buildout.

If you have any further questions regarding the EISPN, your staff may contact Mr. Brian Isa of the Planning Branch at 586-0484.

Sincerely,

Scott M. Ojiri

SCOTT M. OJIRI
Acting Public Works Administrator

BI:lnn

Mark Ohigashi

From: Michael Nishimura
Sent: Wednesday, June 08, 2016 10:47 AM
To: Mark Ohigashi; Sumon Kanpirom
Cc: Bryan Kawamura; Clay Ozaki-Train; Andrea Cheung
Subject: FW: EIS Prep Notice Comment-State Hospital Kaneohe

From: Isa, Brian S [mailto:brian.s.isa@hawaii.gov]
Sent: Wednesday, June 08, 2016 10:41 AM
To: Harold Y. Inouye; Matthew Moy; Michael Nishimura
Cc: Earing, Joseph M; Kinimaka, Chris; Ojiri, Scott M; Thirugnanam, Jeyan; Nishimoto, Eric K
Subject: FW: EIS Prep Notice Comment-State Hospital Kaneohe

Harold, Forwarding the email below from CCH DPP for coordination and action. Brian

---

From: Shaw-Kim, Ardis [mailto:ashaw@honolulu.gov]
Sent: Tuesday, June 07, 2016 8:20 AM
To: Isa, Brian S <brian.s.isa@hawaii.gov>
Subject: EIS Prep Notice-State Hospital Kaneohe

Brian:

Thanks for the chat this morning.

DPP wishes to continue to be a consulted party to the environmental process for the Kaneohe Hospital Project. Subsequent to the completion of the environmental review process we anticipate processing a Planned Review Use Permit. This permit is required for the hospital use in the Ag- 2 General Agricultural District. Thru the approval of this permit via Council Resolution the City Council can grant modifications to the development standards of the Land Use Ordinance, Chapter 21 Revised Ordinances of Honolulu.

I'm not familiar with the provisions of Chapter 46 HRS and the City Charter provisions which are referenced mentioned on page 4-16 of the Prep Notice. Those may provide the basis for City authority.

Call me any time with questions. I am not sure who, who in our shop will ultimately get assigned to this project.

Thanks,

Ardis Shaw-Kim
768-8021

Cc: POSSE

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1290.6

Ms. Ardis Shaw-Kim
Zoning Regulations & Permits Branch
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Dear Ms. Shaw-Kim:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant), Kaneohe, Island of Oahu, Hawaii

Thank you for your June 7, 2016, email offering comments on the EISPN for the subject project. We have coordinated this matter with the Department of Health and provide the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

Comments: Department of Planning and Permitting (DPP) *wishes to continue to be a consulted party to the environmental process for the Kaneohe Hospital Project. Subsequent to the completion of the environmental review process we anticipate processing a Planned Review Use Permit. This permit is required for the hospital use in the Ag- 2 General Agricultural District. Thru the approval of this permit via Council Resolution the City Council can grant modifications to the development standards of the Land Use Ordinance, Chapter 21 Revised Ordinances of Honolulu.*

I'm not familiar with the provisions of Chapter 46 HRS and the City Charter provisions which are referenced mentioned on page 4-16 of the Prep Notice. Those may provide the basis for City authority.

Responses: We have no objections to working and coordinating with your office during the environmental review process and when preparing the Planned Review Use (PRU) application.

We plan to submit the PRU application immediately after we receive the Governor's acceptance of the completed EIS document (around April 2017) and would appreciate your consultation.

If you have any questions regarding the EISPN, your staff may contact Mr. Brian Isa of the Planning Branch at 586-0484.

Sincerely,

SCOTT M. OJIRI
Acting Public Works Administrator

BI:lnn

Sumon Kanpirom

From: Michael Nishimura
Sent: Friday, June 03, 2016 4:03 PM
To: Liu, Rouen
Cc: Kuwaye, Kristen; P. E. Brian Isa; AIA LEED AP BD+C Harold Y. Inouye; Bryan Kawamura; Clay Ozaki-Train
Subject: Re: EISPN for the Hawaii State Hospital, Patient Facility, Oahu

Mahalo Rouen!

Thanks,
Mike

Sent from my iPhone

On Jun 3, 2016, at 3:58 PM, Liu, Rouen <rouen.liu@hawaiianelectric.com> wrote:

Dear Mr. Nishimura

Thank you for the opportunity to comment on the subject project. Hawaiian Electric Company has no objection to the project. Should HECO have existing easements and facilities on the subject property, we will need continued access for maintenance of our facilities. We appreciate your efforts to keep us apprised of the subject project in the planning process. As the proposed Hawaii State Hospital project comes to fruition, please continue to keep us informed. Further along in the design, we will be better able to evaluate the effects on our system facilities.
If you have any questions, please call me at 1-808-543-7245.

Sincerely,

Rouen Q. W. Liu
Permits Engineer
Hawaiian Electric Company, Inc.
Tel: (808) 543-7245
Email: Rouen.liu@hawaiianelectric.com

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DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1292.6

Mr. Rouen Q.W. Liu
Hawaiian Electric Company, Inc.
P.O. Box 2752, WA2-BA
Honolulu, HI 96813

Dear Mr. Liu:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant), Kaneohe, Island of Oahu, Hawaii

Thank you for your June 3, 2016, email offering comments on the EISPN for the subject project. We have coordinated this matter with the Department of Health (DOH) and provide the following response to your comments, as noted below:

Comments: *Thank you for the opportunity to comment on the subject project. Hawaiian Electric Company (HECO) has no objection to the project. Should HECO have existing easements and facilities on the subject property, we will need continued access for maintenance of our facilities. We appreciate your efforts to keep us apprised of the subject project in the planning process. As the proposed Hawaii State Hospital project comes to fruition, please continue to keep us informed. Further along in the design, we will be better able to evaluate the effects on our system facilities.*

Response: We understand that HECO has no objections to the information contained in the EISPN. We note that there is the possibility of HECO easements being located on the Hawaii State Hospital property. Continued access to identified HECO easements is acceptable, but shall be coordinated through DOH and Hawaii State Hospital staff, as necessary. The Draft EIS will provide further details of the New Patient Facility project and we look forward to coordinating with HECO during the design.

If you have any further questions regarding the EISPN, your staff may contact Mr. Brian Isa of the Planning Branch at 586-0484.

Sincerely,

SCOTT M. OJIRI
Acting Public Works Administrator

BI:lnn

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

in reply, please refer to:
EMD/CWB

05007PCTM.16

May 9, 2016

Mr. Michael Nishimura, P.E., LEED AP
Brown and Caldwell
Pacific Guardian Center – Mauka Tower
737 Bishop Street, Suite 3000
Honolulu, Hawaii 96813-3214

Dear Mr. Nishimura:

SUBJECT: Comments on the Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 and (1) 4-5-023:017
Kaneohe, Island of Oahu, Hawaii

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated April 27, 2016. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at:
http://health.hawaii.gov/epo/files/2013/05/Clean-Water-Branch-Std-Comments.pdf

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

3. If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.

   Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

5. It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:

   a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project planning must recognize storm water as an asset that sustains and protects

natural ecosystems and traditional beneficial uses of State waters, like community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g. minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.

c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.

d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.

e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

If you have any questions, please visit our website at:http://health.hawaii.gov/cwb/, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

CTM:bk

c: EPO [via e-mail only]
Mr. Brian Isa, DAGS [via e-mail brian.s.isa@hawaii.gov only]

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1296.6

MEMORANDUM

TO: Mr. Alec Wong, P.E.
Chief, Clean Water Branch
Department of Health

FROM: Scott M. Ojiri SO/
Acting Public Works Administrator

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant), Kaneohe, Island of Oahu, Hawaii

Thank you for your May 9, 2016, letter offering comments on the Environmental Impact Statement Preparation Notice (EISPN) for the subject project. We have coordinated this letter with the Department of Health and provide the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

1. ***Comment:*** *Any project and its potential impacts to State waters must meet the following criteria:*

   a. *Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.*

   b. *Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.*

   c. *Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).*

   Response: The draft EIS will discuss the project's potential impacts to State waters and note that the impacts will meet the requirements as noted in the

Antidegradation Policy (HAR, Section 11-54-1.1), Designated Uses (HAR, Section 11-54-3), and Water Quality Criteria (HAR, Sections 11-54-4 through 11-54-8).

2. ***Comment:*** *You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).*

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

Response: The draft EIS will note the potential need for National Pollutant Discharge Elimination System (NPDES) permits for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

3. ***Comment:*** *If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.*

Pursuant to Federal Water Pollution Control Act (commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

Response: The draft EIS will note the potential need for a determination and application for permits from the Army Corps of Engineers, Regulatory Branch, related to Section 401, Water Quality Certification (WQC) as required by Paragraph 401(a)(1) of the

Federal Water Pollution Control Act, also known as the Clean Water Act (CWA). Furthermore, pre-consultation with the Army Corps of Engineers was completed and they provided a Preliminary Jurisdictional Determination (PJD) that the first phase (New Patient Facility) of the campus improvements is not anticipated to require a Department of Army Permit. Further discussion on this and a copy of the PJD will be included in the draft EIS.

4. ***Comment:*** *Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.*

   Response: The draft EIS will state that the proposed project will comply with the State's Water Quality Standards as specified in HAR, Chapter 11-54 and HAR, Chapter 11-55.

5. ***Comment:*** *It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:*

   a. *Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project planning must recognize storm water as an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters, like community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.*

      Response: The draft EIS will note applicable potential methods of managing and treating storm water such that it is an asset and resource for sustaining surrounding natural ecosystems and maintaining traditional beneficial uses of State waters.

b. *Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g. minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.*

Response: The draft EIS will discuss the State's position on water quality and correlating beneficial uses of State waters. The discussion will include potential applicable methods for conserving natural resources and improving water quality through appropriate storm water management practices.

c. *Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.*

Response: The draft EIS will address BMP approaches that minimize potable water for irrigation, encourage groundwater recharge, and treat discharged waters appropriately.

d. *Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.*

Response: The draft EIS will discuss potential green building practices and landscaping for the construction of the New Patient Facility, supporting buildings and areas.

e. *Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.*

Response: The draft EIS will review the potential for retrofitting of the existing storm water infrastructure as related to the New Patient Facility and surrounding areas to increase hydraulic capacity and decrease flooding and ponding.

If you have any further questions regarding the EISPN, your staff may contact Mr. Brian Isa of the Planning Branch at 586-0484.

BI LM JE 5/31

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

KIRK CALDWELL, MAYOR

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Deputy Manager and Chief Engineer

May 25, 2016

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Mr. James K. Kurata
Public Works Administrator
State of Hawaii
Department of Accounting and General Services
P. O. Box 119
Honolulu, Hawaii 96810-0119

Attention: Brian Isa

Dear Mr. Kurata:

Subject: Your Letter Dated April 27, 2016 Requesting Comments on the Environmental Impact Statement Preparation Notice for the Hawaii State Hospital, Patient Facility, Oahu DAGS Job NO. 12-20-2701 - Tax Map Key: 4-5-023: 002

Thank you for the opportunity to comment on the proposed project.

The existing water system is adequate to accommodate the proposed improvements at the Hawaii State Hospital. However, please be advised that this information is based upon current data, and therefore, the Board of Water Supply reserves the right to change any position or information stated herein up until the final approval of the building permit application. The final decision on the availability of water will be confirmed when the building permit application is submitted for approval.

The construction drawings should be submitted for our review.

The construction schedule should be coordinated to minimize impact to the water system.

When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

Please note that in a report submitted by the Haiku Stairs Working Group dated October 6, 2014, recommendations were made proposing a possible trail access to the stairs along the northwest side of the Hawaii State Hospital property.

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

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1297.6

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, HI 96843

Dear Mr. Lau:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant), Kaneohe, Island of Oahu, Hawaii

Thank you for your May 31, 2016, letter offering comments on the EISPN for the subject project. We have coordinated this matter with the Department of Health (DOH) and provide the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

1. ***Comment:*** *The existing water system is adequate to accommodate the proposed improvements at the Hawaii State Hospital. However, please be advised that this information is based upon current data, and therefore, the Board of Water Supply reserves the right to change any position or information stated herein up until the final approval of the building permit application. The final decision on the availability of water will be confirmed when the building permit application is submitted for approval.*

   Response: We concur and will continue to develop the projected water demands for inclusion in the draft EIS. The draft EIS will also note the requirement to obtain the BWS' confirmation on the availability of water during the building permit application process.

2. ***Comment:*** *The construction drawings should be submitted for our review.*

   Response: We concur and will submit the construction drawings in the future during the design phase of the project.

3. ***Comment:*** *The construction schedule should be coordinated to minimize impact to the water system.*

   Response: We concur and we will inform and require the construction contractor to coordinate the work schedule with your office to minimize impacts to the water system.

4. ***Comment:*** *When water is made available, the application will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.*

   Response: We concur. The Department of Accounting and General Services will pay for the water system facility charges which accompany the improvements.

5. ***Comment:*** *The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.*

   Response: On-site fire protection requirements will be coordinated with the Honolulu Fire Department's Fire Prevention Bureau. The draft EIS will provide a discussion about this coordination.

6. ***Comment:*** *Please note that in a report submitted by the Haiku Stairs Working Group dated October 6, 2014, recommendations were made proposing a possible trail access to the stairs along the northwest side of the Hawaii State Hospital property.*

   Response: The draft EIS will include a discussion about the Haiku Stairs and access through the Hawaii State Hospital property.

If you have any further questions regarding the EISPN, your staff may contact Mr. Brian Isa of the Planning Branch at 586-0484.

Sincerely,

Scott M. Ojiri

SCOTT M. OJIRI
Acting Public Works Administrator

BI:lnn

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Cover Memo – FAX

June 1, 2016

TO:	James K. Kurata, Public Works Administrator Department of Accounting and General Services	FAX: 586-0521
FROM:	Douglas Dykstra, Chancellor Windward Community College	FAX: 247-5362

TOTAL NO. of PAGES (including cover sheet) - 4

UNIVERSITY of HAWAI'I
WINDWARD
COMMUNITY COLLEGE

Office of the Chancellor

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___ Construction Mgmt Br	___ Comments	___
___ Technical Svcs Office	___ Investigate & Report	___
___ Leasing Br	___	

June 1, 2016

MEMORANDUM

TO: James K. Kurata
Public Works Administrator
State of Hawaii, Department of Accounting and General Services

FROM: Douglas Dykstra
Chancellor, Windward Community College

SUBJECT: Environmental Impact Statement Preparation Notice for the Hawaii State Hospital, Patient Facility, Oahu DAGS Job No. 12-20-2701

I have two serious problems with the EISP:

1. It ignores the details of the Skilled Nursing Facility (SNF) proposed by the State Hospital as a public/private partnership with Avalon Health Realty-Kaneohe, LLC. for plot #5 of its 2015 Master Plan Update. The EISP is written almost entirely as a study of the impact of the Goddard facility demolition and replacement. Where is one to look for any consideration of the impact of the SNF upon its neighbors or upon the environment?

2. It identifies the successful request by Avalon for a Certificate of Need (CON) that was approved in December 2010 to complete a project by **no later than December 2013** at a total expenditure of no more than $26,270,340. Now that we have reached June 2016 how can the CON still be valid, and is it possible to complete the project given the expenditure limitation published in the application for the CON? Moreover, what is the explanation for Avalon's dilatoriness with this project when the CON presented the project as a compelling need for the State?

The document begins with a *Project Summary* that clearly identifies the Goddard Building demolition and its replacement, along with the Skilled Nursing Facility (SNF) planned as a public/private partnership as the subjects of the EISP. The SNF project is described in the Project Summary as follows:

45-720 Kea'ahala Road
Kāne'ohe, HI 96744
Telephone: (808) 235-7402
Fax: (808) 247-5362
An Equal Opportunity/Affirmative Action Institution

> Additionally, a Skilled Nursing Facility is planned to be developed on site by an independent developer, Avalon Health Realty—Kaneohe, LLC, which will provide long-term care for elderly residents.
>
> This Preparation Notice represents the beginning of the Environmental Impact Statement process, and summarizes the proposed campus improvements, describes the environment that could be affected by the improvements, identifies potential impacts the work could have on the environment, and assesses any mitigation measures to address any prospective adverse impacts on these resources by the project.

However, **almost nothing** in the subsequent document actually addresses the impact of the SNF project upon its neighbors or the environment. Most of the document focuses on the Goddard Building demolition and its replacement.

The EISP claims in Chapter 4.2.7 (pps. 84-85) that visual resources will not be impacted by the project. However, a review of the report makes clear that the impact is considered only insofar as the Goddard project is concerned. At no time and in no way does the EISP consider the impact of the SNF upon the view plane of the Great Lawn looking to the east from the Windward Community College campus. The State Historic Preservation Division (SHPD) of the State Department of Land and Natural Resources has required Windward Community College to maintain the integrity of the Great Lawn, but now a project for the SNF will construct a multilevel facility directly over the portion of the Great Lawn located on the lower campus of the former State Hospital. Moreover, Windward Community College has gone to great lengths to preserve the architectural integrity of the lower campus of the former State Hospital since the property was assigned to the Windward C.C. campus. Six of the ten major buildings on the college campus have been renovated in accord with SHPD guidelines to preserve the historic architectural integrity, and four of the newly constructed buildings have been planned architecturally to mesh with the existing architectural design. The EISP seeks to demolish a building in the historic district of the lower campus of the former State Hospital and replace it with a structure that may or may not be compatible with the existing design standards. The EISP is so outdated at its inception that it does not even include the architectural floor plans that have already been completed by Avalon Health for the SNF and have been presented to the Kaneohe Neighborhood Board in late 2015.

The EISP has covered the Roadways and Parking issues in Chapter 4.3.1 solely from the perspective of the impact of the Goddard project. No attention whatsoever has been paid to the SNF project and its impact on Windward Community College. The architectural floor plans for the SNF project clearly indicate that loading docks to the SNF will be reached by sending delivery vehicles across the front of the college campus. **This plan is unacceptable to the college** and provides another example of the deficiencies of this EISP.

In light of the foregoing, I believe that the plan to mesh the EISP for the Goddard Building project with the SNF public-private partnership with Avalon Health Realty-Kaneohe, LLC. is premature and inappropriate. The SNF project should be required to complete its own independent environmental impact study because the public and especially project neighbors deserve a full and updated report of the project. The public and neighbors deserve an explanation as to why a project portrayed as being of critical immediate need to the long term care of identified populations of patients has been allowed to languish since the issuance of a CON in December 2010. Additionally the public deserves an explanation for the apparent invalidity of projected deadline dates included in the Certificate of Need document issued in December 2010.

c: Denise Yoshimori-Yamamoto, Architect, VPCC
Michael Unebasami, Associate VP for Administrative Affairs, VPCC
Brian Pactol, Vice Chancellor, WCC
David Krupp, Faculty Senate Off-Campus Chair
Jamie Boyd, Faculty Senate Chair, WCC
Dorene Niibu, Staff Senate Chair, WCC
Kelli Acopan, President of ASUH, WCC

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1299.6

MEMORANDUM

TO: Mr. Douglas Dykstra, Chancellor
Windward Community College
University of Hawaii

FROM: Scott M. Ojiri
Acting Public Works Administrator

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant), Kaneohe, Island of Oahu, Hawaii

Thank you for your June 1, 2016 memorandum commenting on the EISPN for the subject project. We have coordinated this matter with the Department of Health (DOH) and provide the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

1. ***Comment:*** *[The EISPN] ignores the details of the Skilled Nursing Facility (SNF) proposed by the State Hospital as a public/private partnership with Avalon Health Realty-Kaneohe, LLC, for plot #5 of its 2015 Master Plan Update. The EISP is written almost entirely as a study of the impact of the Goddard facility demolition and replacement. Where is one to look for any consideration of the impact of the SNF upon its neighbors or upon the environment?*

   Response: Details of the Skilled Nursing Facility (SNF) and its potential environmental impacts will be identified and addressed in a separate and appropriate (project-level) environmental document with details and the potential impacts after this (current) EIS has been completed and accepted. The current EIS will focus primarily on the first phase of campus improvements, which includes the proposed New Patient Facility and its supporting areas; and, provides some overview, assumptions and references to the future overall buildout of improvements at the Hawaii State Hospital, which includes the

proposed Skilled Nursing Facility. Improvement-specific environmental documents will be prepared separately in the future on a case-by-case basis commensurate with the timing of each future project when the details are developed.

The reasons for a separate environmental document for the SNF is explained as follows:

a. The DOH has obtained the Capital Improvement funding to design and construct the New Patient Facility which requires a construction contract to be executed before June 2018. To meet this deadline, the EIS process, Plan Review Use process, and bidding process is on a very tight schedule.

b. The DOH, who is administering the SNF contract, awarded the project to Avalon Health Care.

c. The Department of Accounting and General Services and the DOH has determined that the project-level details for the SNF are not ready to be included in the EIS at this time. Thus, rather than delay the current EIS to accommodate the SNF project details, which would delay the project delivery and execution of a construction contract by June 2018, a separate environmental document is planned for the SNF.

Future incremental hospital campus improvements will file the appropriate (project-level) environmental document when the need and funding becomes available.

2. ***Comment:*** *[THE EISPN] identifies the successful request by Avalon for a Certificate of Need (CON) that was approved in December 2010 to complete a project by no later than December 2013 at a total expenditure of no more than $26,270,340. Now that we have reached June 2016 how can the CON still be valid, and is it possible to complete the project given the expenditure limitation published in the application for the CON? Moreover, what is the explanation for Avalon's dilatoriness with this project when the CON presented the project as a compelling need for the State?*

Response: We believe the CON is still valid. All the while, between the time of the CON application for the SNF and the execution of a DOH agreement/contract, Avalon Health Care and DOH were negotiating to move the project forward. Avalon Health Care also continues to be in contact with the Department of Health, State Health Planning and Development Agency (DOH-SHPDA) to assure progress is being made. As such, we believe the SNF project has been making a good faith effort to meet the timetable and intent of the CON approval.

The CON's estimated project cost is a preliminary cost estimate and Avalon Health Care will contact the DOH-SHPDA if there are cost increases.

The time element to complete a new health care facility often takes longer than what most people understand or expect. While the need for services is immediate, time is needed to complete the conceptual planning, entitlement approvals, permitting, financing, execution of a ground lease, receive Land Board approvals, and the design and construction implementation. The DOH and Avalon Health Care have been diligently proceeding with agreements and other required features and have been coordinating their progress to ensure they can complete the facility in the timeliest manner.

3. **Comment:** *However, almost nothing in the subsequent document actually addresses the impact of the SNF project upon its neighbors or the environment. Most of the document focuses on the Goddard Building demolition and its replacement.*

Response: Please refer to the response to comment 1 above. The progress of the project-level details for the SNF are not as far along as the New Patient Facility; thus, its details will be provided in a separate, future environmental document.

4. **Comment:** *The EISP claims in Chapter 4.2.7 (pps. 84-85) that visual resources will not be impacted by the project. However, a review of the report makes clear that the impact is considered only insofar as the Goddard project is concerned. At no time and in no way does the EISP consider the impact of the SNF upon the view plane of the Great Lawn looking to the east from the Windward Community College campus.*

Response: Please refer to the responses to comments 1 and 3 above.

5. **Comment:** *Moreover, Windward Community College has gone to great lengths to preserve the architectural integrity of the lower campus of the former State Hospital since the property was assigned to the Windward C.C. campus. Six of the ten major buildings on the college campus have been renovated in accord with SHPD guidelines to preserve the historic architectural integrity, and four of the newly constructed buildings have been planned architecturally to mesh with the existing architectural design. The EISP seeks to demolish a building in the historic district of the lower campus of the former State Hospital and replace it with a structure that may or may not be compatible with the existing design standards.*

Response: Please refer to the responses to comments 1 and 3 above.

6. **Comment:** *The EISP has covered the Roadways and Parking issues in Chapter 4.3.1 solely from the perspective of the impact of the Goddard project. No attention*

whatsoever has been paid to the SNF project and its impact on Windward Community College.

Response: Please refer to the responses to comments 1 and 3 above.

7. ***Comment:*** *In light of the foregoing, I believe that the plan to mesh the EISP for the Goddard Building project with the SNF public-private partnership with Avalon Health Realty- Kaneohe, LLC, is premature and inappropriate. The SNF project should be required to complete its own independent environmental impact study because the public and especially project neighbors deserve a full and updated report of the project.*

Response: Please refer to the responses to comments 1 and 3 above.

8. ***Comment:*** *The public and neighbors deserve an explanation as to why a project portrayed as being of critical immediate need to the long term care of identified populations of patients has been allowed to languish since the issuance of a CON in December 2010. Additionally the public deserves an explanation for the apparent invalidity of projected deadline dates included in the Certificate of Need document issued in December 2010.*

Response: See our responses to comment 2 above.

If you have any further questions regarding the EISPN, your staff may contact Mr. Brian Isa of the Planning Branch at 586-0484.

BI:lnn

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to
File:

June 22, 2015

The Honorable John Morton
Vice President for Community Colleges
2444 Dole Street, Bachman 207
Honolulu, Hawaii 96822

Dear Mr. Morton:

Subject: *Proposed Land Exchange with the Department of Health's Hawaii State Hospital*

This is in response to Chancellor Dykstra's presentation on May 21, 2015 at the Kaneohe Neighborhood Board which mentioned a proposed land exchange with the Hawaii State Hospital (HSH). The HSH understands that the Windward Community College (WCC) would like the HSH's "Bishop parcel" in exchange for an undeveloped area physically separate from the HSH campus.

The Department of Health's (DOH) Administration has reviewed the offer and has decided that it is not in the best interest of the Hawaii State Hospital (HSH) to relinquish any land to the WCC or any other entity that does not provide services in support of the DOH's mission. Therefore, the WCC should look for alternate sites that do not involve the HSH property when planning future development.

The HSH has recently completed its master plan, which includes the development of a long term care facility on the site of the Bishop Building. This public/private partnership will help to alleviate overcrowding in the Hospital. The master plan also outlines development at other locations at the HSH. All locations at the HSH campus will be utilized for patient care or ancillary services with the intent of upgrading the level of services for future patients.

The HSH is committed to working with the WCC, however it must be understood that the population of persons with severe mental illness will not diminish, and will most likely increase in the future. This places an enormous burden on the HSH to expand capacity.

It should be further noted that the HSH was constructed in Kaneohe at a time when there were few close neighbors. Over the years, the once vacant land around the Hospital was developed, to the point where the Hospital now has very close neighbors. Despite this fact, the Kaneohe community and the residents of this state continue to acknowledge the "Kaneohe Hospital" as the state's haven for treating persons with mental illness.

ATTACHMENT

The HSH wishes to remain good neighbors with the WCC and hopes that we can work together on issues of mutual concern. Please contact me whenever an issue arises that must be mutually resolved so that we can move forward in improving our services for the residents of the Kaneohe community and the state of Hawaii.

Sincerely,

Virginia Pressler, M.D.
Director of Health

c: Ms Lynn Fallin Deputy Director for Behavioral Health Administration
Mr Doug Dykstra, Chancellor, Windward Community College

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

In Reply Refer To:
01EPIF00-2016-TA-0293

MAY 0 4 2016

Mr. Sumon Kanpirom, PhD
Principal Engineer
Brown and Caldwell
737 Bishop Street, Suite 3000
Honolulu, Hawai'i 96813

Subject: Technical Assistance for the Proposed Hawaii State Hospital Goddard Patient Facility Improvements, Kaneohe, O'ahu

Dear Mr. Kanpirom:

The U.S. Fish and Wildlife Service received your letter on April 11, 2016, requesting our comments on the proposed Hawaii State Hospital Goddard patient facility improvements located at 45-691/710 Keaahala Road, Kaneohe, O'ahu [TMK: (1)4-5-023:002]. We understand Brown and Caldwell on behalf of the State of Hawai'i, will be preparing the Environmental Impact Statement for the proposed project in accordance with Chapter 343, Hawai'i Revised Statutes. The proposed project involves construction of a new Goddard building patient facility and associated supporting infrastructure. The new facility will accommodate 144 beds, a 24- bed medical unit that can be converted into normal patient housing, and security, public, staff, and patient circulation and emergency redundancies. The new Goddard building will be constructed on the existing Goddard building site, which is currently under demolition.

We have reviewed the information you provided and pertinent information in our files, including data compiled by the Hawai'i Biodiversity and Mapping Program as it pertains to listed species and designated critical habitat in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*). There is no federally designated critical habitat within the immediate vicinity of the proposed project. Our data indicate the federally endangered Hawaiian hoary bat or ope'ape'a (*Lasiurus cinereus semotus*) and the wedge-tailed shearwater or 'ua'u kani (*Puffinus pacificus*), a seabird protected under the Migratory Bird Treaty Act [16 U.S.C. 703-712] (MBTA), may occur within the vicinity of the proposed project. We offer the following comments for your consideration.

<u>Hawaiian hoary bat</u>
The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup

rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Wedge-tailed shearwater

Outdoor lighting, such as street lights and night-time work, can adversely impact listed and migratory seabird species found in the vicinity of the proposed project. Seabirds fly at night and are attracted to artificially lighted areas which can result in disorientation and subsequent fallout due to exhaustion or collision with objects such as utility lines, guy wires, and towers that protrude above the vegetation layer. Once grounded, they are vulnerable to predators or often struck by vehicles along roadways. Wedge-tailed shearwater nesting colonies are located on offshore islets and several locations on Oahu and every year many young shearwaters are downed and struck along O'ahu roadways. Any increase in the use of night-time lighting, particularly during each year's peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.

If night-time work is proposed for your project, impacts to seabirds can be minimized by shielding outdoor lights to the maximum extent possible, eliminating night-time construction, and providing all project staff with information about seabird fallout. All lights, including street lights, should be shielded so the bulb can only be seen from below and use the lowest wattage bulbs possible. The project should address all potential impacts to seabirds and outline conservation measures to minimize these impacts.

If it is determined that the proposed project may affect federally listed species, we recommend you contact our office in the planning process so that we may assist you with Endangered Species Act (ESA) compliance.

We appreciate your efforts to conserve listed species. If you have questions about our comments, please contact Leila Gibson, Fish and Wildlife Biologist (phone: 808-792-9400, email: leila_gibson@fws.gov).

Sincerely,

Aaron Nadig
Island Team Manager
O'ahu, Kaua'i, North Western Hawaiian Islands,
and American Samoa

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1301.6

Mr. Aaron Nadig, Island Team Manager
United States Department of the Interior
Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

Dear Mr. Nadig:

Subject: Draft Environmental Impact Statement for the Hawaii State Hospital
New Patient Facility and Campus Master Plan Development
Kaneohe (Koolaupoko), Oahu, Hawaii
DAGS Job Number 12-20-2701
US DOI-FWS Reference No. 01EPIF00-2016-TA-0293

Thank you for your letter dated May 4, 2016, offering comments in pre-consultation for the subject project. We have coordinated this matter with the Department of Health (DOH) and provide the following responses to your comments as it relates to the upcoming Draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

1. **Comment:** *The US Fish and Wildlife has indicated that there is no federally designated critical habitat within the immediate vicinity of the proposed project. Our data indicated the federally endangered Hawaiian hoary bat or ope'ape'a (Lasiurus cinereus semotus) and the wedge-tailed shearwater or 'ua'u kani (Puffinus pacificus), a seabird protected under the Migratory Bird Treaty Act [16 U.S.C. 703-712] (MBTA), may occur within the vicinity of the proposed project.*

   Response: The Draft EIS will note that there is no federally designated critical habitats within the immediate vicinity of the proposed project. Also, the US Fish and Wildlife will be contacted in the planning process for assistance complying with the Endangered Species Act (ESA).

2. **Comment:** *The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. To minimize impacts to the endangered*

Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Response: Noted in the Fauna section of the Draft EIS is a section about Hawaiian hoary bat. It states "to minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June1 through September 15)."

3. **Comment:** *Outdoor lighting, such as street lights and night-work, can adversely impact listed and migratory seabird species found in the vicinity of the proposed project. Seabirds fly at night and area attracted to artificially lighted areas which can result in disorientation and subsequent fallout due to exhaustion or collision with objects such as utility lines, guy wires, and towers that protrude above the vegetation layer. Once grounded, they are vulnerable to predators or often struck by vehicles along roadways. Wedge-tailed shearwater nesting colonies are located on offshore islets and several locations on Oahu and every year many young shearwaters are downed and struck along Oahu roadways. Any increase in the use of night-time lighting, particularly during each year's peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.*

If night-time work is proposed for your project, impacts to seabirds can be minimized by shielding outdoor lights to the maximum extent possible, eliminating night-time construction, and providing all project staff with information about seabird fallout. All lights, including street lights, should be shielded so the bulb can only be seen from below and use the lowest wattage bulbs possible. The project should address all potential impacts to seabirds and outline conservation measures to minimize these impacts.

Response: The Draft EIS notes the potential impact to seabirds in the project site. In the Fauna and Lighting section, it is noted that artificially lighted areas can result in disorientation and subsequent fallout for seabirds. Once grounded, they are vulnerable to predators or often struck by vehicles along roadways. Any increase in the use of night-time lighting, particularly during each year's peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.

Also noted is that if night-time work is proposed for your project, impacts to seabirds can be minimized by shielding outdoor lights to the maximum extent possible, eliminating night-time construction, and providing all project staff with information about seabird fallout. All lights, including street lights, should be shielded so the bulb can only be seen from below and use the lowest wattage bulbs possible.

If you have any further questions regarding the pre-consultation process or the Draft EIS, your staff may contact Mr. Brian Isa of the Planning Branch at 586-0484.

Sincerely,

SCOTT M. OJIRI
Acting Public Works Administrator

BI:lnn

DAVID Y. IGE
GOVERNOR

FORD N. FUCHIGAMI
DIRECTOR

Deputy Directors
JADE T. BUTAY
ROSS M. HIGASHI
EDWIN H. SNIFFEN
DARRELL T. YOUNG

RECEIVED DAGS
DIV. OF PUBLIC WORKS
2016 JUN 21 AM 10: 46

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

June 15, 2016

IN REPLY REFER TO:
HWY-PS 2.2575

RECEIVED
JUN 21 2016
DIVISION OF PUBLIC WORKS
PLANNING BRANCH

TO: JAMES K. KURATA
PUBLIC WORKS ADMINISTRATOR
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

FROM: FORD N. FUCHIGAMI
DIRECTOR OF TRANSPORTATION

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
HAWAII STATE HOSPITAL, PATIENT FACILITY, OAHU
DAGS JOB NO. 12-20-2701
TMK: (1) 4-5-023: 002, 016 AND 017 (REMNANTS)

The Department of Health proposes to expand patient facilities and improve services at the Hawaii State Hospital (HSH) in Kaneohe. Kahekili Highway, State Route 83, provides access to the HSH via Keaahala Road. The site improvement is expected to occur over separate phases and involve replacing, demolishing and constructing buildings. A Traffic Impact Analysis Report (TIAR) will be prepared for first-phase impacts.

The list of actions to be covered in the TIAR in section 3.2.6 Land Transportation of the Environmental Impact Statement Preparation Notice appears to be satisfactory, however, the Hawaii Department of Transportation (HDOT) would be concerned over the impact of the full buildout of the HSH. The HDOT reserves further comment until the TIAR has been submitted for review and acceptance.

If there are any questions regarding our comments, please contact Nami Wong, Systems Planning Engineer, Highways Division, Planning Branch, at (808) 587-6336. Please reference file review number PS 2016-081.

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1294.6

OCT 2 0 2016

MEMORANDUM

TO: The Honorable Ford N. Fuchigami, Director
Department of Transportation

FROM: Audrey Hidano
Deputy Comptroller

SUJECT: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant)
Kaneohe, Island of Oahu, Hawaii

Thank you for your June 15, 2016, letter offering comments on the EISPN for the subject project. We have coordinated this matter with the Department of Health (DOH) and provide the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and response are noted below.

Comments: *The DOH proposes to expand patient facilities and improve services at the Hawaii State Hospital (HSH) in Kaneohe. Kahekili Highway, State Route 83, provides access to the HSH via Keaahala Road. The site improvement is expected to occur over separate phases and involve replacing, demolishing and constructing buildings. A Traffic Impact Analysis Report (TIAR) will be prepared for first-phase impacts.*

The list of actions to be covered in the TIAR in section 3.2.6 Land Transportation of the Environmental Impact Statement Preparation Notice (EISPN) appears to be satisfactory, however, the Hawaii Department of Transportation (HDOT) would be concerned over the impact of the full buildout of the HSH. The HDOT reserves further comment until the TIAR has been submitted for review and acceptance.

Response: In our draft EIS, we will include a TIAR that will provide a discussion about the traffic impacts to the first phase and the projected overall buildout of the Hawaii State Hospital improvements.

If you have any further questions regarding the EISPN, please have your staff call Mr. Brian Isa of the Public Works Division at 586-0484.

Mark Ohigashi

From: Koskelo, Vera B POH <Vera.B.Koskelo@usace.army.mil>
Sent: Tuesday, June 07, 2016 3:38 PM
To: Michael Nishimura
Cc: Brian Isa (Brian.S.Isa@Hawaii.Gov); Harold Inouye; Mark Ohigashi; Sumon Kanpirom
Subject: Corps response to EIS for POH-2016-00070 (Hawaii State Hospital, Goddard Building Patient Facility, Kaneohe, Oahu
Attachments: POH-2016-00070 PJD w. 2 Encl .pdf

Good afternoon Mr. Nishimura,

Thank you for providing the EIS for the subject project to the Corps for comment.

The Corps has no recommended changes to the EIS and concurs with the explanation provided in Section 3.1.4.1 Streams. Based on the information provided to the Corps, the Corps determined that the area on the property identified as “Aloha Gardens and Wetlands” contains features that may be waters of the United States and formally provided this determination in a preliminary jurisdictional determination dated March 18, 2016 (attached). Based on information discussed with the Corps and as stated in the Section 3.1.4.1 Streams of the EIS, the proposed work for the foreseeable future, including campus improvements and the proposed Goddard Facility, would not involve any work in, access to, or any direct impact to the area known as “Aloha Gardens and Wetlands”. Since the first phase of the proposed work would not impact any aquatic features that may be waters of the U.S., no Corps permit is required at this time.

However, as noted in Section 3.1.4.1 Streams in the EIS, if the proposed work plans change and/or any future work involve potential impacts to aquatic features on site, particularly in the area known as “Aloha Gardens and Wetlands”, a Corps permit may be required. A detailed site wetland/stream delineation may be needed depending on the nature of the work and/or impacts. The applicant may choose to request an approved jurisdictional determination following a site wetland/stream delineation to assist in project planning for avoidance and minimization of impacts to waters of the U.S. and/or calculation of impacts and, if necessary, required mitigation. Please contact the Corps as early in the process as possible if it appears that the plans may change to include impacts to aquatic features that may be waters of the U.S.

Thank you,

Vera Koskelo
Biologist
Regulatory Specialist
USACE-Honolulu District
Building 230
Fort Shafter, Hawaii 96858-5440
808-835-4310
Vera.B.Koskelo@usace.army.mil

From: Michael Nishimura [mailto:mnishimura@BrwnCald.com]
Sent: Thursday, April 28, 2016 11:39 AM
To: Koskelo, Vera B POH <Vera.B.Koskelo@usace.army.mil>; CEPOH-RO POH <CEPOH-RO@usace.army.mil>
Cc: Brian Isa (Brian.S.Isa@Hawaii.Gov) <Brian.S.Isa@Hawaii.Gov>; Harold Inouye <Harold.Inouye@AAI-Architects.Com>;

Mark Ohigashi <mohigashi@BrwnCald.com>; Sumon Kanpirom <SKanpirom@BrwnCald.com>
Subject: [EXTERNAL] EISPN for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)—USACE-HED

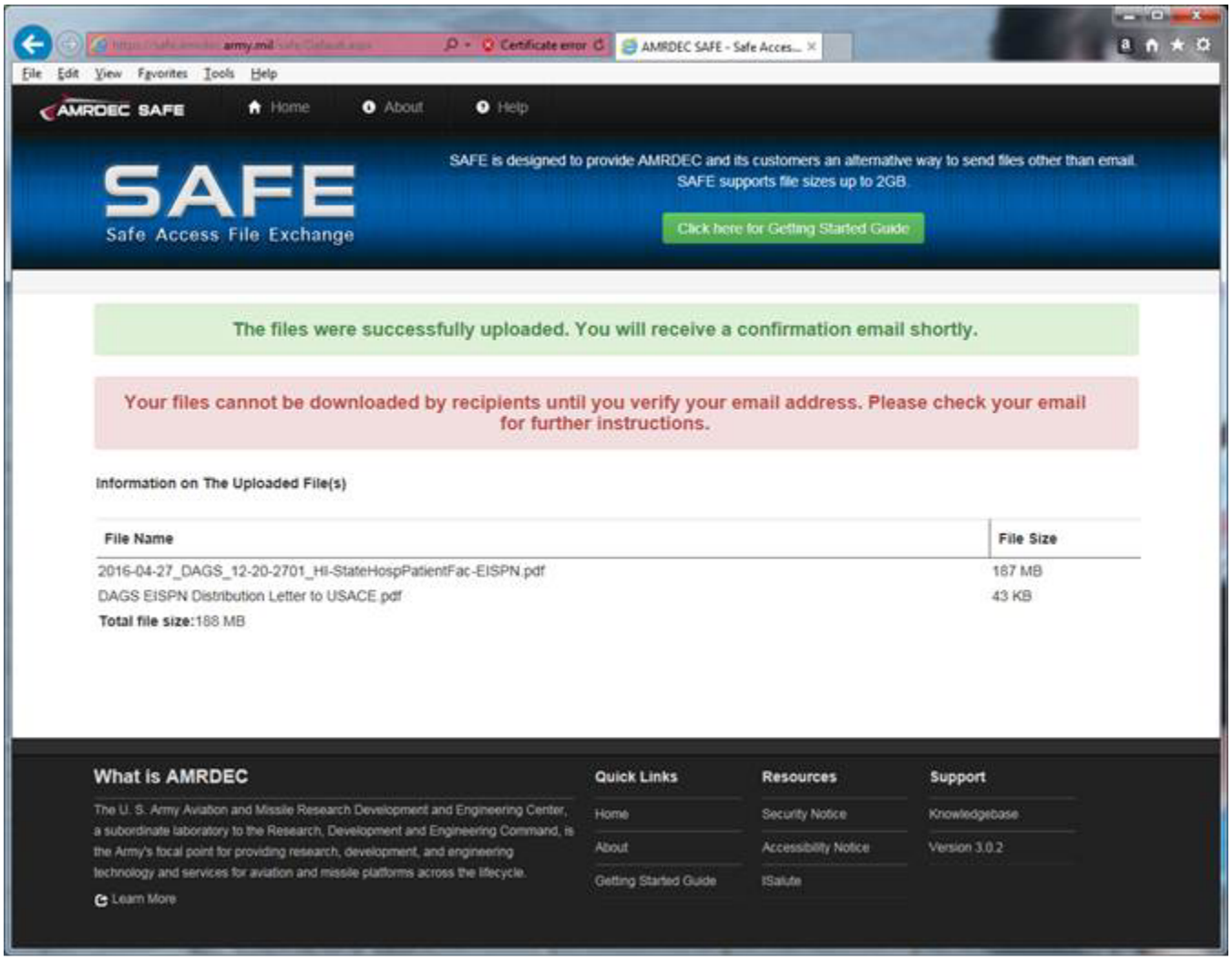
Aloha Vera,

We are pleased to submit to you—on behalf of the State DAGS—the Environmental Impact Statement Preparation Notice (EISPN) for the Hawai‘i State Hospital, Patient Facility, O‘ahu Project that will be published in the upcoming, Sunday, May 8, 2016, edition of the State of Hawai‘i, Department of Health, Office of Environmental Quality Control, *Environmental Notice*.

- https://www.hightail.com/download/ZWJYa3NSZEs4aU9Ga2NUQw

Please note that the 30-day public review & comment period on the EISPN commences on this publication date and concludes on Tuesday, June 7, 2016.

As per your request, we have sent you the EISPN file & its corresponding transmittal letter from the State DAGS via the SAFE website:



Mahalo,
Mike

Should you have any questions, please contact me at the telephone number below.

Michael S. Nishimura, P.E., LEED® AP
Brown and Caldwell | Honolulu, HI
MNishimura@brwncald.com
T 808.523.8499 | **F** 808.533.0226
D 808.203.2682 | **M** 808.258.6453

Pacific Guardian Center—Mauka Tower
737 Bishop Street, Suite 3000
Honolulu, Hawai'i 96813-3214

From: Hightail [mailto:delivery@yousendit.com]
Sent: Wednesday, April 27, 2016 5:00 PM
To: Michael Nishimura
Subject: File Delivered: EISPN for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)

To: mnishimura@brwncald.com

Subject: EISPN for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)

Message:
Environmental Impact Statement Preparation Notice for DAGS 12-20-2701: Hawaii State Hospital, Patient Facility, Oahu (4/27/2016)

2016-04-27_DAGS_12-20-2701_HI-StateHospPatientFac-EISPN.pdf **Size:** 187.48 MB **Expires:** May 11, 2016 19:59 PDT	View File

Here's the link to this file:
https://www.hightail.com/download/ZWJYa3NSZEs4aU9Ga2NUQw

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At Brown and Caldwell, we appreciate your business. If you have any questions or comments, please visit us at http://www.brownandcaldwell.com.

Powered By Hightail

-----Original Message-----
From: Koskelo, Vera B POH [mailto:Vera.B.Koskelo@usace.army.mil]
Sent: Thursday, April 28, 2016 10:09 AM
To: Michael Nishimura
Cc: Mark Ohigashi; Sumon Kanpirom
Subject: EIS preparation notice for POH-2016-00070 (Hawaii State Hospital, Goddard Building Patient Facility, Kaneohe, Oahu)

Good morning Mr. Nishimura,

I spoke with Mr. Kanpirom this morning and he informed me that you will be sending out the EIS preparation notice for the Hawaii State Hospital. I informed him that it would be acceptable to direct this notice to me (Vera.B.Koskelo@usace.army.mil) and that electronic submittal is acceptable, but that any large documents should be sent via the following website: https://safe.amrdec.army.mil/safe/

Thank you,

Vera Koskelo
Biologist
Regulatory Specialist
USACE-Honolulu District
Building 230
Fort Shafter, Hawaii 96858-5440
808-835-4310
Vera.B.Koskelo@usace.army.mil

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1298.6

OCT 2 0 2016

Ms. Vera Koskelo, Biologist
Regulatory Specialist
USACE-Honolulu District
Building 230
Fort Shafter, Hawaii 96858-5440

Dear Ms. Koskelo:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant)
Kaneohe, Island of Oahu, Hawaii

Thank you for your June 7, 2016, email offering comments on the EISPN for the subject project. We have coordinated this matter with the Department of Health (DOH) and provide the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

1. ***Comment:*** *The Corps has no recommended changes to the EIS and concurs with the explanation provided in Section 3.1.4.1 Streams. Based on the information provided to the Corps, the Corps determined that the area on the property identified as "Aloha Gardens and Wetlands" contains features that may be waters of the United States and formally provided this determination in a preliminary jurisdictional determination dated March 18, 2016 (attached). Based on information discussed with the Corps and as stated in the Section 3.1.4.1 Streams of the EIS, the proposed work for the foreseeable future, including campus improvements and the proposed Goddard Facility, would not involve any work in, access to, or any direct impact to the area known as "Aloha Gardens and Wetlands". Since the first phase of the proposed work would not impact any aquatic features that may be waters of the U. S., no Corps permit is required at this time.*

Response: We understand that no USACE permit is required for the proposed first phase project and that further coordination with the USACE would need to be conducted in the future when additional campus improvements are considered.

2. ***Comment:*** *However, as noted in Section 3.1.4.1 Streams in the EIS, if the proposed work plans change and/or any future work involve potential impacts to aquatic features on site, particularly in the area known as "Aloha Gardens and Wetlands", a Corps permit may be required. A detailed site wetland/stream delineation may be needed depending on the nature of the work and/or impacts. The applicant may choose to request an approved jurisdictional determination following a site wetland/stream delineation to assist in project planning for avoidance and minimization of impacts to waters of the U. S. and/or calculation of impacts, and if necessary, required mitigation. Please contact the Corps as early in the process as possible if it appears that the plans may change to include impacts to aquatic features that may be waters of the U. S.*

Response: We concur and will note in the draft EIS that if the proposed plans or work changes in the future which may potentially impact aquatic features on site, further coordination with the USACE for permit determination and application will need to be completed.

If you have any further questions regarding the EISPN, your staff may call Mr. Brian Isa of the Planning Branch at 586-0484.

Sincerely,

Scott M. Ojiri

SCOTT M. OJIRI
Acting Public Works Administrator

UNITE HERE!
LOCAL 5 HAWAII

Eric Gill, Financial Secretary-Treasurer *Hernando Ramos Tan, President* *Godfrey Maeshiro, Senior Vice-President*

June 3, 2016

Via email to James.K.Kurata@hawaii.gov

James Kurata
Public Works Administrator, State of Hawaii Department of Accounting and General Services
Kalanimoku Building
1151 Punchbowl Street, Room 426
Honolulu, HI 96813

Subject: Response to EIS Preparation Notice: Hawai'i State Hospital Patient Facility, Kāne'ohe, O'ahu

Dear Mr. Kurata:

I request that UNITE HERE Local 5 be made a consulted party in the development of this Environmental Impact Statement. After reviewing the Environmental Impact Statement Preparation Notice ("EISPN") for new patient facilities at the Hawaii State Hospital, Local 5 has the following questions and comments:

1. The EIS should include full analysis of the Skilled Nursing Facility (SNF) proposed for the current site of the Bishop building. If that analysis will not be included in this EIS, one should be required at a later time.

2. Will either a new Certificate of Need (CON) or an extension of existing Certificate of Need 10-12 be required for the SNF? CON 10-12 was approved on December 3, 2010 and construction has not proceeded along the timeline in the Certificate of Need application. The applicant projected that the project would receive a building permit around September 2012, be completed in December 2013 and that operation would commence in January 2014. It is unclear how far the developer has moved the project forward, but it does not have a building permit today, more than three-and-a-half years after its projected timeline.

3. Does the developer of the SNF have financing?

4. Have the financing needs for the SNF project changed from what was reported in CON 10-12? If so, to what degree have they changed?

5. Please include an analysis of any changes that have taken place since the inception of the plan for an SNF facility which might impact the project's ideal size, scope, patient mix, etc. For instance:
    a. Have there been changes in the supply of SNF beds between 2010 and 2015 that impact the number needed?
    b. Would the cost of the project be different from what was projected in 2010?
    c. Would the projected revenue and expenses during operation of the SNF be different from what was projected in 2010?

1516 South King Street • Honolulu, Hawaii • 96826-1912 • Phone (808) 941-2141 • Fax (808) 941-2166 • www.unitehere5.org

d. Will the development, when looked at cumulatively with other developments in the area, have a different impact on the natural environment than originally anticipated?
e. Will the development, when looked at cumulatively with other developments in the area, have a different impact on utilities and infrastructure than originally anticipated?

6. Is the state going to consider a re-bid of the SNF project to allow for consideration of developers/operators that might have enough financial resources to carry out the project in a more timely fashion? If not, why not?

7. The EIS should include full analysis of a land swap with Windward Community College and relocation of the SNF part of the project as one of its alternatives. Previously, WCC Chancellor Dr. Dykstra stated that WCC had offered to exchange the land on which the SNF would sit with land at the Windward Comprehensive Health Center.

Thank you in advance for your consideration of these matters.

Sincerely,

Benjamin Sadoski
UNITE HERE, Local 5
1516 South King St.
Honolulu, HI 96826
Phone: 808-941-2141 x238
Email: bsadoski@unitehere5.org

CC:
Office of David Ige, Governor, State of Hawaii
Mike Nishimura, Brown and Caldwell
William May, Administrator, Hawaii State Hospital

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

(P)1305.6

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 2 0 2016

Mr. Benjamin Sadoski
UNITE HERE Local 5
1516 South King St.
Honolulu, HI 96826

Dear Mr. Sadoski:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant)
Kaneohe, Island of Oahu, Hawaii

Thank you for your June 3, 2016, letter offering comments on the EISPN for the subject project. We have coordinated this matter with the Department of Health (DOH) and provide the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

1. ***Comment:*** *The EIS should include full analysis of the Skilled Nursing Facility (SNF) proposed for the current site of the Bishop building. If that analysis will not be included in this EIS, one should be required at a later time.*

Response: The DOH's developer of the SNF, Avalon Health Care (AHC), will file a separate and appropriate (project-level) environmental document with details and identify the potential environmental impacts after this (current) EIS has been completed and accepted. The current EIS will focus primarily on the first phase of campus improvements, which includes the proposed New Patient Facility (NPF) and its supporting areas; and provides some overview, assumptions, and references to the future overall buildout of improvements at the Hawaii State Hospital, including the SNF.

The reasons for a separate environmental document for the SNF is explained as follows:

A. The DOH has obtained the Capital Improvement funding to design and construct the NPF which requires a construction contract to be executed before June 2018. To meet this deadline, the EIS process, Plan Review Use process, and bidding process is on a very tight schedule.

B. The DOH, who is administering the SNF contract, awarded the project to AHC.

C. The Department of Accounting and General Services and DOH has determined that the project-level details for the SNF are not ready to be included in this EIS at this time. Thus, rather than delay the current EIS to accommodate the SNF project details which would delay the project delivery and execution of a construction contract by June 2018 a separate environmental document is planned for the SNF.

Future incremental hospital campus improvements will file the appropriate (project-level) environmental document when the need and funding becomes available.

2. ***Comment:*** *Will either a new Certificate of Need (CON) or an extension of existing CON 10-12 be required for the SNF? CON 10-12 was approved on December 3, 2010, and construction has not proceeded along the timeline in the CON application. The applicant projected that the project would receive a building permit around September 2012, be completed in December 2013, and that operation would commence in January 2014. It is unclear how far the developer has moved the project forward, but it does not have a building permit today, more than three-and-a-half years after its projected timeline.*

Response: We do not believe a new CON is required. All the while, between the time of the CON application for the SNF and the execution of a DOH agreement/contract, AHC and DOH were negotiating to move the project forward. AHC has been in contact with the DOH, State Health Planning and Development Agency (DOH-SHPDA) after receiving the CON to assure progress is being made. As such, DOH and the AHC believe good faith effort was being done to meet the timetable and intent of the CON approval. An environmental assessment document for the SNF is being prepared by AHC for public review and we anticipate the document to be available next year. The process to obtain a building permit will occur after the SNF entitlements and design plans are completed.

3. ***Comment:*** *Does the developer of the SNF have financing?*

Response: The financing arrangements of AHC are not pertinent to this process. We understand they have financing lined up. As noted in the response to comment one (1) above, a future separate environmental document is planned for the SNF.

4. ***Comment:*** *Have the financing needs for the SNF project changed from what was reported in CON 10-12? If so, to what degree have they changed?*

Response: See response to comment three (3) above.

5. ***Comment:*** *Please include an analysis of any changes that have taken place since the inception of the plan for an SNF facility which might impact the project's ideal size, scope, patient mix, etc., for instance:*

   a. *Have there been changes in the supply of SNF beds between 2010 and 2015 that impact the number needed?*

   b. *Would the cost of the project be different from what was projected in 2010?*

   c. *Would the projected revenue and expenses during operation of the SNF be different from what was projected in 2010?*

   d. *Will the development, when looked at cumulatively with other developments in the area, have a different impact on the natural environment than originally anticipated?*

   e. *Will the development, when looked at cumulatively with other developments in the area, have a different impact on utilities and infrastructure than originally anticipated?*

Response: 5.a: The DOH has assessed that there continues to be a high need for SNF beds. We suggest you consult the DOH-SHPDA's website for bed capacity data.

Response: 5.b: AHC's project cost and other cost factors are part of their consideration to move the project forward.

Response: 5.c: AHC's project cost may have increased but ultimately become part of their consideration to move the project forward.

Response: 5.d: Details of the SNF project will be forthcoming in a separate document.

Response: 5.e: See 5.d. response above.

6. ***Comment:*** *Is the State going to consider a re-bid of the SNF project to allow for consideration of developers/operators that might have enough financial resources to carry out the project in a more timely fashion? If not, why not?*

Response: The DOH will not be considering the re-bid of the SNF project. The DOH has an agreement with AHC, and the project is moving forward.

7. ***Comment:*** *The EIS should include full analysis of a land swap with Windward Community College (WCC), and relocation of the SNF part of the project as one (1) of its alternatives. Previously, WCC Chancellor Dr. Dykstra stated that WCC had offered to exchange the land on which the SNF would sit with land at the Windward Comprehensive Health Center.*

Response: The proposed land swap was addressed by the DOH in a letter to the University of Hawaii on June 22, 2015. See the attached letter. Also, see the response to comment one (1) above.

If you have any further questions regarding the EISPN, your staff may call Mr. Brian Isa of the Planning Branch at 586-0484.

Sincerely,

Scott M. Ojiri

SCOTT M. OJIRI
Acting Public Works Administrator

BI:mo

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P O BOX 3378
HONOLULU, HI 96801-3378

In reply please refer to
File

June 22, 2015

The Honorable John Morton
Vice President for Community Colleges
2444 Dole Street, Bachman 207
Honolulu, Hawaii 96822

Dear Mr. Morton:

Subject: ***Proposed Land Exchange with the Department of Health's Hawaii State Hospital***

This is in response to Chancellor Dykstra's presentation on May 21, 2015 at the Kaneohe Neighborhood Board which mentioned a proposed land exchange with the Hawaii State Hospital (HSH). The HSH understands that the Windward Community College (WCC) would like the HSH's "Bishop parcel" in exchange for an undeveloped area physically separate from the HSH campus.

The Department of Health's (DOH) Administration has reviewed the offer and has decided that it is not in the best interest of the Hawaii State Hospital (HSH) to relinquish any land to the WCC or any other entity that does not provide services in support of the DOH's mission. Therefore, the WCC should look for alternate sites that do not involve the HSH property when planning future development.

The HSH has recently completed its master plan, which includes the development of a long term care facility on the site of the Bishop Building. This public/private partnership will help to alleviate overcrowding in the Hospital. The master plan also outlines development at other locations at the HSH. All locations at the HSH campus will be utilized for patient care or ancillary services with the intent of upgrading the level of services for future patients.

The HSH is committed to working with the WCC, however it must be understood that the population of persons with severe mental illness will not diminish, and will most likely increase in the future. This places an enormous burden on the HSH to expand capacity.

It should be further noted that the HSH was constructed in Kaneohe at a time when there were few close neighbors. Over the years, the once vacant land around the Hospital was developed, to the point where the Hospital now has very close neighbors. Despite this fact, the Kaneohe community and the residents of this state continue to acknowledge the "Kaneohe Hospital" as the state's haven for treating persons with mental illness.

The HSH wishes to remain good neighbors with the WCC and hopes that we can work together on issues of mutual concern. Please contact me whenever an issue arises that must be mutually resolved so that we can move forward in improving our services for the residents of the Kaneohe community and the state of Hawaii.

Sincerely,

Virginia Pressler, M.D.
Director of Health

c: Ms. Lynn Fallin Deputy Director for Behavioral Health Administration
Mr. Doug Dykstra, Chancellor, Windward Community College

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

EPO 16-154

May 25, 2016

Mr. Mike Nishimura, P.E., LEED AP
Brown and Caldwell
Pacific Guardian Center – Mauka Tower
737 Bishop Street, Suite 3000
Honolulu, Hawaii 96813
Email: MNishimura@BrwnCald.com

Dear Mr. Nishimura:

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN)
State of Hawaii Department of Health, Hawaii State Hospital Patient Facility, Kaneohe, Oahu
TMK: (1)4-5-023:002, (1)4-5-023:016 (remnant) and (1)4-5-023:017 (remnant)

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your EISPN to our office via the OEQC link:
http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Oahu/2010s/2016-05-08-OA-5B-EISPN-Hawaii-State-Hospital-Patient%20Facility.pdf

EPO strongly recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments. EPO has recently updated the environmental Geographic Information System (GIS) website page. It now compiles various maps and viewers from our environmental health programs. The eGIS website page will be continually updated so please visit it regularly at: http://health.hawaii.gov/epo/egis.

EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: https://eha-cloud.doh.hawaii.gov. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings.

We suggest you review the requirements for the National Pollutant Discharge Elimination System (NPDES) permit. We recommend contacting the Clean Water Branch at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov after relevant information is reviewed at:

1. http://health.hawaii.gov/cwb
2. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/standard-npdes-permit-conditions
3. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/forms

EPO recommends you review the need and/or requirements for a Clean Air Branch permit. The Clean Air Branch can be consulted via e-mail at: Cab.General@doh.hawaii.gov or via phone: (808) 586-4200.

If noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work. Please call the Indoor and Radiological Health Branch at (808) 586-4700 and review relevant information online at: http://health.hawaii.gov/irhb/noise.

You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer. This viewer geographically shows where some previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised Statutes, Chapter 343} documents have been prepared.

In order to better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourages you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at: http://www.epa.gov/ejscreen.

We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design. Thank you for the opportunity to comment.

Mahalo nui loa,

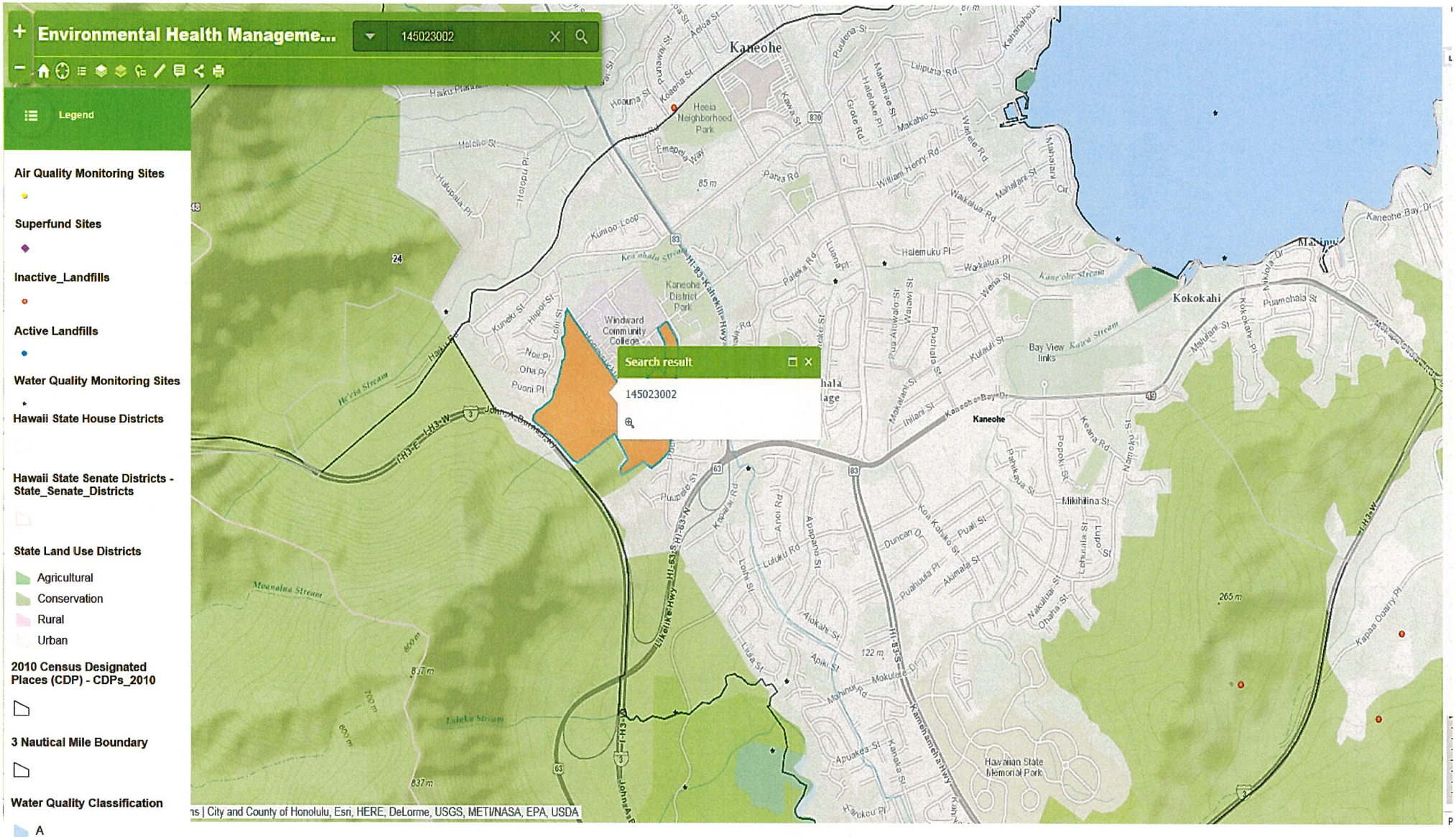
Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

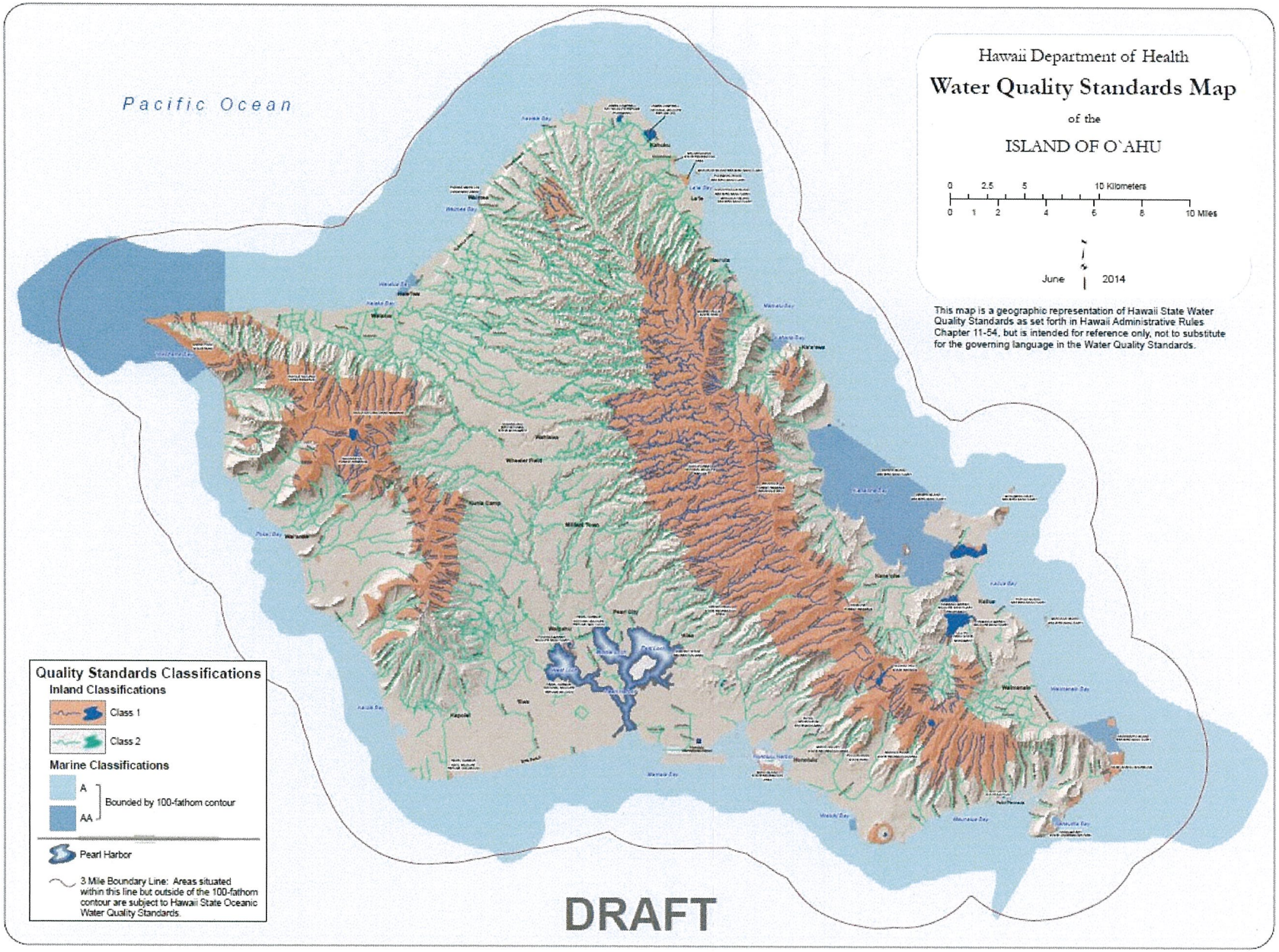
LM:nn

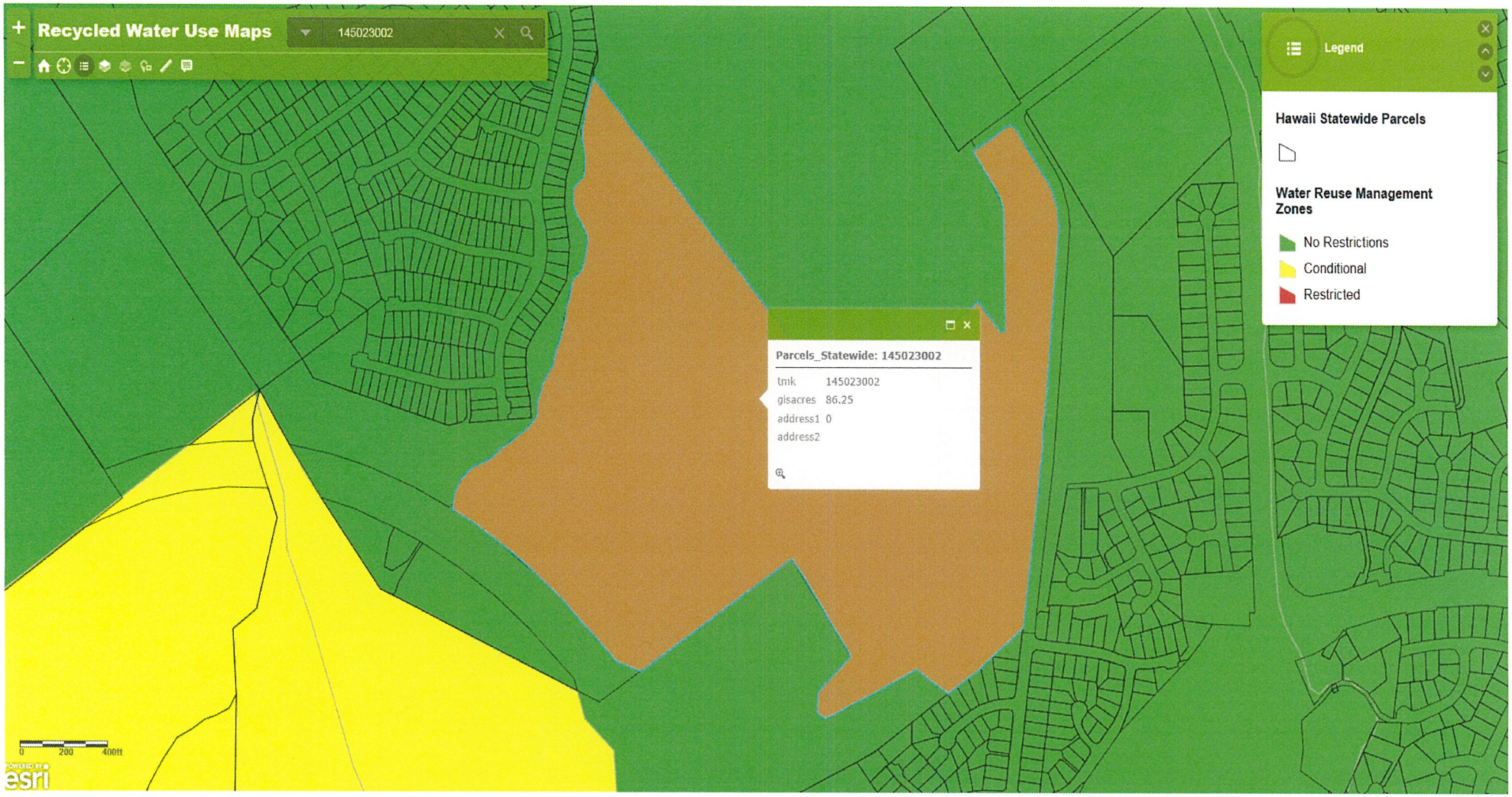
Attachment 1: EPO Draft Environmental Health Management Map - Oahu
Attachment 2: Clean Water Branch: Water Quality Standards Map - Oahu
Attachment 3: Wastewater Branch: Recycled Water Use Map of Project Area
Attachment 4: OEQC Viewer Map of Project Area
Attachment 5: U.S. EPA EJSCREEN Report for Project Area

c: James Kurata, DAGS {via email: James.K.Kurata@hawaii.gov}
The Honorable David Y. Ige, Governor {via email: http://governor.hawaii.gov/contact-us/contact-the governor }
DOH: CWB, IRHB, CAB {via email only}

EPO Draft Environmental Health Management Map: http://health.hawaii.gov/epo/egis




Hawaii Department of Health
Water Quality Standards Map
of the
ISLAND OF O`AHU
0 2.5 5 10 Kilometers
0 1 2 4 6 8 10 Miles
June 2014
This map is a geographic representation of Hawaii State Water Quality Standards as set forth in Hawaii Administrative Rules Chapter 11-54, but is intended for reference only, not to substitute for the governing language in the Water Quality Standards.
Pacific Ocean
Quality Standards Classifications
Inland Classifications
Class 1
Class 2
Marine Classifications
A
AA
Bounded by 100-fathom contour
Pearl Harbor
3 Mile Boundary Line: Areas situated within this line but outside of the 100-fathom contour are subject to Hawaii State Oceanic Water Quality Standards.
DRAFT


Recycled Water Use Maps
145023002
Legend
Hawaii Statewide Parcels
Water Reuse Management Zones
No Restrictions
Conditional
Restricted
Parcels_Statewide: 145023002
tmk 145023002
gisacres 86.25
address1 0
address2
0 200 400ft
esri

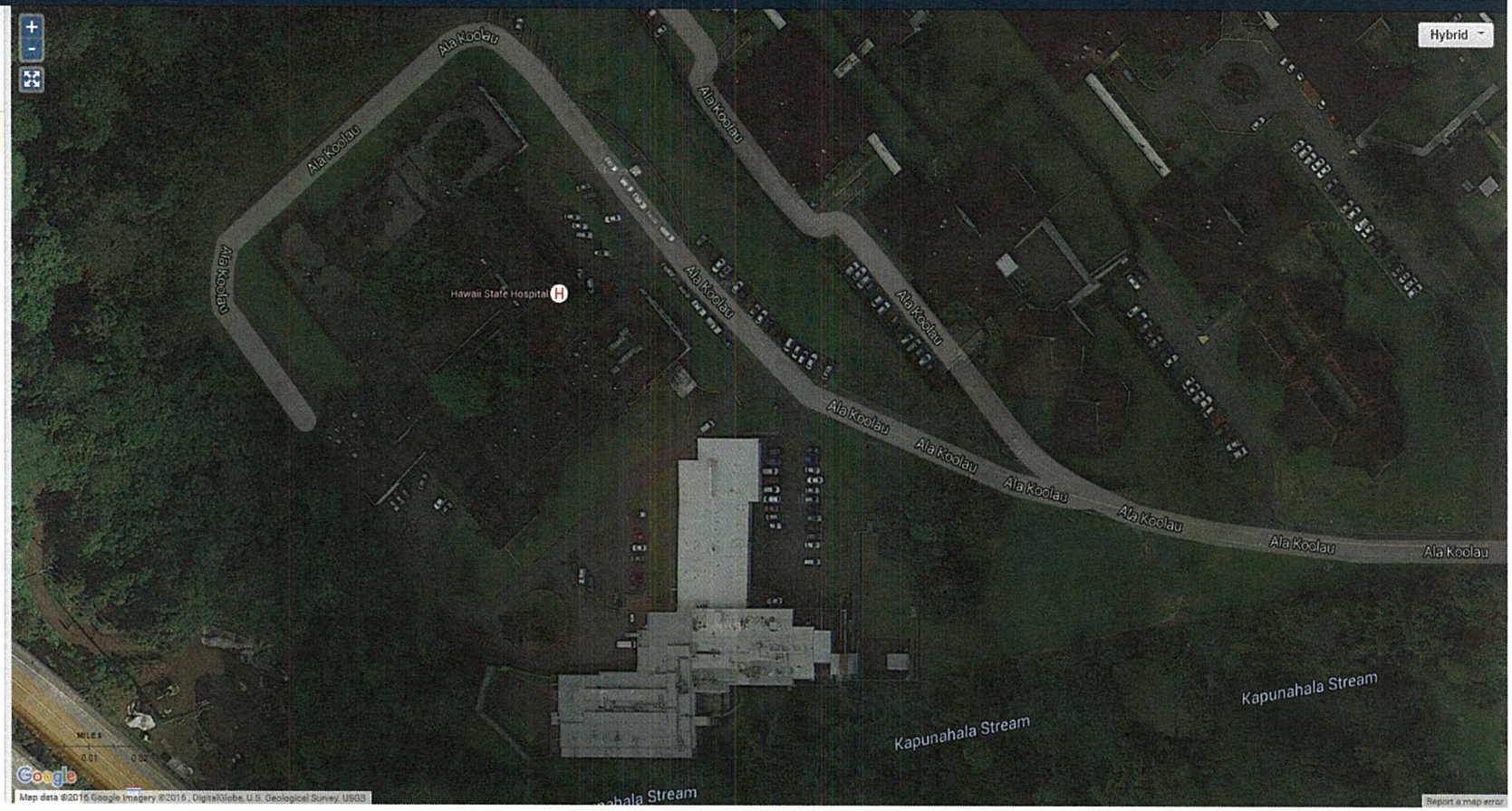
hawaii.gov Stay Connected

OEQC Viewer

0 sites found

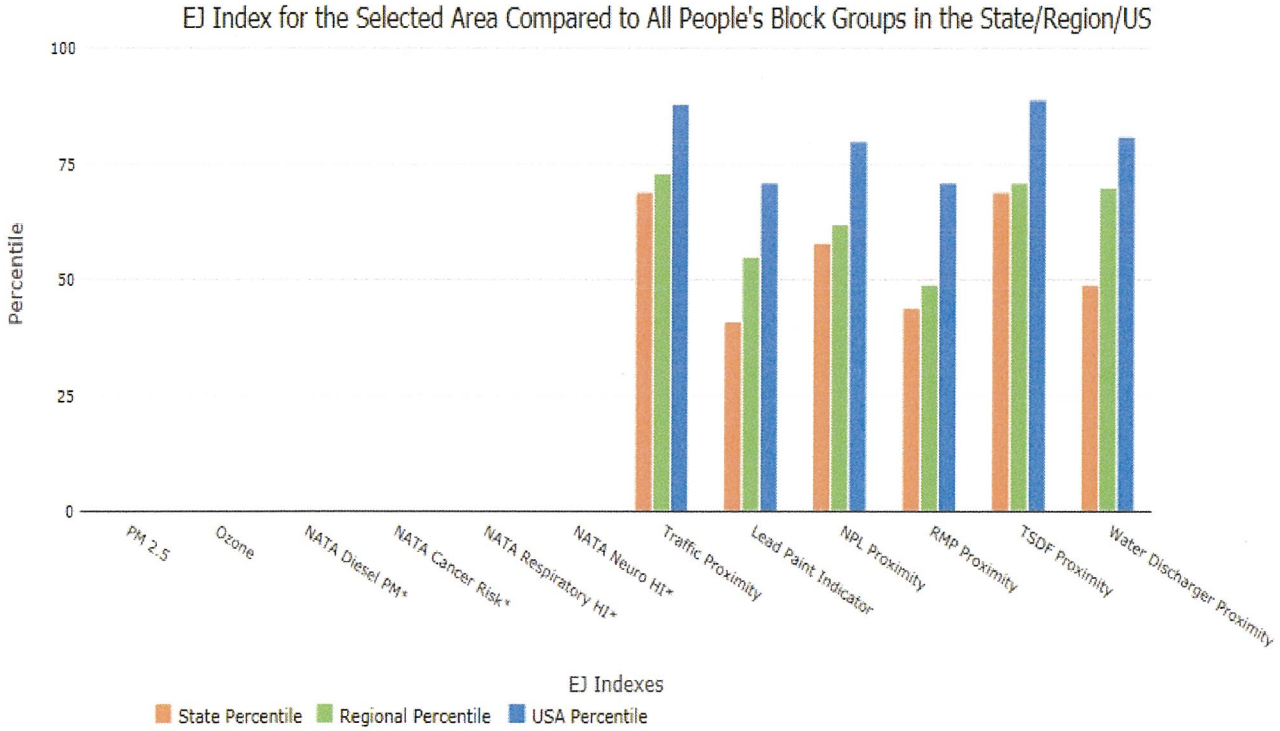
Results Filter

Show sites with no location

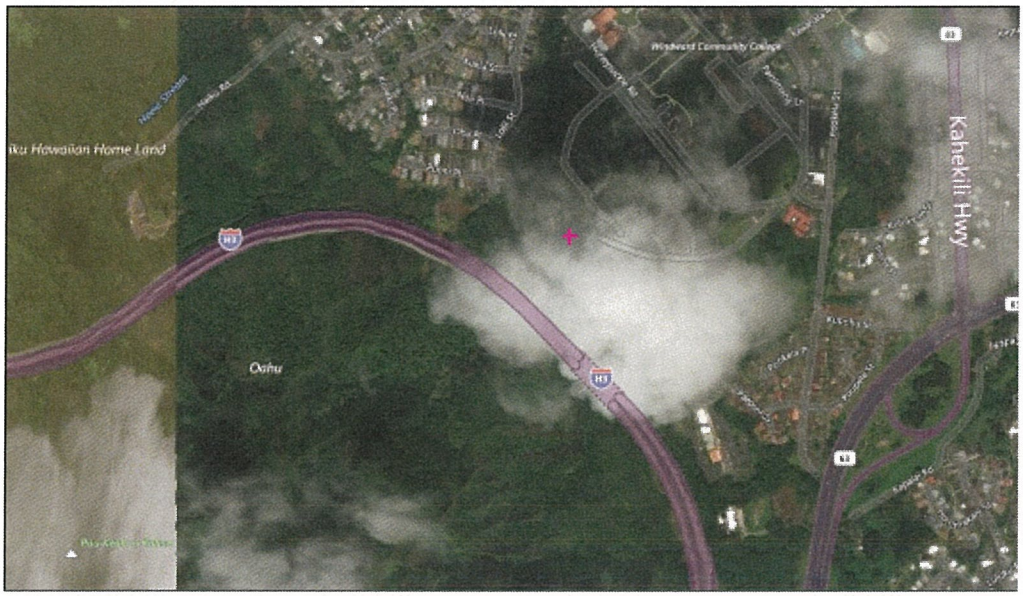


1 mile Ring Centered at 21.404860,-157.815755
HAWAII, EPA Region 9
Approximate Population: 11471

Selected Variables	Percentile in State	Percentile in EPA Region	Percentile in USA
EJ Indexes			
EJ Index for Particulate Matter (PM 2.5)	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA Diesel PM*	N/A	N/A	N/A
EJ Index for NATA Air Toxics Cancer Risk*	N/A	N/A	N/A
EJ Index for NATA Respiratory Hazard Index*	N/A	N/A	N/A
EJ Index for NATA Neurological Hazard Index*	N/A	N/A	N/A
EJ Index for Traffic Proximity and Volume	69	73	88
EJ Index for Lead Paint Indicator	41	55	71
EJ Index for NPL Proximity	58	62	80
EJ Index for RMP Proximity	44	49	71
EJ Index for TSDF Proximity	69	71	89
EJ Index for Water Discharger Proximity	49	70	81



This report shows environmental, demographic, and EJ indicator values. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.



May 11, 2016

Digitized Point

1:9,028

Selected Variables	Raw data	State Average	%ile in State	EPA Region Average	%ile in EPA Region	USA Average	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	N/A	N/A	N/A	9.95	N/A	9.78	N/A
Ozone (ppb)	N/A	N/A	N/A	49.7	N/A	46.1	N/A
NATA Diesel PM (µg/m³)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Air Toxics Cancer Risk (risk per MM)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Respiratory Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Neurological Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Traffic Proximity and Volume (daily traffic count/distance to road)	200	280	72	190	74	110	87
Lead Paint Indicator (% pre-1960s housing)	0.085	0.17	44	0.25	42	0.3	32
NPL Proximity (site count/km distance)	0.051	0.092	51	0.11	45	0.096	52
RMP Proximity (facility count/km distance)	0.069	0.18	28	0.41	12	0.31	21
TSDF Proximity (facility count/km distance)	0.095	0.092	68	0.12	65	0.054	87
Water Discharger Proximity (count/km)	0.16	0.33	34	0.19	64	0.25	58
Demographic Indicators							
Demographic Index	52%	51%	52	46%	60	35%	76
Minority Population	86%	77%	60	57%	78	36%	88
Low Income Population	17%	25%	37	35%	26	34%	26
Linguistically Isolated Population	2%	6%	33	9%	25	5%	53
Population with Less Than High School Education	6%	10%	41	18%	28	14%	31
Population under Age 5	6%	6%	47	7%	42	7%	46
Population over Age 64	15%	14%	56	12%	73	13%	66

*The National-Scale Air Toxics Assessment (NATA) environmental indicators and EJ indexes, which include cancer risk, respiratory hazard, neurodevelopment hazard, and diesel particulate matter will be added into EJSCREEN during the first full public update after the soon-to-be-released 2011 dataset is made available. The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1295.6

OCT 2 0 2016

MEMORANDUM

TO: Ms. Laura Leialoha Phillips McIntyre
Environmental Planning Office (EPO)
Department of Health

FROM: Scott M. Ojiri
Public Works Administrator

SUBJECT: Environmental Impact Statement Preparation Notice (EISPN) for the Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701
TMKs: (1) 4-5-023:002, (1) 4-5-023:016 (remnant) and (1) 4-5-023:017 (remnant)
Kaneohe, Island of Oahu, Hawaii

Thank you for your May 25, 2016, letter offering comments on the EISPN for the subject project. We have coordinated this matter with the Department of Health (DOH) and provided the following responses to your comments as it relates to the upcoming draft Environmental Impact Statement (EIS). Both comments and responses are noted below.

1. ***Comment:*** *EPO strongly recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/ landuse. Projects are required to adhere to all applicable standard comments. EPO has recently updated the environmental Geographic Information System (GIS) website page. It now compiles various maps and viewers from our environmental health programs. The eGIS website page will be continually updated so please visit it regularly at: http://health.hawaii.gov/epo/egis.*

   Response: The draft EIS will include a discussion of the standard comments and available strategies that are applicable for the project to support sustainable and healthy design as listed on the provided websites.

2. ***Comment:*** *EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: https//eha-cloud.doh.hawaii.gov. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Water Quality Data, Warnings, Advisories and Postings.*

   Response: We will examine and utilize the referenced information as needed.

3. ***Comment:*** *We suggest you review the requirements for the National Pollutant Discharge Elimination System (NPDES) permit. We recommend contacting the Clean Water Branch at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov after relevant information is reviewed at:*

   1. *http://health.hawaii.gov/cwb*
   2. *http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/standard-npdes-permit-conditions*
   3. *http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/forms*

   Response: We are in contact and have received comments from the Clean Water Branch with regards to this project. The draft EIS will discuss the potential requirements for NPDES permits that may be applicable to this project.

4. ***Comment:*** *EPO recommends you review the need and/or requirements for a Clean Air Branch permit. The Clean Air Branch can be consulted via e-mail at: Cab.General@doh.hawaii.gov or via phone: (808) 586-4200.*

   Response: The draft EIS will discuss the potential need and requirements for a Clean Air Branch permit that may be applicable to this project.

5. ***Comment:*** *If noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work. Please call the Indoor and Radiological Health Branch at (808) 586-4700 and review relevant information online at:* http://health.hawaii.gov/irhb/noise.

   Response: The draft EIS will discuss potential noise impacts to the community due to construction activities for the proposed project. The requirements that govern obtainment of a noise permit will be specified at a later stage during the design phase and will be executed by the Contractor prior to construction.

6. ***Comment:*** *You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer. This viewer geographically shows where some previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised Statutes, Chapter 343} documents have been prepared.*

   Response: We will examine and utilize the referenced information as needed.

7. ***Comment:*** *In order to better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourage you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at: http://www.epa.gov/ejscreen.*

   Response We will examine and utilize the referenced information as needed.

If you have any further questions regarding the EISPN, your staff may call Mr. Brian Isa of the Planning Branch at 586-0484.

BI:mo

Appendix C: Hawai‘i State Hospital, Certificate of Need

April 8, 2016

CON Application 16-02A

(Approved)

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

STATE HEALTH PLANNING AND DEVELOPMENT AGENCY

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

ROMALA SUE RADCLIFFE, B.A., M.A.
ADMINISTRATOR

1177 Alakea St., #402, Honolulu, HI 96813 Phone: 587-0788 Fax: 587-0783 www.shpda.org

April 8, 2016

CERTIFIED MAIL, RETURN RECEIPT REQUESTED

Virginia Pressler, M.D.
Director of Health
State of Hawaii, Dept. of Health
1250 Punchbowl Street
Honolulu, HI 96813

Dear Dr. Pressler:

The State Health Planning and Development Agency has evaluated the State of Hawaii, Department of Health's Certificate of Need application #16-02A for the establishment of a 144 Long Term Psychiatric Bed patient facility at 45-691 Keaahala Road, Kaneohe, HI, at a capital cost of $60,500,000.

Pursuant to Title 11, Chapter 186 of the Hawaii Administrative Rules (HAR), the Agency has determined that:

(a) The proposal is eligible for administrative review as it meets one or more of the criteria in Subsection 11-186-99.1(b), HAR.

(b) The applicant, the State of Hawaii, Department of Health, has proven by a preponderance of the evidence that its proposal meets the Certificate of Need criteria in HAR 11-186-15.

(c) There is no compelling public interest which will be served by requiring the application to go through the standard review process.

As required under Section 323D-43(b), Hawai`i Revised Statutes (HRS), the Agency finds that:

1. There is a public need for this proposal.
2. The cost of this proposal will not be unreasonable in light of the benefits it will provide and its impact on health care costs.

Accordingly, the State Health Planning and Development Agency hereby APPROVES and ISSUES a Certificate of Need to the State of Hawaii, Department of Health for the proposal described in Certificate of Need application #16-02A. The maximum capital expenditure allowed under this approval is $60,500,000.

Please be advised that pursuant to Section 323D-47, HRS, any person may, for good cause shown, request in writing a public hearing for reconsideration of the Agency's decision within ten working days from the date of this decision. Accordingly, if no person makes such a timely request for reconsideration, this decision shall become final immediately after the deadline for making such a request has expired.

C: OHCA

Romala Sue Radcliffe

Romala Sue Radcliffe
Administrator

REPLACEMENT PAGE

HAWAI'I STATE HEALTH PLANNING AND DEVELOPMENT AGENCY

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ADMINISTRATIVE APPLICATION - CERTIFICATE OF NEED PROGRAM

Application Number: #16-02A
To be assigned by Agency

Date of Receipt: ST. HLTH. PLAN. & DEV. AGENCY

APPLICANT PROFILE

Project Title: Establishment of a 144 Long-Term Psychiatric Bed Patient Facility

Project Address: 45-691 Keaahala Road
Kaneohe, HI 96744

Applicant Facility/Organization: State of Hawaii, Dept. of Health

Name of CEO or equivalent: Dr. Virginia Pressler

Title: Director of Health

Address: 1250 Punchbowl Street, Honolulu, HI 96813

Phone Number: 586-4400 Fax Number: 586-4368

Contact Person for this Application: Harold Inouye (Anbe, Aruga & Ishizu, Architects, Inc.)

Title: Project Coordinator

Address: 1441 Kapiolani Boulevard, Suite 206, Honolulu, HI 96814

Phone Number: 949-1025 Fax Number: 949-1027

CERTIFICATION BY APPLICANT

I hereby attest that I reviewed the application and have knowledge of the content and the information contained herein. I declare that the project described and each statement amount and supporting documentation included is true and correct to the best of my knowledge and belief.

Signature

Date

Name (please type or print)

Title (please type or print)

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1. TYPE OF ORGANIZATION: (Please check all applicable)

Public	x
Private	
Non-profit	x
For-profit	
Individual	
Corporation	
Partnership	
Limited Liability Corporation (LLC)	
Limited Liability Partnership (LLP)	
Other: State Agency	x

2. PROJECT LOCATION INFORMATION

A. Primary Service Area(s) of Project: (please check all applicable)

Statewide:	x
O`ahu-wide:	
Honolulu:	
Windward O`ahu:	x
West O`ahu:	
Maui County:	
Kaua`i County:	
Hawai`i County:	

3. DOCUMENTATION (Please attach the following to your application form):

A. Site Control documentation (e.g. lease/purchase agreement, DROA agreement, letter of intent): See Attachment 1, Governor's Executive Order 3504

B. A listing of all other permits or approvals from other government bodies (federal, state, county) that will be required before this proposal can be implemented (such as building permit, land use permit, etc.):
   Environmental Impact Statement
   Plan Review Use Permit
   Building Permit
   Department of Health Licensure

C. Your governing body: list by names, titles and address/phone numbers: See Attachment 2

D. If you have filed a Certificate of Need Application this current calendar year, you may skip the four items listed below. All others, please provide the following:
   - Articles of Incorporation: Not applicable
   - By-Laws: Not applicable
   - Partnership Agreements: Not applicable
   - Tax Key Number (project's location): TMK (1) 4-5-023:002

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4. **TYPE OF PROJECT.** This section helps our reviewers understand what type of project you are proposing. Please place an "x" in the appropriate box.

	Used Medical Equipment (over $400,000)	New/Upgraded Medical Equip. (over $1 million)	Other Capital Project (over $4 million)	Change in Service	Change in Beds
Inpatient Facility			X		X
Outpatient Facility					
Private Practice					

5. **BED CHANGES.** Please complete this chart only if your project deals with a change in your bed count and/or licensed types. Again, this chart is intended to help our reviewers understand at a glance what your project would like to accomplish. Under the heading "Type of Bed," please use only the categories listed in the certificate of need rules.

Type of Bed	Current Bed Total	Proposed Beds for your Project	Total Combined Beds if your Project is Approved
Long-Term Psych.	0	144	144
TOTAL	0	144	144

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6. PROJECT COSTS AND SOURCES OF FUNDS

A. List All Project Costs:

		AMOUNT:
1.	Land Acquisition	0
2.	Construction Contract	$60,300,000
3.	Fixed Equipment	0
4.	Movable Equipment	200,000
5.	Financing Costs	0
6.	Fair Market Value of assets acquired by lease, rent, donation, etc.	0
7.	Other: _____	0
	TOTAL PROJECT COST:	**$60,500,000**

B. Source of Funds

1.	Cash	0
2.	State Appropriations	$60,500,000
3.	Other Grants	0
4.	Fund Drive	0
5.	Debt	0
6.	Other: _____	0
	TOTAL SOURCE OF FUNDS:	**$60,500,000**

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7. **CHANGE OF SERVICE:** If you are proposing a change in service, then please briefly list what services will be added/modified. Be sure to include the establishment of a new service or the addition of a new location of an existing service. Please reference the Certificate of Need Rules Section 11-186-5 for the categories of services. If you are unable to determine which category best describes your project, please consult with agency staff.

Addition of 144 long-term psychiatric bed facility at the Hawaii State Hospital.

Reference Hawaii Administrative Rules § 11-186-5(2)(A).

8. **IMPLEMENTATION SCHEDULE:** Please present a projected time schedule for the completion of this project from start to finish. Include all of the following items that are applicable to your project:

a) Date of site control for the proposed project:

February 14, 1991

b) Dates by which other government approvals/permits will be applied for and received:

Currently, the Department of Accounting and General Services ("DAGS") is preparing to process an Environmental Impact Statement ("EIS"), which it anticipates submitting in the near future. DAGS anticipates receiving an approval/acceptance of the EIS around February 2017.

Subsequent to the EIS completion, DAGS will prepare and process a Plan Review Use permit. DAGS anticipates receiving an approval around October 2017.

Department of Health Licensure will be sought immediately after completion of the project.

c) Dates by which financing is assured for the project:

DAGS anticipates additional design and construction funding will be appropriated in the 2016 and/or 2017 legislative session. (Thus, construction funding could be available after July 2016 and/or July 2017 depending on legislative approvals.)

d) Date construction will commence:

If construction funding is available after July 2016 and/or July 2017 (depending on legislative approval), DAGS anticipates

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issuing a notice to proceed with the construction work around July 2018.

e) Length of construction period:

DAGS anticipates a construction period of about 30 months.

f) Date of completion of the project:

DAGS anticipates the construction will be completed in December 2020.

DAGS anticipates the Capital Improvement and operating budget approval and furniture and equipment delivery and installation will be completed by March 2021.

g) Date of commencement of operation:

DAGS anticipates the commencement of operation would be in March 2021.

Please remember that the Agency does monitor the implementation of Certificates approved. Non-implementation of a project as described in your application may result in a fine and/or withdrawal of the certificate of need.

9. **EXECUTIVE SUMMARY:** Please present a brief summary of your project. In addition, provide a description of how your project meets each of the certificate of need criteria listed below. If a new location is proposed, please attach an easy to read map that shows your project site.

a) Relationship to the State of Hawai`i Health Services and Facilities Plan.
b) Need and Accessibility
c) Quality of Service/Care
d) Cost and Finances (include revenue/cost projections for the first and third year of operation)
e) Relationship to the existing health care system
f) Availability of Resources.

EXECUTIVE SUMMARY

The Department of Health ("DOH") seeks to construct a 144 long term psychiatric bed facility (the "Proposed Facility") on the Hawaii State Hospital ("HSH") campus in Kaneohe, Hawaii. The Proposed Facility will be constructed on the site now occupied by the Goddard Building, which will be demolished prior to the start of construction. See Attachment 3 (site map).

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The Proposed Facility is the first step in implementing the HSH 2015 Master Plan Update (the "2015 Master Plan"), which provides an overall framework for the short-term and long-term development at HSH. The Proposed Facility falls under the short-term portion of the 2015 Master Plan, focusing on patient capacity, overall safety, and operational efficiency. The Proposed Facility will implement a "2-Hospital Concept," decentralizing the campus and enabling separation of high risk patients from the rest of the hospital.

a) Relationship to the State of Hawai`i Health Services and Facilities Plan.

According to the Hawaii Health Services and Facilities Plan ("HSFP"), to warrant new or additional SHPDA-approved psychiatric beds, the average annual occupancy rate for the licensed beds of each services provider in the service area should be at least 80% for adult (age 18 and over) programs and at least 75% for children (age 17 and younger) programs. The minimum bed size of a new acute psychiatric unit in a general acute facility is 8 beds. Children and adolescents are treated in units that are programmatically and physically distinct from adult patient units.[1]

However, SHPDA has stated that the utilization thresholds merely guide the initial determination of need, and that applications are neither approved nor disapproved solely based on whether the thresholds are met. The thresholds may be modified to allow for suboptimum utilization if a proposal's benefits clearly outweigh the costs to the community of duplicating or under-using services, facilities or technologies. Such benefits may include improved access for the service area combined with significant improvements in quality of care. Thresholds may also be modified for reasons such as incorporating current and best clinical practices or addressing the documented needs of an actual population.

Although some acute care hospitals are licensed for psychiatric beds, they are customarily used only for short-term admissions.[2] Because acute care hospitals do not offer the same types of care and services as HSH, it is not appropriate to consider these types of beds when determining whether this proposal satisfies the HSFP threshold utilization level.

Currently, only two hospitals in Hawaii provide long-term psychiatric care: HSH and Kahi Mohala. The latter is a private psychiatric facility in Ewa Beach. In 2014, HSH reported an occupancy rate of 98% while Kahi Mohala reported an occupancy rate of 78.2% (merely 1.8% less than the 80% threshold level established by the HSFP). The

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[1] "Unit" refers to acute care hospital licensed beds that are dedicated to the treatment of psychiatric patients. These licensed beds are situated in a distinct part of the acute care hospitals (a separate wing, nursing unit, contiguous nursing units, floor or building), and staffed and supported by health care professionals with essential expertise and experience to properly care for and treat psychiatric patients.

[2] While there are 153 licensed psychiatric beds in acute care hospitals in Hawaii, they are rarely used for long term admissions. According to SHPDA's 2014 utilization data, only Wahiawa General Hospital, which has 10 licensed psychiatric beds, had an average length of stay longer than 30 days. All other acute care hospitals in Hawaii reported average lengths of stay ranging from 4.8 to 7.3 days. Moreover, although acute care hospitals are licensed for 153 beds, the total number of beds actually available may be less because some hospitals do not use all of the psychiatric beds for which they have been licensed. For example, The Queen's Medical Center is licensed for 63 psychiatric beds, but, according to its website, currently has only 32 available psychiatric beds, 22 in its Kekela Unit and 10 in the Kekela Crisis Unit.

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average length of patient stay at Kahi Mohala is 37 days compared to an average length of 240 days at HSH. Given the large discrepancy in the average length of patient stays at each facility, the care provided by Kahi Mohala cannot be compared to the extended care provided by HSH. It is apparent that HSH provides unique services that are critical to meet the special needs of the forensic patients who comprise a large proportion of HSH's target population. Accordingly, sub-optimal utilization is appropriate here.

The Special Action Team Report to the Governor on Revitalization of the Adult Mental Health System and Effective Management of the Hawaii State Hospital Census ("SAT Report") indicates that, in May 2012, HSH reached (and on several occasions went over) its licensed capacity of 202 beds due to an accelerated rate of admissions in the previous six months. HSH operated above its licensed capacity during the entire month of June 2012. DOH has since taken certain steps to control HSH's census, including the purchase of additional inpatient capacity from community hospitals. Notwithstanding and despite DOH's best efforts, HSH's census has not meaningfully decreased. In the meantime, DOH has learned that there is limited additional incremental capacity for community hospital bed space available for purchase or contract.

DOH currently contracts with Kahi Mohala for 40 inpatient beds. Kahi Mohala does not have any additional capacity above the current number of beds contracted. DOH has also contracted with the four Hawaii Health System Corporation ("HHSC") hospitals with inpatient psychiatric units so they may accept DOH court ordered patients. However, HHSC facilities have not had sufficient bed space available for DOH patients and, on average, their total daily census of DOH patients under the contract has been less than five.

In addition to Kahi Mohala, DOH contracts with other acute care hospitals in the state, including The Queen's Medical Center and Castle Medical Center, to provide different types of mental health services. DOH expects to continue contracting with these providers for the foreseeable future following the completion of the Proposed Facility.

The capacity problem is exacerbated by the fact the majority of the need stems from forensic commitments of individuals ordered into the custody of DOH by the court. Other providers are often unwilling to assume clinical responsibility and liability for providing the forensic services required by these patients, including access to courts, defense attorneys, forensic examiners, specialized programming to address legal issues and community reintegration opportunities.

This proposal comes very close to satisfying the utilization threshold set forth in the HSFP for all similar psychiatric hospitals that accept long-term patients. However, considering the importance of providing HSH's unique patients with adequate treatment, the benefits of this proposal clearly outweigh the minimal community costs that might result from duplicating or under-using long term psychiatric services.

Additionally, the Proposed Facility advances three of the general principles and one specific area of health concern identified as priorities by the Statewide Health Coordinating Council:

- "promote and support the long-term viability of the health care delivery system"

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- "maintain overall access to quality health care at a reasonable cost"
- "strive for equitable access to health care services"
- "increase and improve access to mental health programs, services, and education"

The Proposed Facility aligns with these guiding principles, providing mental health services to patients through an increase in available beds, enhanced infrastructure, and more efficient delivery. As a phase of the 2015 Master Plan, the Proposed Facility contributes to the long-term viability of HSH, as well as the state's overall mental health care delivery system. Moreover, as the treatment provider of last resort for many patients whom community hospitals are unwilling or unable to care for, HSH's operations are essential to maintain overall access to mental health treatment, promote equitable access to mental health care, and ensure that mental health treatment is accessible to all Hawaii residents.

These facts support the conclusion that this proposal is consistent with the standards and goals of the HSFP.

b) Need and Accessibility

This facility is needed because the existing HSH facilities are outdated, in need of substantial repairs, and inadequate to provide safe, efficient care for high-risk patients.

The HSFP states that Hawaii's population increased by 15% between 1990 and 2007 and is projected to continue to grow. As the only hospital in the state dedicated solely to providing long term care to patients with serious mental illnesses, population growth on any island will affect HSH. The Hawaii State Judiciary frequently orders patients from neighbor islands to HSH for evaluations, care, and custody. As previously stated, forensic patients make up the majority of HSH's current patients. HSH's current facilities are insufficient for purposes of meeting present demand.

Currently, HSH has 202 beds. It is already functioning, effectively, at its full capacity. According to the Population and Economic Projections for the State of Hawaii to 2040, prepared by the Research and Economic Analysis Division of the Department of Business, Economic Development and Tourism ("DBEDT"), Hawaii's estimated population at this time is approximately 1.43 million. Accordingly, the state currently has 14.17 publicly funded inpatient psychiatric beds ("public psych beds") per 100,000 persons. DBEDT estimates that by 2030, the state's population will increase to approximately 1.6 million people. To maintain the current availability of public psych beds, assuming comparable utilization and occupancy rates, the need for public psych beds will increase proportionally to 226. However, full capacity operation does not provide an adequate safety net for Hawaii residents. Assuming that the 80% threshold established by the HSFP represents reasonable operating utilization, the actual need for public psych beds in 2030 will be about 282 beds. Even if an event involving excess patients never occurs, a DOH statistical analysis projects the required number of HSH beds to reach 265 per month as soon as 2019. The addition of 144 beds through the Proposed Facility will directly meet the anticipated future demand.

However, these calculations do not take into account increased demand that will result from Hawaii's aging population. The optimal number of beds to meet current and

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future demand is inversely linked to the lack of availability of community inpatient and long term care beds. The HSFP reports that Hawaii ranks 48th among the states in the number of long term care beds. The supply of state hospital beds available decreases in the absence of adequate community capacity. In some instances, individuals suffering from such conditions as Alzheimer's disease, organic brain syndrome and dementia have been committed to HSH because of inadequate availability of long-term care beds in the community. As the baby boomers grow older, there will likely be an ever increasing demand for long term care facilities with the capacity to serve patients with these age-related mental health conditions.

The Proposed Facility is necessary to keep pace with HSH's long-term patient census resulting from Hawaii's expected population growth and increased demand. HSH has already seen a spike in patient volume in recent years. A convergence of issues has resulted in significant operational challenges and increased safety risks for HSH. The problem is expected to worsen. Long term forecasts prepared by DAGS in March 2014 showed that demand for beds at HSH could exceed 350 in the foreseeable future. If no other changes are made at HSH between now and 2030, the additional beds in the Proposed Facility, plus the 202 beds for which HSH is now licensed, will provide 346 beds. Accordingly, the Proposed Facility puts HSH in a better position to accept all patients in need of its services, while still caring for individuals committed to its care by the courts and those who cannot access care elsewhere.

HSH provides services to all Hawaii residents, including low-income individuals, racial and ethnic minorities, women, individuals with disabilities, other underserved groups, and the elderly.

c) Quality of Service/Care

The Proposed Facility provides increased safety for the public, patients, and staff in a multitude of ways. In addition to being surrounded by high-security fences, dual-gated sally ports will be used to control access to and from the Proposed Facility. Patient rooms within the Proposed Facility will be situated in a manner that offers clear sight lines from the central nursing station. The Proposed Facility will also contain "off-stage" areas for staff, to which patients will not have access. Security cameras will provide video monitoring throughout the building and surrounding areas.

The layout of the Proposed Facility is based on The Colorado Mental Health Institute in Pueblo, Colorado. It will be comprised of six (6) 24-bed patient units and a dedicated Rehab Mall, including one Unit on the second floor modified to provide care to patients with medical issues (the "Medical Unit"), one Unit dedicated to admissions (the "Admissions Unit"), and one Unit on the first floor designed for high-risk patients (the "Hardened Unit"). While other patient rooms in the Proposed Facility will share a toilet and shower, each patient room in the Hardened Unit will have its own toilet and shower so as to minimize uncontrolled patient interaction amongst high-risk patients. Patient rooms in the Admissions Unit will have access to a Rehab Mall used only by patients on that Unit. Patient rooms in the Medical Unit will be designed similarly to regular patient rooms so that they may be utilized by well patients when the sick patient count is low.

Other features of each Unit include: three seclusion rooms, located within a secure, separate area; areas for socialization, consultation, and treatment; and access

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to a nourishment kitchen and patient laundry. The Proposed Facility's unique architectural and design concepts promote intensive treatment, patient privacy, and high security to ensure quality service and care.

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Patient care will be provided by licensed physicians and nurses, through well-defined and well-documented protocols. Ongoing quality assessment and improvement activities will ensure that each HSH patient receives high quality care.

& DEV. ALLEN

The Hawaii State Hospital Quality Management Plan (the "QM Plan") provides a framework and organizational structure for a planned, systematic, organization-wide approach to quality process design and performance measurement, analysis, and improvement. The QM Plan's improvement activities are planned in a collaborative and interdisciplinary manner. It complies with survey requirements from the Adult Mental Health Division, Office of Health Care Assurance and The Joint Commission. The QM Plan provides stated goals, objectives, and measures in relation to Performance Indicator ("PI") principles and methodology. It also clearly identifies the purpose, goals, objectives, leadership responsibilities, and PI indicators and goals relevant to the Proposed Facility. Finally, it outlines the evaluation method for the PI outcomes and provides recommendations.

The QM Plan provides a leadership driven framework that outlines the following comprehensive quality improvement activities to ensure patients receive quality patient care:

- Monitor quality improvement activities on provision of patient care services that provide individualized patient interventions that promote optimal patient outcomes and patient satisfaction.
- Ensure quality services are provided in an environment that is assessed and monitored to minimize hazards and risks and is safe for patients and staff.
- Provide clinical treatment and services based on safety and health care needs of the patient, resolution of legal encumbrances, rehabilitation, recovery, and community re-integration.
- Provide timely and effective treatment and services that are appropriate to each patient/resident's individualized needs and outlined in a recovery plan of care.
- Ensure clinical services include information regarding the patient's ethnic, religious, cultural differences, and specific communication, language or individual needs, and that patients have the opportunity to participate in decisions regarding their care, treatment and services.
- Provide a culture of safety and quality and support a non-punitive culture and environment to facilitate the reporting of sentinel and/or significant events, medication errors and patient or employee incidents.
- Provide opportunities for staff to obtain education and training on the performance improvement principles and processes.
- Ensure that the performance of the Governing Body, HSH Leadership, Medical Staff, and professional staff is monitored to ensure safe, effective, and optimal patient care services.

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- Systematically plan, monitor performance, analyze current performance, and improve and sustain improvements in processes and outcomes of patient care through the efforts of interdisciplinary function teams, clinical service and peer review activities.
- Set-forth organization-wide performance improvement indicators and set goals by reviewing clinical and patient safety indicators using report cards to measure, track and trend improvement processes.
- Facilitate communication, discussion and understanding of clinical and quality management data and performance indicators and measures among staff.
- Measure the hospital's key outcomes, activities, and processes to support safety, improvement, innovation and learning.
- Utilize data and information to guide decisions and to understand variation in the performance of processes supporting clinical and environmental safety and quality.

d) Cost and Finances (include revenue/cost projections for the first and third year of operation)

Capital for non-patient areas are exempt from the certificate of need requirement pursuant to HRS § 323D-54(8). The total capital expenditure for patient care areas for the Proposed Facility is estimated at $60,500,000.00 which includes a $60,300,000 construction contract and $200,000 for movable equipment. The cost for the project will be financed by state appropriations expected to be approved by the state legislature.

The Proposed Facility's estimated revenue and operating costs for the first and third full years of operation following the transaction are shown in the table below.

	Projected 1st Full Year Operations	Projected 3rd Full Year Operations
Total Operating Revenue	**$0**	**$0**
Operating Expenses		
Salaries, Wages, Benefits	$21,874,156	$22.979,506
Other Expenses	$11,268,504	$11,837,927
Depreciation	N/A	N/A
Total Expenses	$33,142,660	$34,817,433
Net Income (Loss) from Operations	**($33,142,660)**	**($34,817,433)**
Add Back: Depreciation	**N/A**	**N/A**
Excess (Deficit) Fund from Operations	**($33,142,660)**	**($34,817,433)**

Patients do not pay for care at HSH. Accordingly, operating deficits are paid through legislative appropriations.

The proposed facility is expected to reduce the cost of caring for mental health patients in Hawaii because providing long term inpatient care is usually the least expensive means of caring for patients with serious mental illnesses. Long term care reduces the need for costly emergency room treatment which is often required when such patients cannot be placed in a long-term facility. The Queen's Medical Center has

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reported that the number of times individuals suffering mental illness were brought to its Emergency Department by police almost doubled from 2011 to 2012, increasing from about 800 visits in fiscal year 2011 to about 1600 visits in fiscal year 2012.

e) Relationship to the existing health care system

The Proposed Facility is intended to supplement and complement HSH's existing facilities and services and provide types of long-term services that are typically not available at community hospitals with psychiatric units. Accordingly, this proposal will have minimal, if any, negative impact on the existing health care system. It will benefit the health care system by providing additional long term care beds for seniors and others suffering from mental health conditions.

f) Availability of Resources.

HSH currently employs or contracts with 17 physicians and 151 nurses. HSH will hire an additional 5 physicians and 56 nurses during the final stages of the Proposed Facility's construction in preparation for staffing the new facility. HSH believes that there will be a sufficiently large pool of qualified applicants in the community to fill necessary positions without causing any negative impact on the staffing levels of other health care providers.

The project will be funded through legislative appropriations.

10. **Eligibility to file for Administrative Review.** This project is eligible to file for Administrative review because: (Check all applicable)

_____ It involves bed changes, which will have a capital expense of $1,000,000 or less, and which will have an increased annual operating expense of less than $500,000.

_____ It involves service changes which will have a capital expense of $1,000,000 or less, and which will have an increased annual operating expense of less than $500,000.

_____ It is an acquisition of a health care facility or service, which will result in lower annual operating expenses for that facility, or service.

_____ It is a change of ownership, where the change is from one entity to another substantially related entity.

_x_____ It is an additional location of an existing service or facility.

_x_____ The applicant believes it will not have a significant impact on the health care system.

Appendix D: Preliminary Jurisdictional Determination, U.S. Army Corps of Engineers, Honolulu District

April 29, 2016

USACE File POH-2016-00070

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Comptroller
3 P. W. Administrator
P. W. Secretary
Staff Services Off.
4, 2 Planning Branch
Project Mgmt. Br.
Constr. Mgmt. Br.
Technical Svcs. Off.
Leasing Services Br.
Contracts
Admin. Services Off.
BI/4

APR 29 2016

Ms. Michelle R. Lynch
Chief, Regulatory Branch
Honolulu District
U.S. Army Corps of Engineers
Regulatory Office, Building 230
Fort Shafter, Hawaii 96858-5440

Dear Ms. Lynch:

Subject: Preliminary Jurisdictional Determination Form for
Hawaii State Hospital, Goddard Building Patient Facility
Kaneohe, Oahu
DA File No. POH-2016-00070

Attached please find the Preliminary Jurisdictional Determination Form for Hawaii State Hospital, Goddard Building Patient Facility, Kaneohe, Oahu. We understand that for the purpose of calculating impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary Jurisdictional Determination will treat all waters and wetlands that would be affected by the permitted activity on the site as if they are jurisdictional waters of the United States.

If you have any questions on this matter, your staff may call Mr. Brian Isa of the Planning Branch at 586-0484.

Sincerely,

JAMES K. KURATA
Public Works Administrator

BI:mo
Attachment
c: Mr. Harold Inouye, Anbe, Aruga & Ishizu Architects Inc., w/attachment

US Army Corps of Engineers, Honolulu District
PRELIMINARY JURISDICTIONAL DETERMINATION FORM

File Number: POH-2016-00070
Project Title: Hawaii State Hospital, Goddard Building Patient Facility, Kaneohe, Oahu
Subject: PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary jurisdictional determination (JD) finds that there "*may be*" waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

A. REPORT COMPLETION DATE FOR PRELIMINARY JURSDICTIONAL DETERMINATION: 09 March 2016

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

James Kurata
Public Works Administrator
Department of Accounting and General Services
1151 Punchbowl Street, Room 426
Honolulu, Hawaii 96813

C. DISTRICT OFFICE: Honolulu District, CEPOH-RO
FILE NAME: Hawaii State Hospital, Goddard Building Patient Facility, Kaneohe, Oahu
FILE NUMBER: POH-2016-00070

D. PROJECT LOCATION(S), BACKGROUND INFORMATION, AND WATERS:
State or Territory: Hawaii
City: Kaneohe
County: Oahu
Center Coordinates of Site: 21.405692 , - 157.814331
Name of nearest waterbody: Kapunahala Stream
Identify the amount of waters in the review area:
- ☒ Non-wetland waters: 2,291 linear feet.
  Cowardin Classification: R2
- ☒ Wetlands: 11.4 acres
  Cowardin Classification:PEM
- ☐ Other:

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal:
Non-Tidal:

E. REVIEW PERFORMED FOR SITE EVALUATION:

☒ Office (Desk) Determination. Date: 07 March 2016
☐ Field Determination. Date(s):

F. EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered

individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

G. SUPPORTING DATA:

Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: TMK map of property provided with 25 February 2016 letter

☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  ☐ Office concurs with data sheets/delineation report.
  ☐ Office does not concur with data sheets/delineation report.

☐ Data sheets prepared by the Corps: .

☐ Corps navigable waters' study: .

☐ U.S. Geological Survey Hydrologic Atlas:
  ☐ USGS NHD data.
  ☐ USGS 8 and 12 digit HUC maps.

☐ U.S. Geological Survey map(s). Cite quad name:

☒ USDA Natural Resources Conservation Service Soil Survey. NRCS Soil Mapper Data Layer in GoogleEarth Pro, http://casoilresource.lawr.ucdavis.edu/soilweb-apps, accessed on 3-7-16.

☒ National wetlands inventory map NWI map data layer in GoogleEarth Pro, http://www.fws.gov/wetlands/Data/Google-Earth.html, accessed on 3-7-16.

☐ State/Local wetland inventory map(s): .

☐ FEMA/FIRM maps: http://gis.hawaiinfip.org/FHAT/

☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)

☐ Photographs: ☐ Aerial (Name & Date): aerial photos 4-12-03, 7-30-04, 6-30-06, 12-30-08, 1-15-13, and 8-30-14 from GoogleEarth Pro
  or ☐ Other (Name & Date): .

☐ Previous determination(s). File no. and date of response letter: .

☒ Other information (please specify): EPA My Waters data layer in GoogleEarth Pro, accessed 3-7-16 http://www.epa.gov/waterdata/my-waters-mapper; Keaahala Spring Topo Map in Honolulu County Hawaii, accessed 3-7-16, http://www.topozone.com/map-print/?lat=21.402756&lon=-157.8129734&title=Keaahala Spring Topo Map in Honolulu County Hawaii; Kaneohe Stream webpage, accessed 3-7-16, http://www.koolau.net/KaneoheStr.html

<u>IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.</u>

Vera Koshelo

Signature and date of
Regulatory Project Manager
(REQUIRED)

3/28/16

Signature and date of
person requesting preliminary JD
(REQUIRED, unless obtaining the
signature is impracticable)

Appendix E: Hawai‘i State Hospital, Master Plan Update

August 28, 2015

DAGS Job 12-20-2698

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HAWAI`I
STATE HOSPITAL

HAWAII STATE HOSPITAL
2015 MASTER PLAN UPDATE

DAGS Job No. 12-20-2698

Final Report | August 28, 2015

ARCHITECTS HAWAII
LIMITED

HAWAII STATE HOSPITAL - 2015 MASTER PLAN UPDATE
DATED AUGUST 28, 2015

The Department of Health has reviewed this document and fully supports the implementation of the Hawaii State Hospital 2015 Master Plan Update.

Virginia Pressler AUG 2 8 2015

Virginia Pressler, M.D. Date
Director, Department of Health

Lynn Fallin AUG 2 8 2015

Lynn Fallin Date
Deputy Director, Department of Health

Mark Fridovich 8/27/2015

Mark Fridovich Date
Administrator, Adult Mental Health Division, Department of Health

8/26/15

William May Date
Administrator, Hawaii State Hospital, Department of Health

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- Plan of Long-Term Care Facility (Lease Site), approved by DOH, December 28, 2009

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1.0 BACKGROUND

1.0 BACKGROUND

1.1 INTRODUCTION

Hawaii State Hospital's last Master Plan was completed in 2005. The *2005 Master Plan*, prepared by Architects Hawaii Limited (AHL), proposed capital improvement projects, such as construction of a new 136-Bed Patient Care Facility, that were intended to address the operational issues resulting from an increasing patient population, a higher percentage of violent patients, and staffing shortages. Unfortunately, the proposed capital improvement projects were not implemented and the operational issues have not been addressed. These operational issues, and the additional operational issues listed below, led to the conclusion that the *2005 Master Plan* needed to be updated.

- The *2005 Master Plan* needed to be updated and improved to ensure that the Department of Health (DOH) has a Master Plan that meets the Hospital's short-term and long-term needs.
- The DOH needed a Master Plan to guide the future construction of facilities that would be:
  - Specifically designed to provide care for high-risk patients.
  - Safer for patients and staff.
  - Safer for the community.
  - More economical to operate and maintain.
- The *2005 Master Plan* provided for increasing the Hospital's total bed count from 178 to 244 beds. The DOH needed a Master Plan that could accommodate more significant, long-term increases in the Hospital's bed count to:
  - Respond to large, long-term increases in patient census resulting from the projected growth of Hawaii's population.
  - Maximize the use of the land under the DOH's control.
  - Ensure the Hospital's long-term operational viability on its current site.
- After the *2005 Master Plan* was completed, the DOH committed to adding a Skilled Nursing Facility (SNF) on the Hospital campus. The current plan is for the SNF to be constructed on the site of the Bishop building. The facility will be independently operated by a third party.
- The DOH needed to prepare for the future demolition of the Guensberg building.
- The DOH needed a backup plan for the 40 patients currently housed at Kahi Mohala.

In 2014, the Department of Accounting and General Services (DAGS), acting as the expending agency for the DOH, commissioned AHL to update the *2005 Master Plan*. This Report describes the process,

findings and recommendations of the *2015 Master Plan Update*. The Executive Summary below provides a brief summary of the ways in which the *2015 Master Plan Update* addresses the issues described above. The *2015 Master Plan Update* is described in greater detail in Section 2.0 (2015 Master Plan Update Summary), Section 3.0 (New Goddard Patient Care Facility - Space Programs), and Section 4.0 (New Goddard Patient Care Facility – Conceptual Design). Section 5.0 (Appendix) includes the DOH-developed *Foundational Document* that projects future patient capacity requirements, a *Conceptual Design Cost Estimate*, and other supporting information.

1.2 EXECUTIVE SUMMARY – 2015 MASTER PLAN UPDATE

The *2015 Master Plan Update* addresses the operational issues described Section 1.1 and provides an overall framework for future development. The Plan includes short-term and long-term development options for responding to increases in patient population and implementing other needed campus improvements.

Planning Zones

Based on discussions with DOH, Hospital, and DAGS staff the Hospital campus was divided into fifteen Planning Zones (see P. 2-15). Each Planning Zone is reserved for the one or more specific uses that were identified as being the most appropriate use(s) for that area of the Hospital campus. The Planning Zones guided development of the Long-Term Master Plan and the Short-Term Master Plan to ensure:

- Maximum (i.e. highest and best) use of all land under the DOH's control.
- Maximum operational efficiency.
- Improved patient, staff, and public safety.
- Long-term viability of Hospital operations at the Kaneohe campus.
-

Long-Term Master Plan

The Long-Term Master Plan (see P. 2-17) provides a flexible "road map" that will guide the Hospital's development for decades to come. Key features of the Long-Term Master Plan include:

- The Hospital's capacity can be increased from 178 beds to 516 beds to accommodate long-term increases in patient census.

- The bed count can be increased incrementally (i.e. in phases).
- The facility improvements will improve patient, staff, and public safety.
- The Long-Term Master Plan provides a framework for implementing the additional campus improvements described on the Planning Zones drawing (see P. 2-15).

Short-Term Master Plan

The development envisioned in the Short-Term Master Plan (see P. 2-19) has the following key features that address the issues of patient capacity, increased safety, and improved operational efficiency:

- A new 144-Bed Patient Care Facility will be built on the site of the Goddard building. The new facility will be specifically designed to house high-risk patients and will include a Rehab Mall and Dining Room exclusively for high-risk patients. The ability to separate high-risk patients from the remainder of the Hospital's patient population (the *2005 Master Plan* called this planning approach the "2-Hospital" Concept) will result in increased safety for patients and staff. A highly secure exterior wall, combined with a high security fencing system, will reduce the risk of patient elopement, and contribute to increased safety for the surrounding community.
- Existing Patient Care Buildings E, F, H, and I (108 beds total) will remain in operation and be used to house low-risk and medium risk patients. The patients in these buildings will use the existing Rehab Mall facilities located in Buildings A, B, and C.
- The 252 beds (144 new, 108 existing) provided in the Short Term Master Plan will address the Hospital's current and short-term patient capacity needs and allow Guensberg to be demolished. The increased number of beds will also allow the 40 patients currently housed at Kahi Mohala to be moved to the Hospital campus.
- The design of the 144-Bed Goddard Patient Care Facility will be similar to the design of a behavioral health facility located in Pueblo, Colorado. The Colorado facility was also referenced in the *2005 Master Plan*. William May, the current HSH Administrator, was the Administrator of the Colorado facility before he joined the HSH staff in 2014. Mr. May has indicated that he believes the Colorado facility is an appropriate model on which to base the conceptual design of future Hawaii State Hospital patient care facilities. The design provides clear sight lines from a

central Nurse Station that will reduce the risk of patients harming themselves, harming other patients, or assaulting Hospital staff.

- The 144-Bed Goddard Patient Care Facility will include "off-stage" areas for certain staff functions (offices, conference rooms, break room, etc.). Access to the "off-stage" areas will be controlled to ensure that patients cannot enter these areas. This design feature will give Hospital staff a respite area and further reduce the risk of their being assaulted patients.
- The existing Dietary service in Building B will prepare the food for all patients. Food for the patients in the 144-Bed Goddard Patient Care Facility will be delivered to a Serving Kitchen on the Ground Floor, or to the nursing units when required. The process for providing food to patients in the existing Rehab Mall and Buildings E, F, H, and I will not change.
- Construction of the 144-Bed Goddard Patient Care Facility will generate the need for approximately 272 additional parking spaces (see Preliminary Parking Study, Appendix 5.3). Some of the additional spaces (98+/-) will be located adjacent to the new building. The remaining 174 spaces will need to be located in Planning Zones 7, 8, 10, 14, or 15).
- With the exception parking as indicated above, the Short-Term Master Plan does not include any development in Planning Zones 2, 3A, 3B, 4A, 4B, 5, 6, 7, 8, 9A, 9B, 10, 11, 12, 13,14, or 15.

1.3 HAWAII STATE HOSPITAL – EXISTING CONDITIONS

History and Mission

The Hawaii State Hospital dates back to 1932 when it opened at its present site in Kaneohe. The Hospital was originally constructed and operated by the Territory of Hawaii. It is currently operated by the Adult Mental Health Division of the DOH. According to a Hospital website its Mission is *"to provide safe, integrated, evidence-based psychiatric assessment, treatment, and rehabilitation to individuals suffering from brain, medical and behavioral disorders who are primarily court ordered to Hawaii State Hospital"*. Hawaii State Hospital is the only hospital in the State that is *"dedicated solely to serving patients with serious mental illnesses"*. The judiciary court system orders patients from all islands to the Hawaii State Hospital for evaluations, care, and custody. The Hospital provides a safety net for forensic patients (see definitions) because, by law, it must accept them. Forensic patients can only be discharged following a complex evaluation process and a Judge's written authorization. This combination of factors has been described as a *"wide open front door"* combined with a *"narrow*

back door". The Hospital's inability to control its patient population results in occasional overcrowding and serious operational challenges.

The Existing Site Plan (see P. 1-12) is provided to supplement and clarify the following information.

Patient Capacity

Patients are currently housed in Guensberg and Buildings E, F, H, and I. These patient care facilities were designed to house a total of 178 patients.

Guensberg	70 beds
Building E	36 beds
Building F	28 beds
Building H	20 beds
Building I	24 beds
	178 beds

Due to the lack of bed capacity at the Hospital an additional 40 patients are housed at the independently-operated Kahi Mohala facility in Ewa Beach. The beds at Kahi Mohala are not included in the Hospital's current bed count indicated above.

Site Characteristics

The Hospital's 103-acre (+/-) site is located at the base of the Koolau mountain range in Kaneohe. The site has an elevation change of approximately 225' from its lowest point near the Kaneohe District Courthouse to its highest point adjacent to Interstate H-3. The significant elevation change presents challenges for moving patients and staff around the site. However, the offsetting benefits of the topography include magnificent views of Kaneohe and Kailua Bays, as well as exposure to the prevailing trade winds.

1.0 BACKGROUND

Site Context

When the Hospital opened in 1932 it was located in a rural, primarily agricultural area. The site is still zoned for agricultural uses (AG-2). Kaneohe has grown significantly during the eight decades since the Hospital opened. The areas to the east and west of the Hospital have been developed as residential neighborhoods. Windward Community College (WCC) occupies the area adjacent to the northeast side of the Hospital campus, on land that was formerly under Executive Order to the DOH. The State Department of Transportation's (SDOT) Maintenance Facility and Base Yard are located adjacent to the Hospital entrance, on land that was formerly under Executive Order to the DOH.

Existing Hospital Buildings

The Space Program Summary (Section 3.2) provides the following information for each existing building on the Hospital campus:

- Total Net Floor Area
- Total Gross Floor Area
- Year Opened
- Departments or services located in the building

1.4 DEFINITIONS

The following definitions are provided to ensure a common understanding of certain terms and abbreviations that are used in this Report.

Central Campus	The mid-elevation of the Hospital campus. Patient Care Units E, F, H, and I; as well as Cooke, Haloa, Iolani, Hale Imua, and Buildings A, B, C, G, K, L, and Q are located in this area. See Existing Site Plan on P. 1-12 for location.
Civil Patient:	A patient who has been voluntarily committed to the Hospital. At the present time few, if any, Hospital patients fall into this category.
Forensic Patient:	A patient whose admission to the Hospital has been ordered by the judicial court system. At the present time the Hospital's census consists almost entirely of forensic patients.

1.0 BACKGROUND

Gross Area	A term used in space and functional programming to indicate the total area of a building as measured to the outside face of the exterior walls.
GSF	Gross Square Feet (i.e. the Gross Area).
High-Risk Patient:	A patient who presents a high risk of behaving violently.
Low-Risk Patient:	A patient who presents a low risk of behaving violently.
Lower Campus	The lowest elevation of the campus (location of Bishop, Hospital main entrance, Guard Shack, Hina Mauka, the SDOT Maintenance Facility and Base Yard). See Existing Site Plan on P. 1-12 for location.
Master Plan:	A Master Plan is intended to guide the short-term and long-term growth and renewal of an institution. A well-developed Master Plan ensures that the changes that occur over time are implemented in a manner that is functionally, operationally, and fiscally optimal. It should be noted that a Master Plan does not include detailed planning and design of the future projects it envisions. However, the Master Plan can, and should, inform and shape future projects.
Medium-Risk Patient:	A patient who presents a medium risk of behaving violently.
Net Area	A term used in space and functional programming to indicate the floor area of a room. Net area excludes the area occupied by walls, corridors, stairs, elevators, mechanical shafts, etc.
NSF	Net Square Feet (i.e. the Net Area)
Patient Care Facility:	A building and its associated site area that includes one or more Patient Units (see definition below), Rehab Mall functions (Rehab Therapy, Occupational Therapy, Recreational Therapy, Dining and Servery), staff support, materials management, loading dock, and a central plant that provides primary mechanical and electrical services.
Patient Unit:	The primary component(s) of a Patient Care Facility. Patient units are designed to meet the needs of specific sectors of the overall patient population. Patient units include bedrooms, toilets and showers, living areas, patient support areas (counseling, laundry, etc.), and staff support areas (offices, conference rooms, break room, etc.).

1.0 BACKGROUND

Upper Campus	The highest elevation of the campus (location of Goddard and Guensberg). See Existing Site Plan on P. 1-12 for location.

1.5 EXECUTIVE SUMMARY - 2005 MASTER PLAN

The *2005 Master Plan* was published in four Volumes. Volumes I and II were dated April 16, 2004. Volumes III and IV were dated April 29, 2005. For clarity this Report refers to the entire earlier plan as the *2005 Master Plan*. The following overview of the four Volumes provides information to assist the reader in understanding the areas where the *2015 Master Plan Update* and the *2005 Master* Plan are similar, and the areas where they differ. The major similarities and differences between the two Master Plans are addressed in Section 2.0. To further assist in the comparison a full copy of the *2005 Master Plan* is included in CD-format – see Appendix 5.8

Volume 1: Facility Analysis / Maintenance Plan

This Volume included three major components:

- A detailed summary of all existing buildings on the Hospital campus was provided. The summary included factors such as age, floor area, and an analysis of physical conditions. The analysis of physical conditions addressed architectural, structural, mechanical, and electrical system conditions and issues.
- A site analysis covered the conditions of roadways and site utilities such as domestic water, sanitary sewer, and storm drainage. The existing landscape features were also analyzed.
- The analysis of building and site physical conditions was used to prepare recommendations for needed repairs and maintenance. In some cases budgetary (i.e. rough) estimates of the probable costs of the repairs were provided.

Much of the information in Volume I is still applicable and useful for future planning efforts. The scope of work for the *2015 Master Plan Update* did not include updating Volume I.

Volume II: Functional Analysis / Space Programming

This Volume included four major components:

- An Existing Space Inventory provided the following information:

- A list of the services located in each existing Hospital building.
- The total net area occupied by each service or department.
- The total gross area of each building on the Hospital campus.
- A detailed list of all rooms in each building, including functions and net areas.

- Space Programs for a proposed new 136-Bed Forensic Patient Care Facility consisting of a 16-Bed Admissions Patient Care Unit and five 24-Bed Typical Patient Care Units.
- Space Programs for proposed additions and renovations to existing buildings and services.
- Detailed Floor Plans, color-coded to assist in identifying various functions.

Volume III: Master Site and Facility Development Plan

In Volume III the Project Vision was essentially defined as increasing the Hospital's existing 178-bed capacity to 244 beds. The 244-bed capacity was based on the number of beds approved by the Hospital's Certificate of Need (CON). Volume III included seven Site Development Concepts identified as 1-A, 1-B, 2-A, 2-B, 2-C, 3-A, and 3-B. Each Site Development Concept provided an alternative vision for achieving the desired 244-bed capacity. Several factors were common to all seven Concepts:

- All Concepts included the construction of a new 136-Bed Forensic Patient Care Facility intended to house the Hospital's high-risk patients in a highly secured, self-contained environment.
- All Concepts assumed that the 108 beds located in existing Buildings E, F, H, and I would be retained and used to house low-risk and medium-risk patients.
- All Concepts assumed that the 40 patients housed at the independently operated Kahi Mohala facility in Ewa Beach would be returned to the Hawaii State Hospital campus.
- Additional common factors included a new main campus entry and guard station, moving Plant Operations to the Hospital campus, a new covered walkway connecting the upper campus to the central campus, a new emergency water supply tank, additional parking, and roadway improvements.

1.0 BACKGROUND

Two primary variable factors distinguished the seven Site Development Concepts:

- "1-Hospital Concept" vs. "2-Hospital Concept"
  - The "1-Hospital Concept" proposed to centralize all Rehab Mall functions in a single, new building. In this concept the single Rehab Mall would serve the entire patient population (high-risk, medium-risk, and low-risk patients).
  - The "2-Hospital Concept" proposed a decentralized campus. One area of the campus would be developed for high-risk patients and a separate area would be designated for low-risk and medium-risk patients. Each area would have its own Rehab Mall to ensure that high-risk patients would be separated from the remainder of the patient population.
- Location
  - Site Development Concepts 1-A, 1-B, 2-A, 2-B, and 2-C located the new 136-Bed Forensic Patient Care Facility on the upper campus. These Concepts required both the Goddard and Guensberg Buildings to be demolished.
  - Site Development Concepts 3-A and 3-B located the new 136-Bed Forensic Patient Care Facility on the lower campus. These Concepts preserved Goddard and Guensberg, but required demolition of Bishop.

Additional recommendations were provided for campus-wide civil, mechanical, electrical, and landscape improvements that were generally common to all seven Site Development Concepts.

Volume IV: Planning and Design Guidelines

This Volume included guidelines intended to ensure that future projects would be developed in a consistent and coherent manner. The guidelines address the following issues:

- Design Intent
- Architectural Character
- Appearance / Aesthetics
- Outdoor Signage, Lighting, and Furniture
- Landscaping
- Roadways, Water, Sewers, Storm Drainage, Grading, and Soils

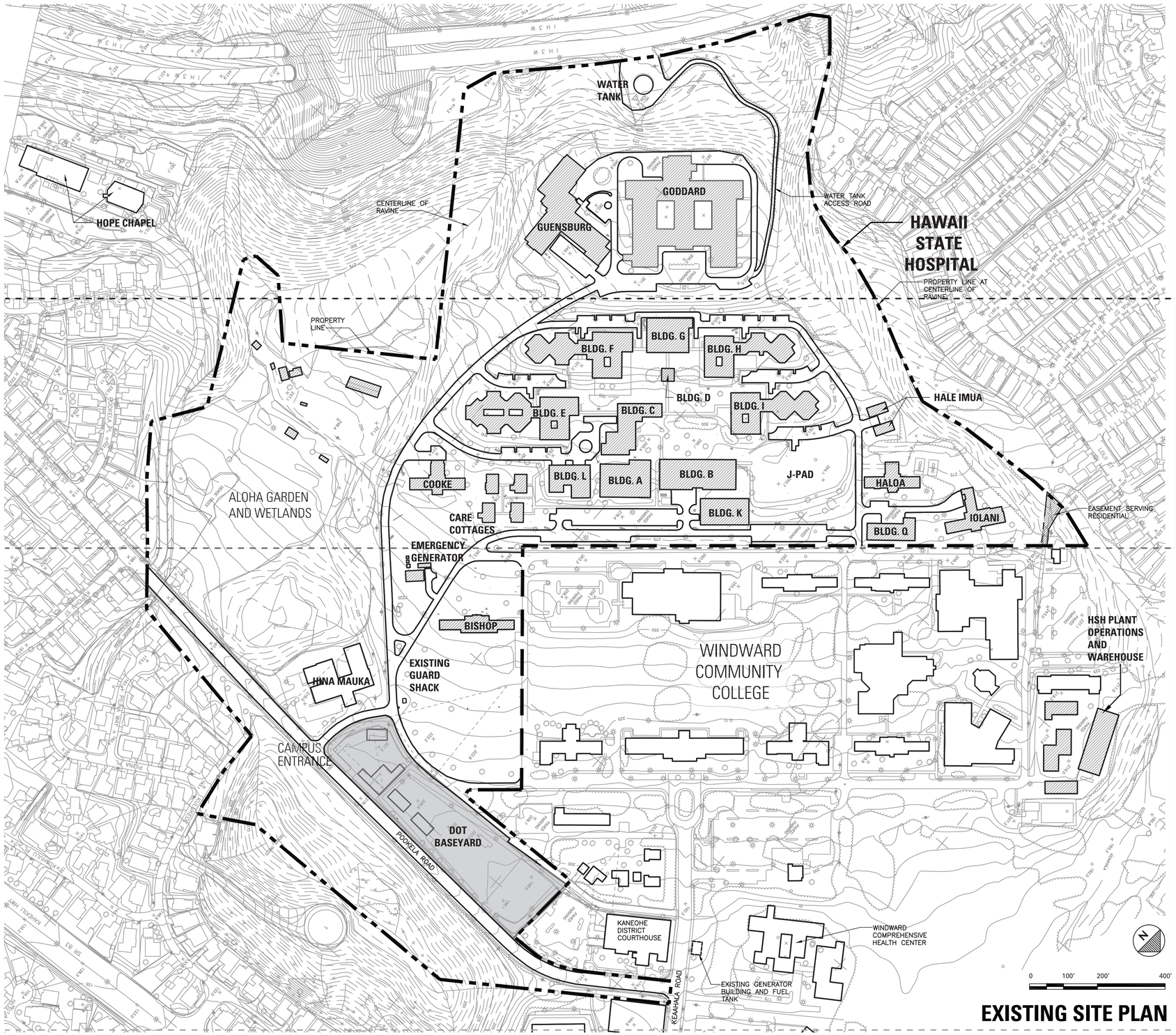
1.0 BACKGROUND

The 2005 Planning and Design Guidelines remain valid and should be considered in connection with future campus development.

2005 Master Plan Implementation

As noted above, most of the improvements envisioned in the *2005 Master Plan* were not implemented.

- Capital Improvement Projects: The capital improvement projects envisioned in the *2005 Master Plan*, including the new 136-Bed Forensic Patient Care Facility, were not constructed.
- Repairs and Maintenance: According to Hospital staff some, but not all, of the repairs recommended in the *2005 Master Plan* have been implemented. Volume 1 of the *2005 Master Plan* is still a useful guide for any of the repairs that are still needed. However, it should be noted that the budgetary estimates included in the *2005 Master Plan* for the costs of these repairs are no longer valid. Also, because it has been more than a decade since the *2005 Master Plan* was completed it is likely that additional repairs are required. The scope of work for the *2015 Master Plan Update* did not include an updated evaluation of repair and maintenance issues.



UPPER CAMPUS

CENTRAL CAMPUS

LOWER CAMPUS

EXISTING SITE PLAN

HAWAI'I STATE HOSPITAL

ARCHITECTS HAWAII LIMITED

HAWAII STATE HOSPITAL | 2015 MASTER PLAN UPDATE

AUGUST 28, 2015 | DAGS JOB NO. 12-20-2698

2.0 2015 MASTER PLAN UPDATE- SUMMARY

2.0 MASTER PLAN SUMMARY

2.1 PLANNING PROCESS

The process for developing the *2015 Master Plan Update* included:

- Establishing Goals and Priorities to guide the planning process.
- Gathering information to ascertain the Hospital's current and future program requirements.
- Comparing the current Goals, Priorities and program requirements to similar factors that were included in the *2005 Master Plan*.
- Determining if any of the *2005 Master Plan* recommendations are still valid.
- Determining if any of the *2005 Master Plan* recommendations are no longer valid, or need to be modified to respond to current requirements.
- Preparing a new Long-Term Master Plan and a new Short-Term Master Plan that respond to current and projected future needs, and retain any valid *2005 Master Plan* recommendations.
- A highly productive collaboration between DOH, Hospital, DAGS, and Architects Hawaii staff.

The planning process included the following meetings with DOH, Hospital, and DAGS staff:

May 9, 2014	Project Initiation Meeting
July 22, 2014	Master Plan Kick-Off Meeting (Present Process, Goals and Priorities to Hospital staff)
August 14, 2014	Steering Committee* Meeting 1
August 21, 2014	Steering Committee Meeting 2
August 28, 2014	User Groups Meetings (Nurses, Clinical Services, Rehab Mall, Dietary, Facilities)
September 19, 2014	Steering Committee Meeting 3
September 26, 2014	Steering Committee Meeting 4
October 10, 2014	Steering Committee Meeting 5
October 24, 2014	Steering Committee Meeting 6
March 27, 2015	Master Plan Closing Meeting with Hospital staff (present results, discuss future planning recommendations)

* Comprised of DAGS, DOH, Hospital, and AHL Group Leaders

2.0 MASTER PLAN SUMMARY

Two meetings were also scheduled with the Kaneohe Neighborhood Board (a planning meeting and a full Board meeting). The results of those meetings are discussed in Section 2.7.

2.2 MASTER PLAN GOALS AND PRIORITIES

Eleven Goals and Priorities were established by DOH and DAGS prior to the start of the planning process. AHL's responses are listed below each of the Goals.

1. The *2005 Master Plan* shall be used as a reference/re-start point.

AHL began the planning process with a careful review of the *2005 Master Plan*. This review allowed AHL staff to understand the goals, priorities, and program requirements that shaped that plan. When those factors were compared to current goals, priorities, and program requirements (determined through meetings with DOH, Hospital, and DAGS staff) AHL determined that some features of the *2005 Master Plan* were still valid and should be retained.

Key features from the *2005 Master Plan* that were incorporated in the *2015 Master Plan Update* include:

- Both plans provide additional short-term bed capacity (244 beds in 2005 / 252 beds in 2015).
- The first new patient care facility envisioned in both plans is located on the Goddard site.
- Both plans set the stage for the future replacement of Guensberg.
- Patient Care Buildings E, F, H, and I are used for low-risk and medium-risk patients.
- Plant Operations and Warehouse facilities move from WCC to the Hospital campus.
- A new Hospital main entrance is developed on Pookela Street.

Key differences between the *2005 Master Plan* and *2015 Master Plan Update* include:

- The *2015 Master Plan Update* more clearly addresses the DOH's need to retain control of all areas of the Hospital campus (see Goal 3 below).
- The *2015 Master Plan Update* provides for long-term, incremental growth to as many as 516 beds. The *2005 Master Plan* did not provide for growth beyond 244 beds.

- The *2015 Master Plan Update* reserves the J-Pad site for a future Patient Care Facility. In the *2005 Master Plan* the J-Pad site is identified as the future location of the Hospital's Plant Operations and Warehouse facility.
- The Preliminary Parking Study (Appendix 5.3) included in the *2015 Master Plan Update* addresses the substantial increases in parking capacity that will be required as the Hospital's bed capacity increases. The *2005 Master Plan* did not address the issue of additional parking requirements.
- The *2015 Master Plan Update* provides for developments that could not have been foreseen in 2005 (i.e. an independently-operated Skilled Nursing Facility on the Bishop site).

2. Determine whether a new Certificate of Need (CON) is required.

In 1986 the State Health Planning & Development Agency (SHPDA) approved a CON that allows the Hospital to have a maximum census of 244 patients. Future construction of the proposed 144-Bed Goddard Patient Care Facility described in this Report will increase the Hospital's census to 252 patients. Therefore, a new CON will be required. AHL's discussions with DOH staff suggest that getting a new CON to authorize a census of 252 patients will probably not be an issue. The *Foundational Document* (Appendix 5.1) issued by the DOH in September 2014 clearly supports the need for additional beds.

3. Show future development needs/options for all areas under DOH control, including non-Hospital related facilities.

This Goal is intended to show other State agencies that the DOH's needs are great, and that it must retain control of the entire campus area for future patient and support facilities. AHL addressed this Goal by developing fifteen Planning Zones (see P. 2-15) that establish the recommended use(s) for all areas of the site.

4. **Identify future facilities that could be located at the Hawaii State Hospital campus (other than those required to provide the required number of beds).**

   In the *2015 Master Plan Update* AHL reserved specific areas (see 2.4 Planning Zones) for:

   - An independently-operated Skilled Nursing Facility (Planning Zone 5).
   - A Behavioral Stability Facility (Planning Zone 7).
   - Aloha Garden improvements (Planning Zone 9A).
   - A landscape buffer between the Hospital and WCC campuses (Planning Zone 13).

5. **Incorporate current projects and planned future projects in the planning process.**

   AHL included the areas previously reserved for development of new emergency generator and switchgear facilities in the *2015 Master Plan Update*.

6. **Relocate the Hospital's Base Yard, Warehouse, Plant Operations, and related parking from the Windward Community College campus to the Hospital campus.**

   In the *2015 Master Plan Update* AHL recommends relocating the Hospital facilities listed above to the area where the Iolani and Haloa buildings are currently located. The existing buildings would be demolished to allow these important support facilities to be located much closer to the Hospital, which would improve operational efficiency. The Iolani/Haloa location differs from the *2005 Master Plan*, which recommended that the support facilities be located on the J-Pad site. AHL concluded that it would be better to reserve the J-Pad site for long-term bed growth because of its adjacency to the existing patient care units.

7. **Remove the State Department of Transportation's Base Yard from Hospital campus.**

   It should be noted that, until November 14, 2014, the current SDOT Base Yard was under the DOH's management and control under Executive Order No. 3504. The removal of the SDOT Base Yard and "reacquisition" of this area would be similar to returning the land back to the DOH's management and control.

The DOH's rationale for this Goal is that the Hospital's future building and parking needs will require expansion of the Hospital campus. The SDOT Base Yard area is the most viable, and one of the last, options to accommodate the Hospital's needs within the boundaries of its previously defined campus.

Another option would be to acquire land from the Windward Community College. (It is believed that this option would be contentious.)

Another option would be to acquire land from an adjacent private landowner (or landowners). (It is believed that pursuing this option would be less sensible because the acquired land would not be easily accessible from the existing Hospital campus.)

The SDOT's Base Yard is comprised of their construction and maintenance facilities (permanent and portable buildings). The Base Yard is located adjacent to Pookela Street in the area identified as Planning Zones 6 and 7 (see P. 2-15). On October 18, 2014 Governor Abercrombie signed Executive Order No. 4470 giving management and control of that area to the SDOT. See Appendix 5.7.1 for a November 14, 2014 letter from the Department of Land and Natural Resources (DLNR) to the DOH, including an attached copy of Executive Order No. 4470.

Prior to receiving the above letter DOH wrote a letter to DLNR requesting that they not issue the Executive Order. The DOH letter, dated September 23, 2013, states that the Hospital "*must retain all of its property for use as a hospital*". The letter also states that "*it would be a severe hardship for the DOH to secure an alternative location where the HSH will be welcome*". See Appendix 5.7.2 for a copy of this letter.

In the 2015 Master Plan Update, AHL recommends removing the SDOT facilities from Planning Zones 6 and 7 to support the following future developments:

- Planning Zone 7 is an ideal location for Hospital uses such as the additional staff parking required in connection with increases in the Hospital's patient census, a Behavioral Stability Facility, relocation of the Transitional Care Cottages, or a public education center/museum.
- Planning Zone 6 is the ideal location for a new and improved Hospital main entrance (see Goal 8 below).

8. Study options for a new, improved main entrance to the Hospital campus.

The Hospital's primary access is from Pookela Street. The Kaneohe District Court, WCC, Hina Mauka, and the DOT's Base Yard and Maintenance facility occupy most of the frontage along Pookela Street, which makes the Hospital entrance difficult to find. There is a long-standing desire to develop a new entrance that would be consistent with the Hospital's important stature, and easier to find. In the *2015 Master Plan Update* AHL responded to this Goal by developing a prominent Hospital entrance (Planning Zone 6, P. 2-15) consisting of in and out lanes separated by a landscaped median strip. The Guard Shack would be moved from its current location to median strip. Signage, lighting, and landscaping features would effectively move the Hospital entrance out to Pookela Street and make it easier to find. This development will require that at least a portion of the DOT Base Yard, which was previously under Executive Order to the DOH, be returned to the Hospital.

9. Develop a campus theme or vision that is consistent with the desired treatment philosophy.

The development envisioned in the *2015 Master Plan Update* will allow the Hospital to respond to one if its most significant challenges: providing safe, effective care for high-risk patients. The *2015 Master Plan Update* also provides the desired capability to separate high-risk patients from low-risk and medium-risk patients. Thus, from a functional/operational point of view, the 2015 Master Plan Update develops a campus vision that is consistent with the desired treatment philosophy.

The *2015 Master Plan Update* does not develop a campus vision from a design/aesthetic point of view. AHL recommends that the Planning and Design Guidelines (Volume IV of the 2005 Master Plan) be considered during the design phases of future Hospital facilities.

10. Determine if there is a need to demolish any existing buildings. Provide a justification if demolition is needed.

In the *2015 Master Plan Update AHL* identifies the short-term need to demolish Goddard and Bishop. It also identifies the long-term future need to demolish Guensberg, Building I, Haloa, Iolani, Cooke, and the Transitional Care Cottages. The demolition of these facilities is justified for the following reasons:

- Goddard must be demolished to construct the initial new 144-Bed Goddard Patient Care Facility. The Department of Land and Natural Resources, State Historic Preservation Division (SHPD) has already approved the demolition of Goddard.
- Bishop will have to be demolished prior to the construction of an independently-operated Skilled Nursing Facility that the DOH has been planning since 2007. The *2005 Master Plan* envisioned Bishop being rehabilitated for use as a public information/education facility and its demolition has not been approved by SHPD. See Appendix 5.4 for correspondence between the DOH and SHPD regarding the demolition of Bishop. The mitigation process (Intensive Level Survey) required by SHPD in order to demolish Bishop is not included in the scope of the *2015 Master Plan Update*. The mitigation process will need to be handled separately by the DOH.
- Guensberg will need to be demolished in order to construct a future, second 144-Bed Patient Care Facility for high-risk patients. The Guensberg site is the appropriate location for this facility because it can be functionally and operationally linked to the 144-Bed Goddard Patient Care Facility.
- Building I (20 beds) will need to be demolished in the long-term future in order to complete construction of a third 144-Bed Patient Care Facility on the J-Pad site.

- Haloa (currently vacant) and Iolani will need to be demolished in order to move the Hospital's Base Yard, Warehouse, and Plant Operations from the WCC campus to Hospital campus.
- Cooke and the Transitional Care Cottages (22 beds) will need to be demolished in the long-term future to make room for additional administration and/or parking in the Central Campus area. AHL recommends that the Transitional Care Cottages be relocated to Planning Zone 7 in the future. AHL also recommends that the Grounds Maintenance facilities currently located in Cooke be moved to the relocated Plant Operations area in Planning Zone 4A.

11. Coordinate planning with adjacent "owners" and "site users" that impact the Department of Health's property (Windward Community College, Windward Community College's tenants, Hina Mauka, Hope Chapel, CARE cottages, Hale Imua cottages).

AHL addressed this Goal by incorporating the following features in the *2015 Master Plan Update*:

- WCC will regain control of a portion of its site when the Hospital's Base Yard, Warehouse, and Plant Operations are relocated to the Hospital campus. WCC's use of Iolani will need to be discontinued prior to the future construction of this project.
- The boundary between the Hospital and WCC campuses will be defined by a landscape buffer.
- The developments envisioned in the 2015 Master Plan Update do not affect Hina Mauka, Hope Chapel, or Hale Imua.
- The Transitional Care Cottages (currently in Planning Zone 8) can remain in place for the foreseeable future. In the long term they will need to be relocated, potentially to Planning Zone 7, to facilitate development of additional administration or parking in Planning Zone 8.

The property owners and site users listed above will receive a copy of the *2015 Master Plan Update*.

Additional Goals and Priorities

During the master planning process the following additional Goals and Priorities were identified.

12. **Address the issue that the existing patient care units were not designed to provide care for high-risk patients.**

    The *2015 Master Plan Update* provides a plan for incrementally replacing the Hospital's existing patient care facilities with facilities that are designed to provide safe, efficient care for high-risk patients. The conceptual design of the new patient care facilities (see Section 4.0) is based on a proven approach (a State of Colorado behavioral health facility) that was incorporated in the *2005 Master Plan*, and further refined in the *2015 Master Plan Update*. The conceptual design also incorporates the "2-Hospital Concept", which improves safety by separating high-risk patients from medium-risk and low-risk patients.

13. **Provide increased short-term bed capacity to allow the 40 patients currently housed in leased space at Kahi Mohala to be moved to the Hospital campus.**

    Construction of the new 144-Bed Goddard Patient Care Facility will increase the Hospital's current 178-bed capacity to 252 beds. The increased bed count will allow the patients at Kahi Mohala to be moved to the Hospital. Consolidating all of the Hospital's patients at one site will increase efficiency and reduce operational costs.

14. **Provide increased short-term bed capacity to prepare for the future demolition of Guensberg.**

    Guensberg is sixty years old, in need of substantial repairs, and its configuration is not appropriate for the Hospital's increasing percentage of high-risk patients. Construction of the new 144-Bed Goddard Patient Care Facility will provide the bed capacity needed to relocate the 70 patients in Guensberg and prepare for its demolition. The Guensberg patients can be relocated based on their risk levels – either to the new Goddard Patient Care Facility, or to one of the existing patient care units.

15. **Plan for long-term, incremental increases in the Hospital's patient census.**

    Based on discussions with Hospital and DOH staff, and the information contained in the *Foundational Document* (Appendix 5.1), AHL realized that the Long-Term Master Plan needed to provide for substantial growth. The *2015 Master Plan Update* provides the ability to increase Hospital's census from the current 178 patients to 516 patients. This substantial growth can be implemented in four (or more) phases as the needs are justified. This approach ensures that the Hospital can remain operational on its current site far into the future.

16. **The Short-Term Master Plan should include some patient rooms designed to provide care for patients with medical issues.**

    The Short-Term Master Plan identifies one 24-Bed Patient Unit on the Second Floor of the Goddard Patient Care Facility as the Medical Unit (see P. 4-7). The specific features (medical gases, medical equipment, etc.) included in this patient care unit will be determined during the future design phases. AHL recommends that the design of the medical unit be as close as possible to the design of the typical patient units. This approach will allow well patients to be housed on the medical unit when the census of sick patients is low.

17. **The Short-Term Master Plan should include a "hardened" patient care unit designed to provide care for extremely high-risk patients.**

    The Short-Term Master Plan identifies one 24-bed Patient Unit on the First Floor of the Goddard Patient Care Facility as the Hardened Unit (see P. 4-6). In order to minimize uncontrolled patient interaction each patient room will have its own toilet and shower (unlike the other patient units where two rooms typically share a toilet and shower).

18. **The capacity of the Admissions Patient Care Unit should be increased.**

    The *2005 Master Plan* included a 16-Bed Admissions Patient Care Unit. The current Hospital staff felt that 16 beds would not be adequate to meet their needs. The Short-Term Master Plan

responds to the staff's concern by increasing the capacity of the Admissions Patient Care Unit (see P. 4-6) to 24 beds.

19. The 2015 Master Plan Update must address the goal of providing increased safety.

The *2015 Master Plan Update* provides for increased public, patient, and staff safety as follows:
Public Safety: The future patient facilities will be designed specifically for high-risk patients and will be surrounded by high-security fences. Patient, staff, and public access to, and egress from, the future facilities will be controlled by sally ports. These features will increase public safety by reducing opportunities for patients to elope into the surrounding community.
Patient Safety: The conceptual design of the future patient care facilities (see Section 4.0) is based on a plan layout that provides clear sight lines from a central nursing station. This feature, in combination with security cameras, will reduce the risk of patients harming themselves, or other patients.
Staff Safety: The conceptual design of the future patient care facilities includes "off stage" areas for functions such as staff offices, locker rooms, and conference rooms. Access to the "off-stage" areas will be controlled to prevent patients from entering. This feature, in combination with the visibility features indicated above, will reduce the risk of staff being assaulted by patients.

Issues Not Addressed in 2015 Master Plan Update

At the time the master planning process started several proposed new programs were under discussion. The DOH issued the following directives regarding those programs:

- An adult substance abuse forensic treatment facility will not be considered at this time.
- Additional 1/4-Way transitional housing will not be provided. The 22 beds in the Transitional Care Cottages will remain.
- Additional 1/4-Way transitional housing will not be provided. The 16 beds in Hale Imua will remain.
- A joint Department of Public Safety (PSD) / DOH forensic facility will not be accommodated on the Hospital site.

2.0 MASTER PLAN SUMMARY

2.3 GROWTH IN PATIENT CENSUS

As indicated in Section 1.4, the capital improvement projects recommended in the *2005 Master Plan* were not implemented. Therefore, two of the primary issues that shaped the *2005 Master Plan* (i.e. increases in patient population and the increasing percentage of high-risk patients) have not been addressed. These issues continue to present significant operational challenges. William May, the current Hospital Administrator, recently made the following statement: "The hospital was built as a 178-bed facility to treat severely chronic mentally ill and acute criminally-committed patients, but census figures today have grown to more than 200 patients and continue to rise". The makeshift accommodations required to house the extra patients, combined with the increasing percentage of high-risk patients, results in operational challenges and increased safety risks.

In September 2014 the DOH issued a statistical analysis that provides an estimate of the number of patient beds likely to be required each month; starting in August 2014 and ending in January 2019. The analysis shows the forecasted monthly average patient census continuing to rise, reaching 265 patients in 2019. The DOH statistical analysis, identified as the *Foundational Document*, is included in the Appendix 5.1. Hawaii's population will continue to grow in the years beyond 2019 resulting in an even greater demand for patient capacity.

The *2015 Master Plan Update* provides options that address the census growth through 2019 as projected in the *Foundational Document*. It also provides a "road map" for addressing the substantial further increases in census that are likely to occur in the years beyond 2019.

2.4 LONG-TERM MASTER PLAN

The Long-Term Master Plan provides a flexible plan for incrementally responding to all of the established Goals and Priorities over time. The Long-Term Master Plan is illustrated by two drawings:

- Planning Zones (see P. 2-15)
- Long-Term Master Plan (see P. 2-17)

2.0 MASTER PLAN SUMMARY

Planning Zones

The Planning Zones drawing (see P. 2-15) provides a broad overview of the Long-Term Master Plan. The fifteen Planning Zones respond to Goal 3 by establishing clear, logical uses for all areas of the Hospital site. The use(s) identified for each Planning Zone were established by consensus of the DOH, Hospital, DAGS, and AHL planning participants. The development(s) envisioned for each Planning Zone are described in the Keynotes on the right side of the drawing. Except for Zone 1, the Planning Zone numbers do not imply a sequence of implementation. As stated elsewhere in this Report, the project(s) in each Planning Zone can be implemented when the needs can be justified and when funding is available. The following summary identifies the Planning Goal(s) for the future development in each zone.

Zone 1 Reserved for future 144- Bed Goddard Patient Care Facility (see Short-Term Master Plan for details)

Zone 2 Reserved for future 144- Bed Patient Care Facility (current Guensberg site). Construction of this facility will result in the need to add approximately 482 new parking spaces (see Preliminary Parking Study, Appendix 5.3). Prior to construction the DOT Base Yard will probably need to be relocated from Planning Zone 7 to another location (not on DOH land).

Zone 3A Reserved for future 72-Bed Patient Care Facility (current J-Pad site)

Zone 3B Reserved for future 72-Bed Patient Care Facility (current Building I site)

Zone 4A Reserved for future relocation of Hospital Plant Operations, Warehouse, Base Yard

Zone 4B Current Hospital Plant Operations, Warehouse, and Base Yard on WCC campus

Zone 5 Reserved for future independently-operated Skilled Nursing Facility

Zone 6 Reserved for future main Hospital entrance improvements. This area is currently under SDOT management and control per Executive Order No. 4470.

Zone 7 Reserved for future development options such as additional staff parking required in connection with future increases in the Hospital's patient census, a Behavioral Health Stability facility, relocating the Transitional Care Cottages, Housing, or a Hospital history museum. This area is currently under SDOT management and control per Executive Order No. 4470.

Zone 8	Reserved for future expansion of Hospital administration, or additional parking
Zone 9A	Reserved for future Aloha Garden improvements
Zone 9B	Reserved for protection of watershed
Zone 10	Reserved for future development such additional staff parking
Zone 11	Reserved for continued use by Hina Mauka
Zone 12	Reserved for water tanks and emergency ingress to / egress from Hospital site
Zone 13	Future landscape buffer at Hospital/WCC property line
Zone 14	Reserved for future development of additional parking
Zone 15	Reserved for future development of additional parking

LEGEND

- PLANNING ZONES (SEE KEYNOTES BELOW)
- EXISTING HSH BUILDINGS: ADMINISTRATION, SUPPORT, REHAB MALL, THERAPY, DINING & KITCHEN
- EXISTING HSH BUILDINGS: PATIENT CARE UNITS

KEYNOTES

1 Zone reserved for new 144-Bed "Goddard" Patient Care Facility. This facility will require demolition of the existing Goddard building.

2 Zone reserved for future 144-Bed Patient Care Facility. This facility will require demolition of the existing Guensberg building.

3A Zone reserved for future 72-Bed Patient Care Facility. This facility will be located on the "J-Pad".

3B Zone reserved for future 72-Bed Patient Care Facility. This facility will require demolition of the existing Building I Patient Care Facility (24 beds).

4A Zone reserved for future HSH Plant Operations and Warehouse Facility. The existing Haloa building (currently abandoned) and the existing Iolani building (currently used by WCC under an agreement with DOH) will be demolished.

4B Existing HSH Plant Operations and Warehouse Facility will be turned over to WCC after construction of the new facility in Zone 4A.

5 Zone reserved for future development (by others) of an independently operated Skilled Nursing Facility. Demolition of Bishop will be by others. Existing Guard Shack to remain.

6 Zone reserved for future HSH main entrance improvements. This plan will require moving the SDOT Base Yard to another site (off HSH's campus).

7 Zone reserved for future development such as a Behavioral Stability Facility, relocation of Transitional Care Cottages (22 beds), or additional parking (320 Spaces, surface or parking structure). This plan will require moving the SDOT Base Yard to another site (off HSH's campus).

8 Zone reserved for future expansion of HSH Administration or additional parking (220 spaces, surface or parking structure). This plan will require demolition of Cooke (currently used by Security and Grounds Maintenance) and relocation of Transitional Care Cottages (22 beds in 4 cottages).

9A Zone reserved for Aloha Garden improvements.

9B Zone reserved for watershed.

10 Zone reserved for future development such as additional parking (200 spaces, surface).

11 Zone reserved for continued use by Hina Mauka (an independently operated drug treatment facility) on the HSH campus.

12 Zone reserved for water tanks, access road, emergency ingress to / egress from HSH site.

13 Zone reserved for future landscape buffer.

14 Zone reserved for future development such as additional parking (60 spaces, surface).

15 Zone reserved for future development such as additional parking (110 spaces, surface).

0 100' 200' 400'

PLANNING ZONES

HAWAI'I STATE HOSPITAL

ARCHITECTS HAWAII LIMITED

2.0 MASTER PLAN SUMMARY

Long-Term Master Plan

The Long-Term Master Plan (see P. 2-17) provides a detailed illustration of the future development options for Zones 2, 3A, 3B, and 4A. In all other respects the Long-Term Master Plan is identical to the Planning Zones drawing.

Zone 2 **(Orange)** This future Patient Care Facility on the Guensberg site will provide 144 additional beds (six 24-bed patient units) and expanded Rehab Mall capacity. Construction of this facility will increase the Hospital's capacity to 396 beds. The facility design is anticipated to be similar to the previously constructed Goddard Patient Care Facility. The two projects will be capable of operating as a single, integrated facility. The Guensberg building, vacant after construction of the 144Bed Goddard Patient Care Facility in Zone 1, will be demolished prior to construction.

Zone 3A **(Green)** This future Patient Care Facility on the J-Pad site will provide 72 additional beds (three 24 bed units). Construction of this facility will increase the Hospital's capacity to 468 beds. The facility design is anticipated to be similar to one-half of the 144-bed patient care facilities constructed earlier in Zones 1 and 2. Building I (24 beds) can remain in operation during construction of this facility.

Zone 3B **(Brown)** The future Patient Care Facility in Zone 3B will provide 72 additional beds (three 24 bed units). Construction of this facility will increase the Hospital's capacity to 516 beds. This facility will likely be joined to the patient care facility to create an integrated 144-bed patient care facility. Building I, which will be quite old by the time this project is implemented, will need to be demolished prior to construction.

Zone 4 **(Purple)** The plan shown in Zone 4 is a conceptual configuration for the future Hospital Plant Operations and Warehouse (relocated from the WCC campus). A conceptual plan for this facility is included in the Appendix (Item 5.6)

KEYNOTES

5 Zone reserved for future development (by others) of an independently operated Skilled Nursing Facility. Demolition of Bishop will be by others. Existing Guard shack to remain.

6 Zone reserved for future main campus entry improvements. This development will require moving the Department of Transportation's base yard to another site (off HSH's campus).

7 Zone reserved for future development such as a Behavioral Stability Facility, relocation of Transitional Housing (22 beds), or additional parking (320 spaces, surface or parking structure). This plan will require moving the Department of Transportation's base yard to another site (off HSH's campus).

8 Zone reserved for future expansion of administration and support services or additional parking (220 spaces, surface or parking structure). This development will require demolition of Cooke (currently used by security office and grounds maintenance) and relocation of Transitional Housing (22 beds in 4 cottages).

9A Zone reserved for Aloha Gardens improvements.

9B Zone reserved for watershed.

10 Zone reserved for future development such as additional parking (200 spaces, surface).

11 Zone reserved for continued use by Hina Mauka (an independently operated drug treatment facility) on HSH campus.

12 Zone reserved for water tanks, access road, potential emergency ingress/egress.

13 Future landscape buffer

14 Zone reserved for future development such as additional parking (60 spaces, surface).

15 Zone reserved for future development such as additional parking (110 spaces, surface).

LEGEND

- PROPERTY LINE
- PLANNING ZONES (SEE KEYNOTES BELOW)
- NEW GODDARD PATIENT CARE FACILITY (144 BEDS), REHAB MALL, PEDESTRIAN BRIDGE TO LOWER CAMPUS, AND PARKING (42 SPACES)
- FUTURE PATIENT CARE FACILITY (144 BEDS), REHAB MALL, AND PARKING (42 SPACES)
- FUTURE PATIENT CARE FACILITY (24-72 BEDS)
- FUTURE PATIENT CARE FACILITY (24-72 BEDS)
- FUTURE PLANT OPERATIONS, WAREHOUSE, AND PARKING (25 SPACES)
- EXISTING ADMINISTRATION, FACILITY SUPPORT, PATIENT SUPPORT, REHAB MALL, THERAPY, DINING & KITCHEN, TRANSITIONAL CARE COTTAGES (22 BEDS), AND PARKING
- EXISTING PATIENT CARE UNITS (84 BEDS TOTAL)

KEYNOTES

5 Zone reserved for future development (by others) of an independently operated Skilled Nursing Facility. Demolition of Bishop will be by others. Existing Guard Shack to remain.

6 Zone reserved for future HSH main entrance improvements. This plan will require moving the SDOT Base Yard to another site (off HSH's campus).

7 Zone reserved for future development such as a Behavioral Stability Facility, relocation of Transitional Care Cottages (22 beds), or additional parking (320 spaces, surface or parking structure). This plan will require moving the SDOT Base Yard to another site (off HSH's campus).

8 Zone reserved for future expansion of HSH Administration or additional parking (220 spaces, surface or parking structure). This plan will require demolition of Cooke (currently used by Security and Grounds Maintenance) and relocation of Transitional Housing (22 beds in 4 cottages).

9A Zone reserved for Aloha Garden improvements.

9B Zone reserved for watershed.

10 Zone reserved for future development such as additional parking (200 spaces, surface).

11 Zone reserved for continued use by Hina Mauka (an independently operated drug treatment facility) on the HSH campus.

12 Zone reserved for water tanks, access road, emergency ingress to / egress from HSH site.

13 Zone reserved for future landscape buffer.

14 Zone reserved for future development such as additional parking (60 spaces, surface).

15 Zone reserved for future development such as additional parking (110 spaces, asurface).

0 100' 200' 400'

LONG-TERM MASTER PLAN

HAWAI'I STATE HOSPITAL

ARCHITECTS HAWAII LIMITED

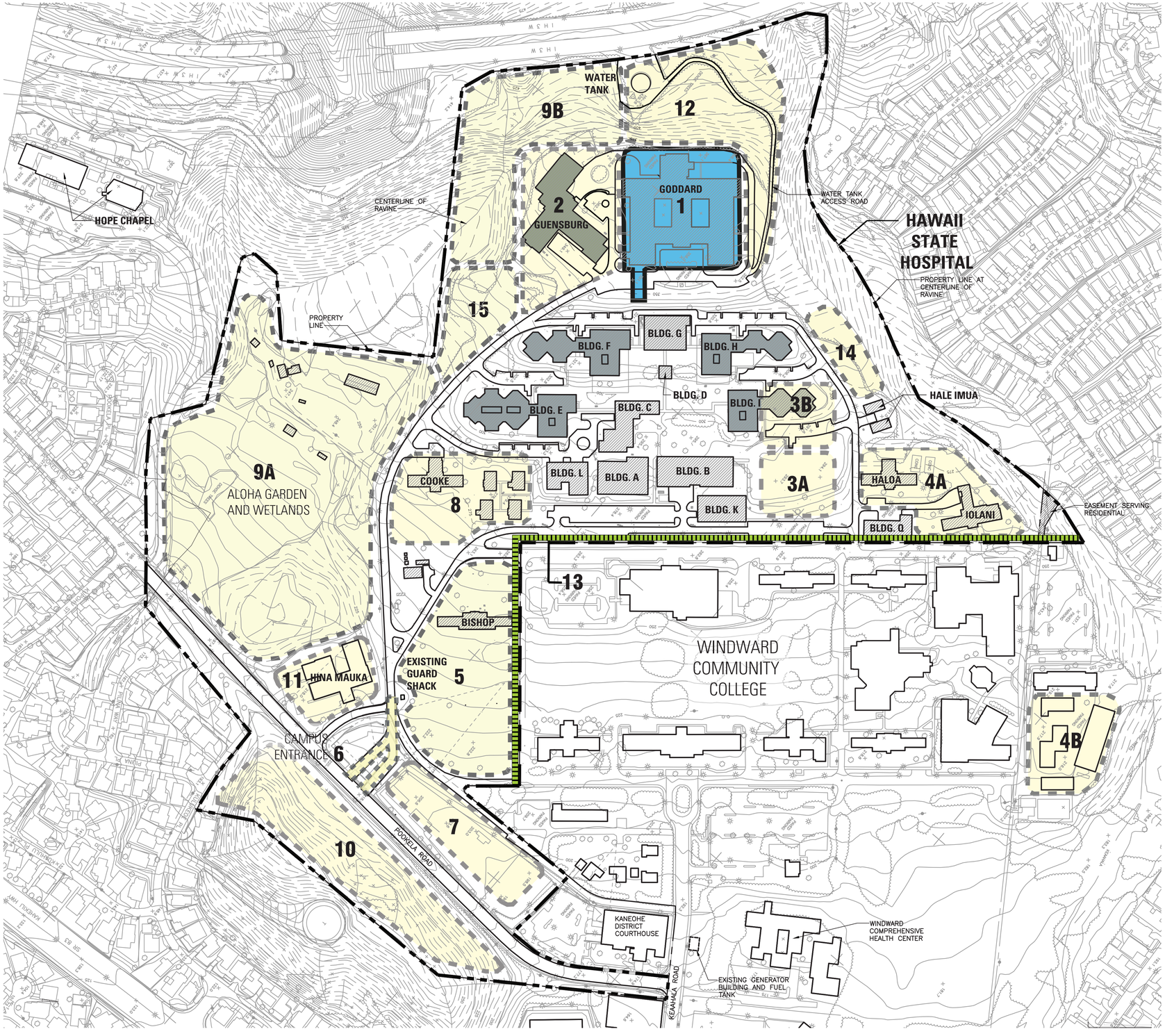
2.0 MASTER PLAN SUMMARY

2.5 SHORT-TERM OVERALL MASTER PLAN

The Short-Term Master Plan (see P. 2-19) follows the development approach established by the Planning Zones. It proposes construction of a new 144-Bed Patient Care Facility in Planning Zone 1 – the Goddard site. Construction of the 144-Bed Goddard Patient Care Facility, in combination with the 108 existing beds (Buildings E, F, H, and I), will increase the Hospital's capacity to 252 beds. The Short-Term Master Plan specifically responds to the following Goals and Priorities:

- Goal 12: Provides facilities designed to provide safe, efficient care for high-risk patients.
- Goal 13: Provides additional beds needed to move 40 patients from Kahi Mohala to Hospital.
- Goal 14: Provides new beds to replace the 70 beds in Guensberg.
- Goal 15: Provides a long-term plan for incrementally increasing the Hospital's patient census.
- Goal 16: Provides a 24-Bed Medical Patient Care Unit.
- Goal 17: Provides a 24-Bed Hardened Patient Care Unit for extremely high-risk patients.
- Goal 18: Provides a 24-Bed Admissions Patient Care Unit.
- Goal 19: Provides increased safety for patients, staff, and the public.

For a detailed description of the proposed new 144-Bed Goddard Patient Care Facility please refer to Section 3.0 Space Programs and Section 4.0 Conceptual Design. A Conceptual Design Cost Estimate for the 144-Bed Goddard Patient Care Facility is included in the Appendix (Item 5.2).



LEGEND

- NEW GODDARD PATIENT CARE FACILITY
- PLANNING ZONES (SEE KEYNOTES BELOW)
- EXISTING HSH BUILDINGS: ADMINISTRATION, SUPPORT, REHAB MALL, THERAPY , DINING & KITCHEN
- EXISTING HSH PATIENT CARE UNITS (108 BEDS TOTAL)

KEYNOTES

1 New 144-Bed "Goddard" Patient Care Facility. This facility will require demolition of the existing Goddard building.

2 Zone reserved for future 144-Bed Patient Care Facility. This facility will require demolition of the existing Guensburg building.

3A Zone reserved for future 72-Bed Patient Care Facility. This facility will require demolition of the existing Building F Patient Care Facility (24 beds).

3B Zone reserved for future 72-Bed Patient Care Facility. This facility will require demolition of the existing Building I Patient Care Facility (24 beds).

4A Zone reserved for future HSH Plant Operations and Warehouse Facility. This facility will be constructed on the vacant land between existing Aloha Building (currently abandoned) and the existing Haloa building (currently used by WCC under a lease agreement with DOH). The existing HSH Plant Operations and Warehouse Facility will be demolished, and the vacated land will be leased to WCC (with DOH).

4B Existing HSH Plant Operations and Warehouse Facility will be turned over to WCC after construction of the new facility in Zone 4A.

5 Zone reserved for future development (by others) of an independently operated Skilled Nursing Facility. Demolition of Bishop will be by others. Guard shack to remain.

6 Zone reserved for future HSH main entrance improvements. This plan will require moving the DOT Base Yard to another site (off HSH's campus).

7 Zone reserved for future development such as a Behavioral Stability Facility, relocation of Transitional Housing (22 beds), or additional parking (320 spaces, surface or parking structure). This plan will require moving the DOT Base Yard to another site (off HSH's campus).

8 Zone reserved for future expansion of HSH Administration or additional parking (220 spaces, surface or parking structure). This plan will require demolition of Cooke (currently used by Security and Grounds Maintenance) and relocation of Transitional Housing (22 beds in 4 cottages). This plan requires moving the Department of Transportation baseyard to another site (off HSH's campus).

9A Zone reserved for future HSH main entrance improvements.

9B Zone reserved for future development such as administration, staff offices, support, or additional parking. This increment will require demolition of Cooke (currently used by the security office and grounds maintenance) and relocation of transitional housing (23 beds in 4 cottages).

10 Zone reserved for future development such as additional parking (200 spaces, surface).

11 Zone reserved for future development such as additional parking (110 spaces, surface).

12 Zone reserved for water tanks, access road, emergency ingress to / egress from HSH site.

13 Zone reserved for future landscape buffer.

14 Zone reserved for future development such as additional parking (60 spaces, surface).

15 Zone reserved for future development such as additional parking (110 spaces, surface).

0 100' 200' 400'

SHORT-TERM MASTER PLAN

HAWAI'I STATE HOSPITAL

ARCHITECTS HAWAII LIMITED

HAWAII STATE HOSPITAL | 2015 MASTER PLAN UPDATE

AUGUST 28, 2015 | DAGS JOB NO. 12-20-2698

2.0 MASTER PLAN SUMMARY

2.6 FUNCTIONAL RELATIONSHIPS

The Functional Relationship Diagram (see P. 2-21) is a supplement to the Short-Term Master Plan. It provides a diagrammatic view of the Hospital's future state in the time period:

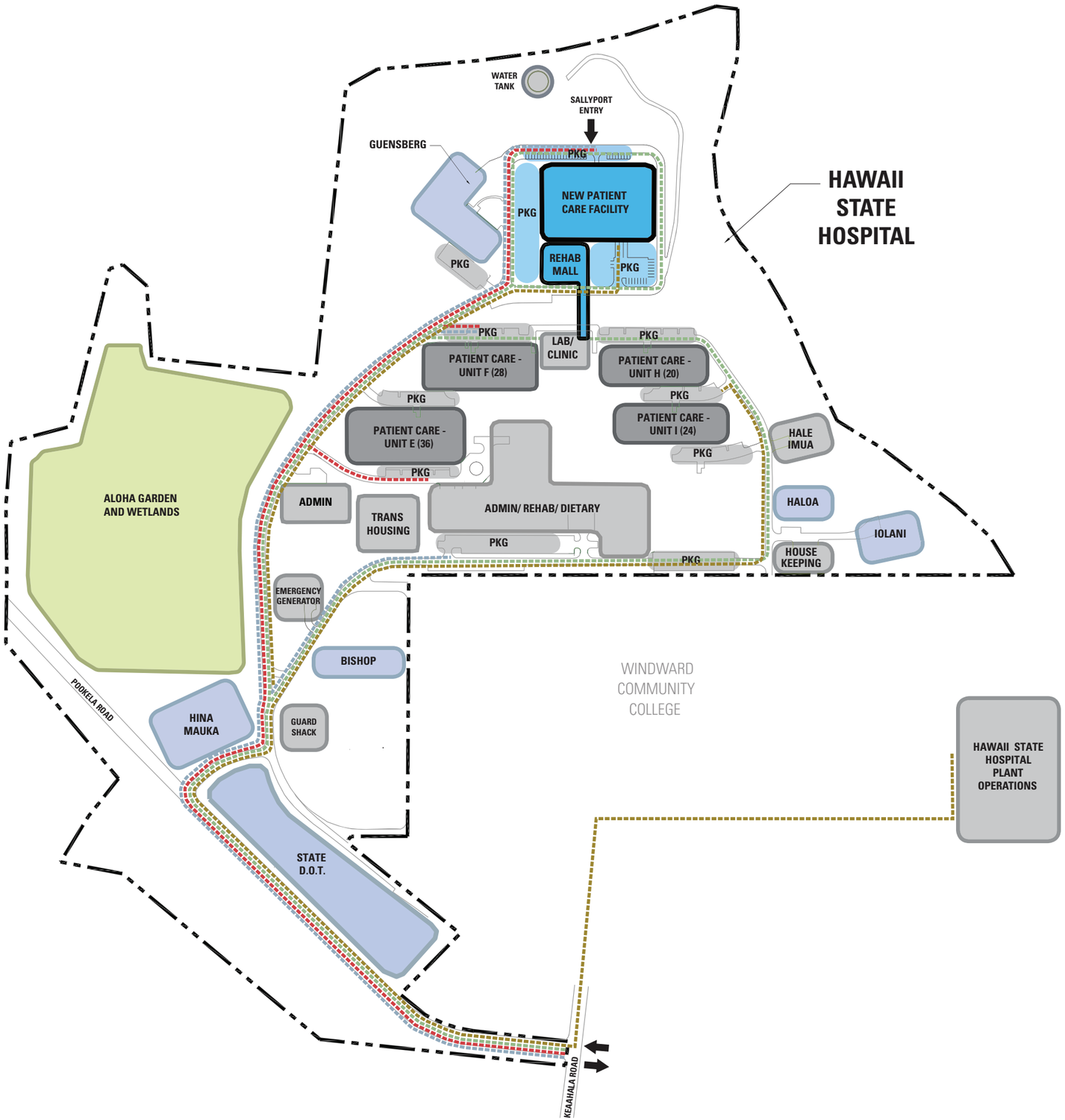
- Following completion of the new 144-Bed Goddard Patient Care Facility.
- Prior to future implementation of the projects in Planning Zones 2 – 15.

The diagram uses color coding to identify:

- Building and land use categories.
- Major vehicular circulation routes for patient transport, service vehicles, staff, and visitors.

The Functional Relationship Diagram also illustrates certain key functional considerations that are covered in more detail in Sections 3.0 and 4.0:

- The new 144-Bed Goddard Patient Care Facility will have its own dedicated Rehab Mall (the *2005 Master Plan* called this approach the "2-Hospital Concept").
- The Guensberg building can remain in operation while the new Goddard Patient Care Facility is being built, thus avoiding any reduction in patient care capacity.
- A pedestrian bridge and elevators will connect the new Goddard Patient Care Facility to the existing patient care units and services located on the central campus, which is approximately 25' lower in elevation.
- The new Goddard Patient Care Facility will be surrounded by a high-security fence, and will be accessible only via dual-gated sally ports.
- Approximately 98 parking spaces will be provided immediately adjacent to the new Goddard Patient Care Facility (see Conceptual Site Plan, P. 4-4). The Preliminary Parking Study (Appendix 5.3) estimates that 272 new spaces will be required following completion of the 144-Bed Goddard Patient Care Facility. The additional 174 spaces will need to be located in Planning Zone 7, 8, 10, 14, or 15. The specific location for the additional required parking will need to be determined as part of the future design process for the 144-Bed Goddard Patient Care Facility.



LEGEND

- PROPERTY LINE
- NEW GODDARD PATIENT CARE FACILITY (144 BEDS), REHAB MALL, PEDESTRIAN BRIDGE TO LOWER CAMPUS AND PARKING
- EXISTING PATIENT CARE UNITS (108 BEDS)
- EXISTING ADMINISTRATION, FACILITY SUPPORT, PATIENT SUPPORT, REHAB MALL, THERAPY, DINING & KITCHEN, TRANSITIONAL HOUSING (22 BEDS), AND PARKING
- EXISTING BUILDINGS OR ZONES OCCUPIED BY OTHERS OR UNOCCUPIED
- ALOHA GARDEN AND WETLANDS

VEHICULAR CIRCULATION

- PATIENTS
- ADMIN / STAFF
- SERVICE
- PUBLIC / VISITORS

0 100' 200' 400'

FUNCTIONAL RELATIONSHIP DIAGRAM

HAWAI'I STATE HOSPITAL

ARCHITECTS HAWAII LIMITED

HAWAII STATE HOSPITAL | 2015 MASTER PLAN UPDATE

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2.7 KANEOHE NEIGHBORHOOD BOARD

DOH, Hospital, DAGS, and AHL staff attended two Kaneohe Neighborhood Board (KNB) meetings. These meetings were intended to:

- Give KNB members and the Kaneohe community a preview of the *2015 Master Plan Update*.
- Provide an opportunity for the Board and community to comment on the *2015 Master Plan Update*.
- Set the stage for continuing dialogue as the projects envisioned in the *2015 Master Plan Update* are implemented in the future.

The first KNB meeting occurred on May 5, 2015. This meeting, also referred to as a planning meeting, is typically attended only by Board members. The meeting was intended to give the Board members an advance look at the materials to be presented at the public meeting on May 21, 2015. William May, the Hospital Administrator, and Gary Marshall (AHL) gave a summary of the key features of the *2015 Master Plan Update*.

The second meeting, which was the official KNB public meeting, occurred on May 21, 2015. William May made the presentation, which focused on the ways in which the *2015 Master Plan Update* addresses the major challenges the Hospital is facing:

- Improving safety for staff, patients, and the Kaneohe community.
- Providing additional patient beds to meet current needs and long-term growth projections.
- Providing new patient care facilities designed specifically to care for high-risk patients.

In his presentation Mr. May made the following points:

- The development envisioned in the *2015 Master Plan Update* occurs mainly within the boundaries of the existing Hospital site. Some of the development (in Planning Zones 6 and 7) is shown on lands currently managed by the SDOT. These lands were previously managed and controlled by the DOH under Executive Order No. 3504.
- The vacant Goddard building will be demolished and the 144-Bed Goddard Patient Care Facility will be constructed in that location. This is a short-term project that DOH hopes to complete within 7 – 10 years.

- The vacant Bishop building will be demolished and an independently-operated 150-Bed Skilled Nursing Facility (SNF) will be constructed in that location. The timetable for this project is not certain, but it is intended to be a relatively short-term project.
- The remaining development envisioned in the *2015 Master Plan Update* consists of long-term projects that will be implemented over a period of many years.

Following the presentation the following issues were discussed:

- Dr. Dykstra, the WCC Chancellor, stated that WCC has previously offered to exchange the land in Planning Zone 5 (the Bishop site) for a comparable sized property near the Windward Comprehensive Health Center. He said that WCC would like to work with a charter school to renovate Bishop, and would also like to construct a new building adjacent to Bishop. It was noted that the requested exchange of lands would constitute a significant departure from the Hospital's *2015 Master Plan Update* and the issue was not discussed further at the KNB meeting. Resolution of this issue was subsequently handled by the DOH in a June 22, 2015 letter to John Morton, the Vice President of Community Colleges. See Appendix 5.4.3 for a copy of the letter.
- A Kaneohe resident asked how the SNF beds are going to paid for. Mr. May replied that the beds will be financed by Medicaid and other funding mechanisms. Another resident stated that Medicaid will probably not cover all of the expenses.
- Brian Isa (DAGS) stated that the *2015 Master Plan Update* process is not finished. He mentioned that further planning, including an Environmental Assessment, is required and there will be additional opportunities for public comments. He also mentioned that construction of the 144-Bed Goddard Patient Care Facility will require additional appropriations from the Hawaii State Legislature.
- KNB Chair Radke asked if the Environmental Assessment will be presented to the KNB when it is completed. Brian Isa indicated that the appropriate environmental process will be followed.
- KNB member San Nicholas asked if the Master Plan includes safe zones for patients and the community. William May replied that the new patient care facilities will include high-security perimeter fencing.

3.0 NEW 144- BED GODDARD PATIENT CARE FACILITY- SPACE PROGRAMS

3.0 NEW GODDARD PATIENT CARE FACILITY – SPACE PROGRAMS

3.1 Introduction

In the 2015 Master Planning effort, user groups comprised of key personnel from major departments were instrumental to re-define the future needs of the Hospital Campus. Six user groups were involved with the master planning process: Administrative, Clinical Services, Dietary, Nursing, Facilities, and Rehab Treatment Mall. Each group reviewed the 2005 functional space programs and confirmed the applicability of room types, sizes, and space deficiencies. They also reviewed and provided key campus functional relationships and preferred adjacencies to address safety and security.

During the 2015 Master Planning process, it was determined based on several hospital user group discussions that the New Goddard Patient Care Facility and Rehab Mall Space Programs would need to be revised to reflect a "2-Hospital Concept" so that the New Goddard Patient Care Facility and Rehab Mall on the upper campus has a distinct high-security zone, separate from central campus functions. The New Goddard Patient Care Facility would completely separate the interaction of high risk patients with other types of patients on campus.

The New Goddard Patient Care Facility includes six 24-Bed Patient Care Units for a total of 144 beds. There are four typical 24-Bed Patient Care Units, one of which will be modified to care for patients with medical issues. The remaining two 24-Bed Patient Care Units will be dedicated for Admissions and High-Risk patients. Bold red text in subsequent sections 3.3 – 3.6 indicates information that was revised or added during the 2015 Master Plan Update process due to user group input.

The 2015 Master Plan update does not address future changes that may need to occur to the existing space programs for the patient care units, administrative, and facility support buildings as a direct result of the New Goddard Patient Care Facility and Rehab Mall being built. It will be necessary to reevaluate the space program in these existing buildings as the Hospital's bed count continues to increase in the future. Section "3.2 Space Program Summary" separates the subtotal area of the New Goddard Patient Care Facility from other existing building areas on campus in order to distinguish new space requirements from existing.

3.2 SPACE PROGRAM SUMMARY

NEW GODDARD PATIENT CARE FACILITY	NSF	GSF	Remarks
24-Bed Typical Patient Care Unit	9,479	17,062	Three 8-bed wings, patient support functions, and staff support functions.
24-Bed Typical Patient Care Unit	9,479	17,062	Three 8-bed wings, patient support functions, and staff support functions.
24-Bed Typical Patient Care Unit	9,479	17,062	Three 8-bed wings, patient support function, and staff support functions.
24-Bed Typical Patient Care Unit (Medical)	9,479	17,062	Similar to a typical 24-Bed Patient Care Unit, modified to provide care for patients with medical issues.
24-Bed Admissions Patient Care Unit	11,031	19,856	Similar to a typical 24-Bed Patient Care Unit, also includes a dedicated Rehab Mall used only by the patients on this unit.
24-Bed High-Risk Patient Care Unit	10,194	18,349	Similar to a typical 24-Bed Patient Care Unit, modified to provide care for high-risk patients.
Rehab Mall	23,160	41,688	Dedicated for use by patients in the New Patient Care Facility. Patients in Buildings E, F, H, and I will continue to use the existing Rehab Mall facilities.
Support Services	16,460	29,628	Allowance for Materials Management, Covered Loading Dock, General Storage, and Central Plant
Area - Patient Care Facility	**98,761**	**177,770**	

EXISTING BUILDINGS[1]	NSF[2]	GSF[2]	Opened[2]	Remarks / Services [3]
Patient Care Unit - Building E	19,327	28,411	1992	Designed to house 36 patients.
Patient Care Unit - Building F	15,954	23,452		Designed to house 28 patients.
Patient Care Unit - Building H	11,560	16,993	1992	Designed to house 20 patients.
Patient Care Unit - Building I	12,546	18,443	1992	Designed to house 24 patients.
Patient Care Unit - Guensberg Building	35,909	48,993	1955	After the New Patient Care Facility is completed Guensberg will not be used for patient care.
Building A	19,926	25,422	1992	Business Office, HSH Administration, Consumer Representation, Medical Records, Telecommunications, MIS, Rehab Mall, Nursing Office, Staff Development, Housekeeping, Shared Facilities
Building B	21,386	24,651	1992	Dietary, Housekeeping, Rehab Mall, Shared Facilities. The existing Dietary department will also prepare food for the New Patient Care Facility.

3.2 SPACE PROGRAM SUMMARY

EXISTING BUILDINGS[1]	NSF[2]	GSF[2]	Opened[2]	Remarks / Services [3]
Building C	6,623	7,830	1992	Rehab Mall, Kau Kau Café, Safety Officer, Consumer Representation, Volunteer Services, Nursing Office, Housekeeping, Shared Facilities
Building D	970	1,152	1992	Elevator and stairs connecting the site level where Buildings A, B, C, E, L, and I are located to the site level where Buildings F, G, and H are located.
Building G	7,884	10,726	1992	Lab, Medical Services, Pharmacy, Central Medical Supply, Shared Facilities
Building K	5,914	8,069	1992	Occupational Therapy, Recreational Therapy
Building L	5,347	7,568	1992	MIS, Utilization Management, Personnel / HR, Volunteer Services, Housekeeping, Shared Facilities
Buildings M, N, O, and P - CARE Cottages	4,000	5,000	1992	Transitional housing. Areas approximate - dimensioned drawings not available.
Building Q	6,783	7,614	1992	Housekeeping/Laundry, Plant Operations
Bishop Building	6,485	8,100	1932	Vacant. Will be demolished prior to construction of a planned, new Skilled Nursing Facility. Areas approximate - dimensioned drawings not available.
Cooke Building	7,950	10,568	1932	Security (PSD), QI / Risk Management, RN / QI, CPSU, Standards and Compliance, Rehab Mall.
Goddard Building	88,000	110,000	1947	Vacant -scheduled to be demolished under a separate project. Both the 2005 Master Plan and the 2015 Master Plan Update identify the Goddard site as the preferred location for the New Patient Care Facility. Areas approximate.
Haloa Building	6,988	8,735	1932	Currently vacant. Areas approximate - dimensioned drawings not available.
Iolani Building	13,881	17,351	1932	Currently used by Windward Community College under an agreement with DOH. Areas approximate - dimensioned drawings not available.
Cottages (Hale Imua)	1,682	2,103	2001	Areas approximate - dimensioned drawings not available.

3.2 SPACE PROGRAM SUMMARY

EXISTING BUILDINGS[1]	NSF[2]	GSF[2]		
Area - Existing Buildings	299,115	391,181		

Area - New Patient Care Facility and Existing Buildings	397,876	568,951		

Footnotes:

1. The New Goddard Patient Care Facility project does not include renovations or repairs in any of the existing buildings.

2. The areas (net and gross) and year each existing building opened are taken from the 2005 Hawaii State Hospital Master Plan.

3. The services located in the existing buildings are taken from the 2005 Hawaii State Hospital Master Plan.

3.3 SPACE PROGRAM: TYPICAL 24-BED PATIENT CARE UNITS [1][2]

Black text: Indicates information that is identical to the 2005 Master Plan Space Program.

Bold red text: Indicates information that was revised or added during the 2015 Master Plan Update process.

Dept.		Space Name	Existing Total NSF	Proposed Occ.	Proposed NSF	Proposed No.	Proposed Total NSF	Remarks
Dorm Wing	1	Patient Bedroom	NA	1	110	22	2,420	
	2	Toilet & Shower - Shared	NA	~	65	11	715	Shared - 1 per 2 patient rooms
	3	Isolation Patient Room	NA	~	110	2	220	
	4	Isolation Toilet & Shower	NA	~	65	2	130	
Day Wing	5	Seclusion Room	NA	1	80	3	240	
	6	Toilet & Shower	NA	~	65	1	65	**Shared by Seclusion rooms**
	7	Ante Room	NA	~	55	1	55	
	8	Consultation / Visitor	NA	~	120	3	360	2 should be joinable
	9	Quiet / Visitor Room	NA	~	100	1	100	
	10	Tub Room	NA	~	120	1	120	
	11	Grooming Room - Men	NA	~	120	1	120	
	12	Grooming Room - Women	NA	~	120	1	120	
	13	Social Space - Quiet Activities	NA	12	40	1	480	Multi-Use for Group Therapy and Dining. Can be joined with the other social space.
	14	Social Space - Noisy Activities	NA	12	40	1	480	Multi-Use for Group Therapy and Dining. Can be joined with the other social space.
	15	Group Therapy	NA	~	225	1	225	
	16	Patient Restroom - Women	NA	~	55	1	55	
	17	Patient Restroom - Men	NA	~	55	1	55	
	18	Patient Laundry	NA	~	130	1	130	
	19	Patient Belonging Storage	NA	22	7	1	154	
	20	Extra Storage	NA	2	15	1	30	
	21	Equipment Storage	NA	~	160	1	160	
	22	Clean Linen	NA	~	100	1	100	
	23	Soiled Utility	NA	~	80	1	80	
	24	Nurse Station	NA	8	30	1	240	**Centrally located with clear sightlines to all areas accessible by patients**
	25	Medication Room	NA	~	100	1	100	Visible from nursing station
	26	Treatment Room	NA	~	120	1	120	
	27	MD Charting Room	NA	3	30	1	90	

3.3 SPACE PROGRAM: TYPICAL 24-BED PATIENT CARE UNITS [1][2]

Black text: Indicates information that is identical to the 2005 Master Plan Space Program.

Bold red text: Indicates information that was revised or added during the 2015 Master Plan Update process.

Dept.		Space Name	Existing Total NSF	Proposed Occ.	Proposed NSF	Proposed No.	Proposed Total NSF	Remarks
Day Wing	28	Conference/Treatment Planning[3]	NA	15	20	1	300	**Locate with Office Wing functions**
	29	Emergency Equipment	NA	~	20	1	20	
	30	Nourishment / Kitchen	NA	~	220	1	220	
	31	Entry Vestibule	NA	~	75	1	75	**Sallyport**
	32	Telephone Booth	NA	~	10	2	20	
Office Wing	33	Office - Psychiatrist[3]	NA	~	120	2	240	
	34	Office - Psychologist[3]	NA	~	100	2	200	
	35	Office - Social Worker[3]	NA	~	100	2	200	
	36	Office - Head Nurse[3]	NA	~	120	1	120	
	37	Office - Other Clinical[3]	NA	~	100	2	200	
	38	Staff Lounge[3]	NA	10	25	1	250	
	39	Staff Toilet / Shower / Lockers[3]	NA	10	22	2	440	30 Male, 30 Female (3-Tier configuration)
Shared	40	Housekeeping Closet	NA	~	30	1	30	
Exterior	41	Covered Lanai	NA	~	**TBD**	**2**		1 Smoking, 1 Non-Smoking
	42	Covered Loading Stall	NA	~				**Not required at typical patient units**
	43	Outdoor Recreation	NA	~	**TBD**	**1**		**Provide controlled access to secure outdoor recreation areas.**

Total Net SF (NSF) per Typical 24-Bed Patient Care Unit **9,479**

Estimated Total Gross SF for (1) Typical Patient Care Unit = 1.8 x Total NSF **17,062**

Total NSF for 4 Typical Patient Care Units **37,916**

Estimated Total Gross SF for (4) Typical Patient Care Units = 1.67 x Total NSF **68,249**

Footnotes:

1. **The New Patient Care Facility will have (4) 24-bed Typical Patient Care Units.**
2. **One of the four Typical Patient Care Units will be modified to care for patients with medical issues. The program specific modifications required to provide medical services will need to be determined in the detailed planning phase.**
3. **Co-locate these functions in an area that has controlled access (i.e. an "offstage"area not available to patients)**

3.4 SPACE PROGRAM: 24-BED ADMISSIONS PATIENT CARE UNIT [1]

Black text: Indicates information that is identical to the 2005 Master Plan Space Program.
Bold red text: Indicates information that was revised or added during the 2015 Master Plan Update process.

Dept.		Space Name	Existing	Proposed				Remarks
			Total NSF	Occ.	NSF	No.	Total NSF	
Dorm Wing	1	Patient Bedroom	NA	~	110	**22**	2,420	**Increased from 14 rooms to 22**
	2	Toilet & Shower - Shared	NA	~	65	**11**	715	Shared - 1 per 2 patient rooms
	3	Isolation Patient Room	NA	~	110	2	220	
	4	Isolation Toilet & Shower	NA	~	65	2	130	
Day Wing	5	Seclusion Room	NA	~	80	3	240	
	6	Toilet & Shower	NA	~	65	1	65	**Shared by Seclusion Rooms**
	7	Ante Room	NA	~	55	1	55	
	8	Triage Room	NA	~	110	3	330	
	9	Toilet & Shower	NA	~	65	1	65	**Shared by Triage rooms**
	10	Ante Room	NA	~	75	1	75	
	11	Classroom	NA	~	350	1	350	
	12	Classroom / OT Office	NA	~	350	1	350	
	13	Classroom / RT Office	NA	~	350	1	350	
	14	Classroom / Interview	NA	~	200	2	400	
	15	Consultation / Visitor	NA	~	120	2	240	2 should be joinable.
	16	Quiet / Visitor Room	NA	~	100	1	100	
	17	Tub Room	NA	~	120	1	120	
	18	Grooming Room - Men	NA	~	120	1	120	
	19	Grooming Room - Women	NA	~	120	1	120	
	20	Social Space - Quiet Activities	NA	8	40	1	320	Multi-Use for Group Therapy and Dining. Can be joined with the other social space.
	21	Social Space - Noisy Activities	NA	8	40	1	320	Multi-Use for Group Therapy and Dining. Can be joined with the other social space.
	22	Group Therapy	NA	~	225	1	225	
	23	Patient Restroom - Women	NA	~	55	1	55	
	24	Patient Restroom - Men	NA	~	55	1	55	
	25	Patient Laundry	NA	~	130	1	130	
	26	Patient Belonging	NA	14	7	1	98	
	27	Extra Storage	NA	2	15	1	30	
	28	Equipment Storage	NA	~	160	1	160	
	29	Clean Linen	NA	~	100	1	100	
	30	Soiled Utility	NA	~	80	1	80	
	31	Nurse Station	NA	8	30	1	240	**Centrally located with clear sightlines to all areas accessible to patients**
	32	Medication Room	NA	~	100	1	100	Visible from nursing station.
	33	Treatment Room	NA	~	120	1	120	
	34	MD Charting Room	NA	3	30	1	90	

3.4 SPACE PROGRAM: 24-BED ADMISSIONS PATIENT CARE UNIT [1]

Black text: Indicates information that is identical to the 2005 Master Plan Space Program.
Bold red text: Indicates information that was revised or added during the 2015 Master Plan Update process.

Dept.		Space Name	Existing Total NSF	Proposed Occ.	Proposed NSF	Proposed No.	Proposed Total NSF	Remarks
Day Wing	35	Conference/Treatment Planning[2]	NA	15	20	1	300	**Locate with Office Wing functions**
	36	Emergency Equipment	NA	~	20	1	20	
	37	Nourishment / Kitchen	NA	~	150	1	150	Stove / oven located in staff lounge
	38	Entry Vestibule	NA	~	75	1	75	**Sallyport**
	39	Telephone Booth	NA	~	10	2	20	
Office Wing	40	Office - Psychiatrist[2]	NA	~	120	2	240	
	41	Office - Psychologist[2]	NA	~	100	2	200	
	42	Office - Social Worker[2]	NA	~	100	2	200	
	43	Office - Head Nurse[2]	NA	~	120	1	120	
	44	Office - Substance	NA	2	70	1	140	
	45	Office - Steno Clerk[2]	NA	~	100	1	100	
	46	Copy / Fax / Mail Room[2]	NA	~	120	1	120	
	47	Staff Lounge[2]	NA	10	20	1	200	
	48	Staff Toilet / Shower / Lockers[2]	NA	12	22	2	528	30 Male, 30 Female (3-Tier configuration)
Shared	49	Housekeeping Closet	NA	~	30	1	30	
Exterior	50	Covered Lanai	NA	~	**TBD**	**2**		1 Smoking, 1 Non-Smoking
	51	Covered Loading Stall	NA	~	**TBD**	1	0	**Required for Admissions Unit**
	52	Outdoor Recreation	NA	~	**TBD**	**1**		**Provide controlled access to a secure outdoor recreation area for use only by Admissions Unit patients**

Total Net SF (NSF) **11,031**
Total Estimated Gross SF = 1.8 x Total NSF **19,856**

Footnotes:

1. **The New Patient Care Facility will have one 24-bed Admissions Patient Care Unit. The 2005 Master Plan included a 16-bed Admissions unit.**
2. **Co-locate these functions in an area that has controlled access (i.e. an "offstage" area not available to patients)**

3.5 SPACE PROGRAM: HIGH-RISK 24-BED PATIENT CARE UNIT [(1)(2)]

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Dept.		Space Name	Existing Total NSF	Proposed Occ.	Proposed NSF	Proposed No.	Proposed Total NSF	Remarks
Dorm Wing	1	Patient Bedroom	NA	1	110	22	2,420	
	2	Toilet & Shower	NA	~	65	**22**	**1,430**	**Not Shared**
	3	Isolation Patient Room	NA	1	110	2	220	
	4	Isolation Toilet & Shower	NA	~	65	2	130	
Day Wing	5	Seclusion Room	NA	1	80	3	240	
	6	Toilet & Shower	NA	~	65	1	65	**Shared by Seclusion rooms**
	7	Ante Room	NA	~	55	1	55	
	8	Consultation / Visitor	NA	~	120	3	360	2 should be joinable
	9	Quiet / Visitor Room	NA	~	100	1	100	
	10	Tub Room	NA	~	120	1	120	
	11	Grooming Room - Men	NA	~	120	1	120	
	12	Grooming Room - Women	NA	~	120	1	120	
	13	Social Space - Quiet Activities	NA	12	40	1	480	Multi-Use for Group Therapy and Dining. Can be joined with the other social space.
	14	Social Space - Noisy Activities	NA	12	40	1	480	Multi-Use for Group Therapy and Dining. Can be joined with the other social space.
	15	Group Therapy	NA	~	225	1	225	
	16	Patient Restroom - Women	NA	~	55	1	55	
	17	Patient Restroom - Men	NA	~	55	1	55	
	18	Patient Laundry	NA	~	130	1	130	
	19	Patient Belonging	NA	22	7	1	154	
	20	Extra Storage	NA	2	15	1	30	
	21	Equipment Storage	NA	~	160	1	160	
	22	Clean Linen	NA	~	100	1	100	
	23	Soiled Utility	NA	~	80	1	80	
	24	Nurse Station	NA	8	30	1	240	**Centrally located with clear sightlines to all areas accessible by patients**
	25	Medication Room	NA	~	100	1	100	Visible from nursing station
	26	Treatment Room	NA	~	120	1	120	
	27	MD Charting Room	NA	3	30	1	90	
	28	Conference/Treatment Planning[(3)]	NA	15	20	1	300	**Locate with Office Wing functions**
	29	Emergency Equipment	NA	~	20	1	20	
	30	Nourishment / Kitchen	NA	~	220	1	220	
	31	Entry Vestibule	NA	~	75	1	75	**Sallyport**
	32	Telephone Booth	NA	~	10	2	20	

3.5 SPACE PROGRAM: HIGH-RISK 24-BED PATIENT CARE UNIT [1][2]

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Dept.		Space Name	Existing Total NSF	Proposed Occ.	Proposed NSF	Proposed No.	Proposed Total NSF	Remarks
Office Wing	33	Office - Psychiatrist[3]	NA	~	120	2	240	
	34	Office - Psychologist[3]	NA	~	100	2	200	
	35	Office - Social Worker[3]	NA	~	100	2	200	
	36	Office - Head Nurse[3]	NA	~	120	1	120	
	37	Office - Other Clinical[3]	NA	~	100	2	200	
	38	Staff Lounge[3]	NA	10	25	1	250	
	39	Staff Toilet / Shower / Lockers[3]	NA	10	22	2	440	30 Male, 30 Female (3-Tier configuration)
Shared	40	Housekeeping Closet	NA	~	30	1	30	
Exterior	41	Covered Lanai	NA	~	**TBD**	**2**		1 Smoking, 1 Non-Smoking
	42	Covered Loading Stall	NA	~				**Not required**
	43	Outdoor Recreation	NA	~	**TBD**	**1**		**Provide controlled access to a secure outdoor recreation area for use only by patients on the High-Risk Unit**

Total Net SF (NSF) per Typical 24-Bed Patient Care Unit 10,194

Estimated Total Gross SF = 1.8 x Total NSF 18,349

Footnotes:

1. **The New Goddard Patient Care Facility will have one 24-bed High-Risk Patient Care Unit. High-Risk patients will not use the Rehab Mall.**
2. **Program similar to a Typical 24-bed Patient Care Unit, except each Patient Bedroom has its own Toilet / Shower. Additional program modifications may be required - this should be addressed during the detailed planning phase.**
3. **Co-locate these functions in an area that has controlled access (i.e. an "offstage"area not available to patients)**

3.6 SPACE PROGRAM: REHAB MALL[1]

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Dept.		Space Name	Existing[2]	Proposed				Remarks
			Total NSF	Occ.	NSF	No.	Total NSF	
Operations Center	1	Office	228	1	120	**1**	**120**	**Reduced from 2 offices.** Overlooking Mall area.
	2	Open Work Stations	283	**3**	60	1	**180**	**Reduced from 5 workstations.** Overlooking Mall area.
	3	Copy Room	170	1	100	1	100	
Rehab Therapy	4	Chart Work Area	NA	**12**	15	1	**180**	**Reduced from 15 occupants. Two** conference tables for **10 -12** visiting staff.
	5	Chart Work Room	NA	**6**	40	1	**240**	Chart space for each 24-bed nursing unit **(six total).**
	6	Classroom[3]	NA	**24**	**480**	**4**	**1,920**	**One classroom per 24-bed nursing unit. Excludes Intake Unit (has dedicated Rehab Mall) and High-Risk Unit (patients don't go to Rehab Mall). See Footnote 3.**
	7	Classroom	NA	~	300	**0**	**0**	**Delete from Phase 1. Additional Classrooms will be provided in Phase 2.**
	8	Interview / Treatment Planning	378	~	100	**3**	**300**	**Reduced from 4 rooms**
	9	Restraint Bays	218	**2**	80	1	**160**	**Reduced from 3 bays to 2 bays.** One room w/ solid partitions forming bays.
	10	Restraint Ante Room	71	~	80	1	80	With small storage closet for equipment.
	11	Quiet Room / Interview	75	~	100	1	100	
	12	Timeout Room	130	~	100	1	100	Single violent patient, provide vision panels.
	13	Refusal Room	228	~	120	**1**	**120**	**Reduced from 2 rooms to 1 room.** Multiple non-violent patients, provide vision panels.
	14	Med Room	105	~	120	1	120	
	15	Sick Bay	150	**2**	80	1	**160**	**Reduced from 3 bays to 2 bays.** One room w/ solid partitions forming bays.
	16	Sick Call Exam Room	127	~	**120**	1	**120**	**Reduced from 140 NSF**

3.6 SPACE PROGRAM: REHAB MALL[1]

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Dept.		Space Name	Existing[2] Total NSF	Proposed Occ.	Proposed NSF	Proposed No.	Proposed Total NSF	Remarks
Occupational Therapy	17	Office - Director	149	1	**120**	1	**120**	**Reduced from 150 NSF**
	18	Office - Secretary	136	2	60	1	120	Shared
	19	Office - Music Therapist	130	~	200	1	200	Adjacent to Auditorium. Includes ~~**some**~~ **instrument** storage.
	20	Office - Occupational Therapists	561	2	60	**2**	**240**	**Reduced from 4 offices.** Shared.
	21	Conference / Lounge	242	~	**150**	1	**150**	**Reduced from 240 NSF**
	22	Auditorium	1,344	140	10	1	1,400	Sub-dividable **(may be difficult to sub-divide an auditorium with a stage)**
	23	Stage (in Auditorium)	546	~	**500**	1	**500**	**Reduced from 550 NSF**
	24	Storage	475	~	100	**3**	**300**	**Reduced from 5 rooms to 3 rooms**
	25	Greenhouse	NA	~	**400**	1	**400**	**Reduced from 450 NSF**
	26	Auto Detailing Garage	NA	~	**600**	1	**600**	**Reduce from 4 stalls to 2 stalls - can add more stalls in Phase 2. Includes office.**
	27	Storage	NA	~	100	1	100	**Storage for Garage and Greenhouse**
	28	Grounds Care Shop	2,000	~	**800**	1	**800**	**Reduced from 1,100 NSF. Includes office.**
	29	Patient Incentive Program Store	342	~	**250**	1	**250**	**Reduced from 400 NSF**
	30	Storage	128	~	100	1	100	
	31	Office	158	**1**	60	1	**60**	**Reduced to one office staff**
	32	Print Shop	226	~	**180**	1	**180**	**Reduced from 240. Capacity = 8-10 patients**
	33	Sheltered Workshop	730	~	**450**	1	**450**	**Capacity = 20-25 persons. Reduced from 730 NSF.**
	34	Patient Computer Lab	236	~	**160**	1	**160**	**Reduced from 240. Capacity = 8-10 patients.**
	35	Patient Library	362	~	**250**	1	**250**	**Reduced from 350 NSF.** At perimeter, accessible after Mall hours.
	36	Internet Café	168	~	**125**	1	**125**	**Reduced from 170 NSF.** At perimeter, accessible after Mall hours.
	37	Classroom - Laundromat	249	~	350	**0**	**0**	**Deleted: Every Patient Unit has a dedicated Laundromat.**

3.6 SPACE PROGRAM: REHAB MALL[1]

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Dept.		Space Name	Existing[2] Total NSF	Proposed Occ.	Proposed NSF	Proposed No.	Proposed Total NSF	Remarks
Occupational Therapy	38	Classroom - Adult Literacy[3]	470	~	**300**	1	**300**	**Capacity = 15-20 patients. See Footnote 3.**
	39	Adult Literacy Resource Room	153	~	**100**	1	**100**	**Reduced from 150 NSF**
	40	Adult Literacy Offices	294	2	60	**1**	**120**	**Reduced from 2 offices to 1 office.**
	41	Classroom - Kitchen	205	~	**150**	1	**150**	**Reduced from 300 NSF. Capacity = 5 patients plus staff. Adjacent to Dining CR.**
	42	Classroom - Dining	254	~	**120**	1	**120**	**Capacity = 8 persons (5 patients, 3 staff). Adjacent to Kitchen CR.**
	43	Classroom - Art	509	~	500	1	500	
	44	Kiln	99	~	100	1	100	**Adjacent to Art Classroom**
	45	Classroom - Various Programs[3]	615	~	**400**	1	**400**	**Reduced from 615 NSF. Capacity = 20-25 patients. See Footnote 3.**
Recreational Therapy	46	Office - Director	131	~	**120**	1	**120**	**Reduced from 150 NSF**
	47	Office - Recreational Therapists	700	2	60	**3**	**360**	**Reduced from 5 offices to 3 offices**
	48	**RT** Staff Shower **- Female**	25	~	65	1	65	**Combine female RT staff toilet, shower and lockers in one room. Locate adjacent to gymnasium.**
	49	**RT** Staff Toilet **- Female**	66	~	**60**	1	**60**	
	50	**RT** Staff Lockers **- Female**	144	~	100	**1**	100	
	51	**RT Staff Shower - Male**	NA	~	**65**	**1**	**65**	**Combine male RT staff toilet, shower and lockers in one room. Locate adjacent to gymnasium.**
	52	**RT Staff Toilet - Male**	NA	~	**60**	**1**	**60**	
	53	**RT Staff Lockers - Male**	NA	~	**100**	**1**	**100**	
	54	Large Gymnasium	7,196	~	6,000	1	6,000	**Sized for 50' x 90' basketball court**
	55	Small Gymnasium	NA	~	3,200	**0**	**0**	**Defer to later phase.** Adjacent to large
	56	Weight Room	304	~	**200**	1	**200**	**Reduced from 300 NSF.** Adjacent to gyms.
	57	RT Clinic	559	~	0		0	
	58	**RT Equipment** Storage	115	~	**125**	1	**125**	**Reduced from 200 NSF**
Dining	59	**Dining Room**	NA	**120**	**15**	**1**	**1,800**	**Capacity = 96 patients plus 24 staff**
	60	**Serving Kitchen**	NA	~	**500**	**1**	**500**	**Food will be prepared in the existing Kitchen**

3.6 SPACE PROGRAM: REHAB MALL[1]

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Dept.		Space Name	Existing[2]	Proposed				Remarks
			Total NSF	Occ.	NSF	No.	Total NSF	
Legal	61	**Video Courtroom**	NA	**25**	**500**	**1**	**500**	**Finishes, furniture and equipment similar to a typical small courtroom**
Patient Restrooms	62	**Female Patient Restroom**	NA	**48**	**215**	**1**	**215**	**Centrally located restroom for all female patients. Provide fixture count per UPC for 48 females (1/2 of 96 max. patients in Phase 1 Rehab Mall)**
	63	**Male Patient Restroom**	NA	**48**	**215**	**1**	**215**	**Centrally located restoom for all male patients. Provide fixture count per UPC for 48 males (1/2 of 96 max. patients in Phase 1 Rehab Mall)**
Staff Restrooms	64	**Female Rehab Therapy and OT Staff Restroom**	NA	**24**	**160**	**1**	**160**	**Centrally located restroom for female staff (except Recreational Therapy). Provide fixture count per UPC for 24 female staff.**
	65	**Male Rehab Therapy and OT Staff Restroom**	NA	**24**	**160**	**1**	**160**	**Centrally located restroom for male staff (except Recreational Therapy). Provide fixture count per UPC for 24 male staff.**
Shared	66	**Housekeeping Closet**	NA	**~**	**60**	**1**	**60**	**Centrally located**

Total 22,184 **Total Net SF (NSF)** **23,160**

Estimated Total GSF = 1.8 x Total NSF **41,688**

Footnotes:

1. **This Rehab Mall will <u>only</u> serve the patients in the new 144-bed Patient Care Facility.**
2. The existing Rehab Mall functions are located in Buildings A, B, C, K, Cooke, and the Garden. **After the New Goddard Patient Care Facility is completed the existing Rehab Mall functions will continue to serve the lower risk patients that will be housed in Buildings E, F, H, and I.**
3. **Ideally all general purpose classrooms (shaded gray) should be co-located to facilitate sharing by Rehab Therapy, Occupational Therapy, and Recreational Therapy.**

4.0 NEW 144- BED GODDARD PATIENT CARE FACILITY- CONCEPTUAL DESIGN

4.0 NEW GODDARD PATIENT CARE FACILITY – CONCEPTUAL DESIGN

4.1 Introduction

The conceptual design of the 144-Bed Goddard Patient Care Facility is based on The Colorado Mental Health Institute in Pueblo, Colorado. Its unique architectural form promotes intensive treatment, patient privacy, and high security. The new facility includes six, 24-bed Patient Care Units and a dedicated Rehab Mall. Each patient has three wings – each with eight private bedrooms and a shared shower room. With the exception of the Hardened Patient Care Unit (see 4.4), two patient bedrooms share a toilet room. Each patient care unit includes three seclusion rooms, located within a secure, separate area. Each patient care unit also includes areas for socialization, consultation, and treatment. A nourishment kitchen and patient laundry are provided on each unit. The patient unit configuration promotes safety by providing direct, line of sight observation of each corridor from a centralized nurse station. Rooms that are not visible from the nurse station, such as staff support services, are located in controlled access, "off stage" areas. Most rooms will also be video monitored.

The Preliminary Parking Study (Appendix 5.3) estimates that 272 additional parking spaces will be needed on the Hospital campus to support the 144-Bed Goddard Patient Care Facility. Approximately 98 of the additional spaces are located adjacent to the new facility (see Site Plan, P. 4-4). Potential locations for the remaining 174 spaces are indicated on the Planning Zones drawing (see P. 2-15).

4.2 Site Plan

The Site Plan (see P. 4-4) shows that the new Goddard Patient Care Facility will be strategically located within the footprint of the existing Goddard building. This location for the new facility allows Guensberg to remain operational during construction. The road that loops around the existing Goddard building will be re-constructed. Patients and visitors will enter the First Floor through a sally port located on the Mauka side of the facility. The service entrance and loading dock are located on the Ground Floor on the Makai side of the facility. Approximately 98 parking spaces are located adjacent to the new facility. A pedestrian bridge and stair/elevator tower will link the new Goddard Patient Care facility to the central campus, which is approximately 25' lower in elevation..

4.0 NEW GODDARD PATIENT CARE FACILITY – CONCEPTUAL DESIGN

4.3 Ground Floor Plan

The Rehab Mall on the Ground Floor (see P. 4-5) provides spaces for Rehabilitation Therapy, Occupational Therapy, and Recreational Therapy. A centrally-located Operations Center will oversee and control patient activities on the Ground Floor. Patients will typically spend a good part of each day on this floor so a Dining Room is also provided. Courtyards and a recreational yard provide opportunities for outdoor activities, and bring daylight into interior areas.

A secure perimeter will separate the facility support functions (loading dock, materials management, storage, central plant) on the northwest side of the Ground Floor from the Rehab Mall.

4.4 First Floor Plan

The First Floor of the new Goddard Patient Care Facility (see P. 4-6) includes the main patient and visitor entrance. A bank of elevators and a stair adjacent to the main entrance facilitates connections to the Ground Floor below, and the Second, and Third Floors above. The First Floor includes two patient care units:

- Most patients will be admitted to the 24-Bed Admissions Patient Care Unit, and will stay there during their initial evaluation period. The Acute Rehab Mall located in the center of the First Floor will be used by the patients on this unit. Except for the addition of the Acute Rehab Mall, the design of this unit is similar to a 24-Bed Typical Patient Care Unit.
- The other unit on the First Floor is a 24-Bed Hardened Patient Care Unit. This unit was added during the *2015 Master Plan Update* process and is intended to house patients who present an extremely high-risk of adverse behavior. The patient rooms in this unit will not share a toilet room – each room will have its own toilet, lavatory, and shower.

Portions of the Ground Floor roof that extend beyond the perimeter of the First Floor create private, secure outdoor recreational yards.

4.0 NEW GODDARD PATIENT CARE FACILITY – CONCEPTUAL DESIGN

4.5 Second Floor Plan

The Second Floor (see P. 4-7) includes two, 24-Bed Typical Patient Care Units. One of the units will be modified to provide care for patients with medical issues. The details of those modifications (medical gases, medical equipment, etc.) will be determined during the future design phases. However, it is important to note that the design of the "medical" patient care unit should be as close as possible to the design of a typical patient care unit. This approach will allow the medical unit to be used by other patients when the census of sick patients is low.

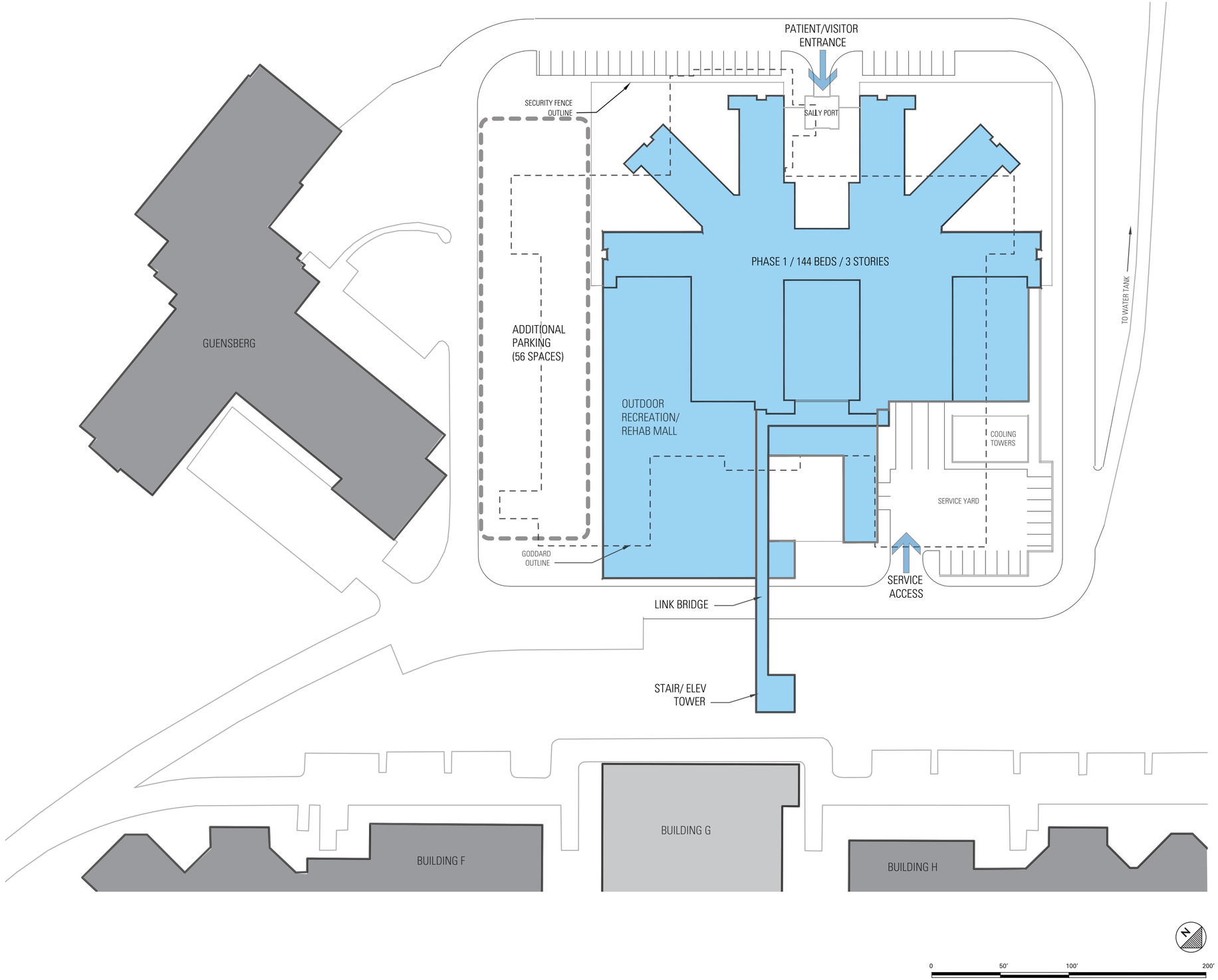
4.6 Third Floor Plan

The Third Floor (see P. 4-8) includes two, 24-Bed Typical Patient Care Units.

4.7 Building Section

The Building Section (see P. 4-9) illustrates how the design of the new Goddard Patient Care Facility adapts to the existing topographic conditions. The four-story structure is built into the sloping site in order to reduce its apparent height and volume. Because of the elevation change the Makai side of the Ground Floor is mostly above grade, giving it access to natural daylight. The Building Section also illustrates the pedestrian bridge and elevators that are required because of the elevation difference (25' +/-) between the upper campus and the central campus.

Three floors of patient care units are required in order to get the desired capacity (144 beds) on the Goddard site. This results in a building that exceeds the 25' AG-2 zoning height limit. This issue will need to be addressed during the future Plan Review Use (PRU) Permit process.



SITE PLAN - NEW GODDARD PATIENT CARE FACILITY

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GROUND FLOOR PLAN - NEW GODDARD PATIENT CARE FACILTY

59,600 GSF

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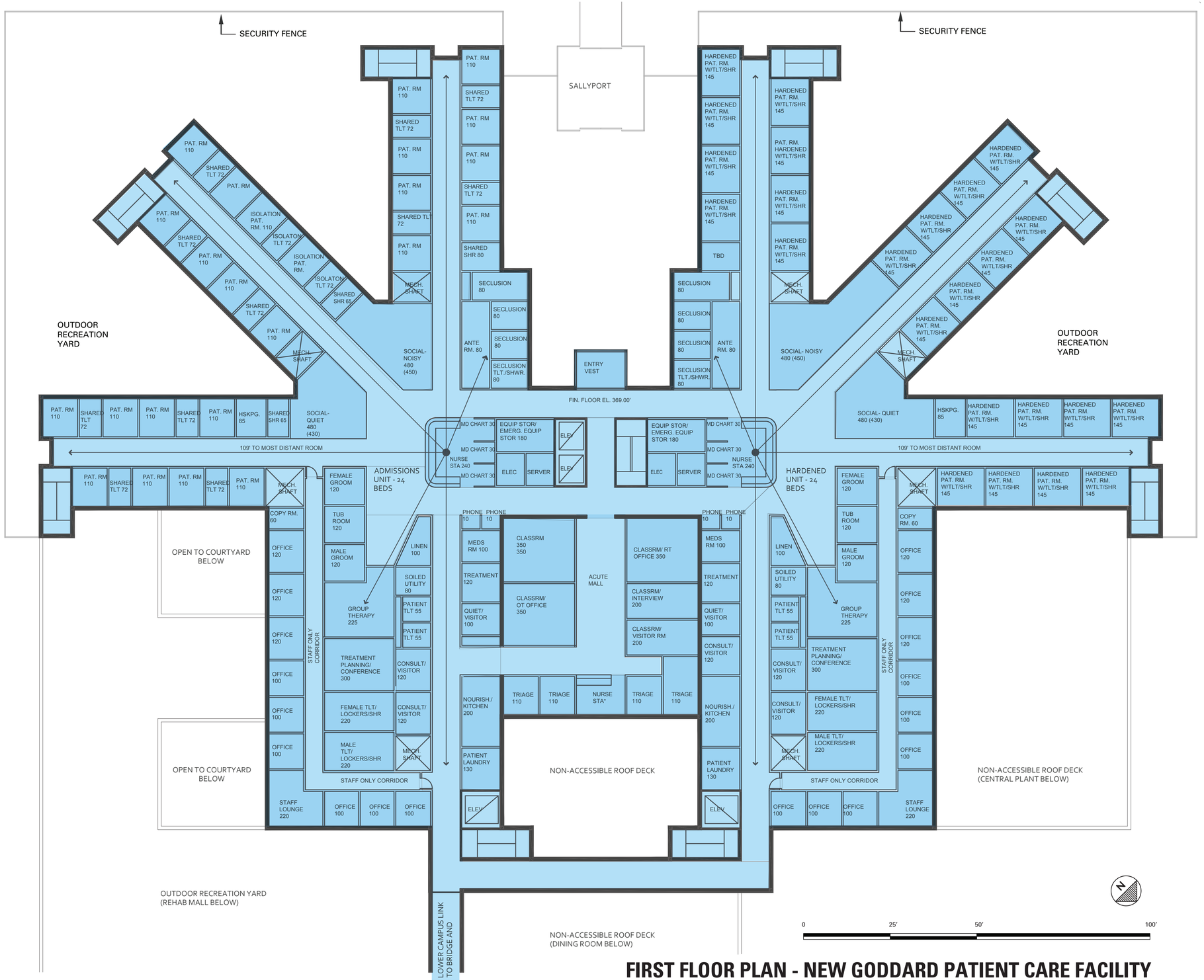

FIRST FLOOR PLAN - NEW GODDARD PATIENT CARE FACILITY

41,770 GSF

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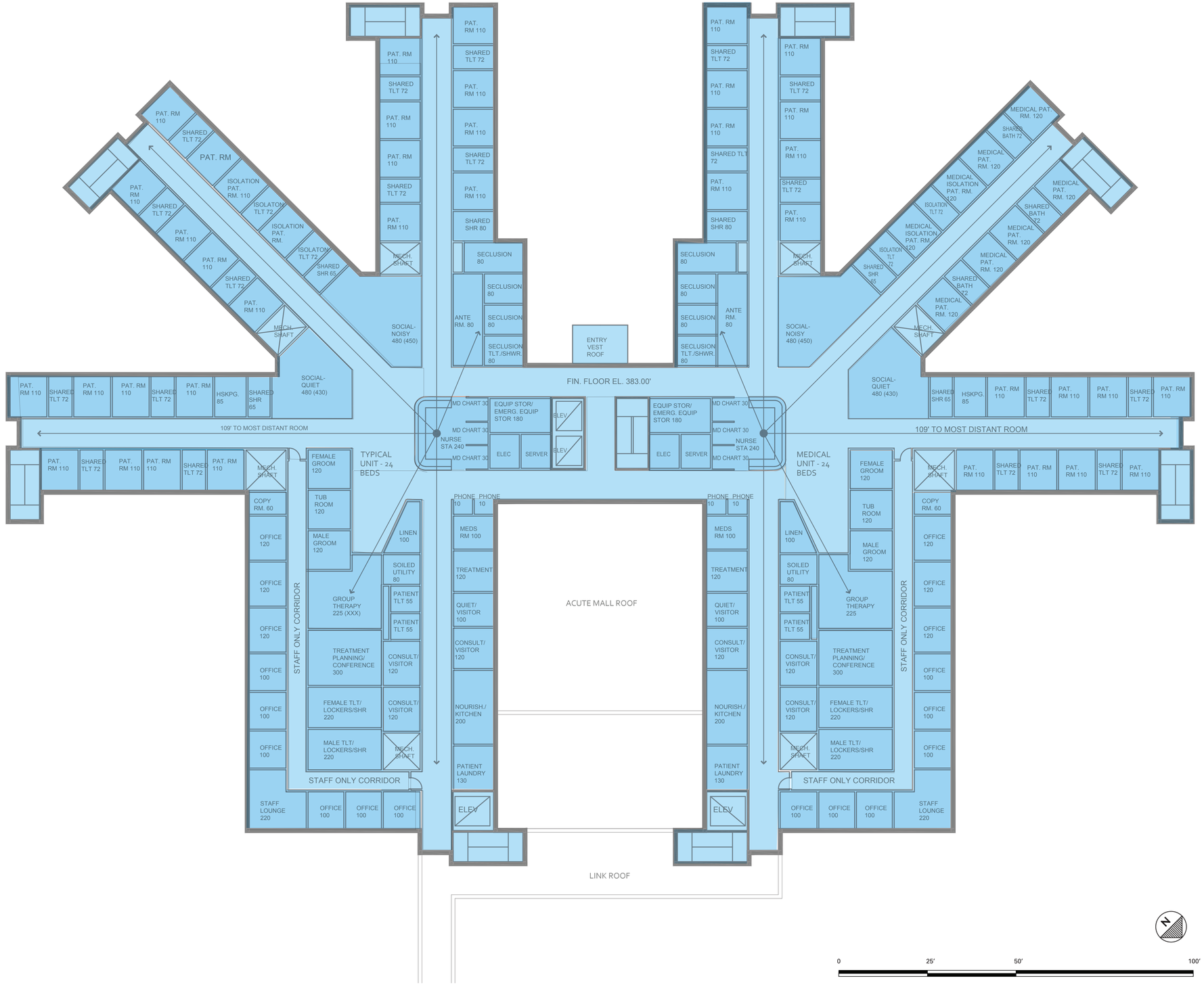

SECOND FLOOR PLAN - NEW GODDARD PATIENT CARE FACILITY

37,400 GSF

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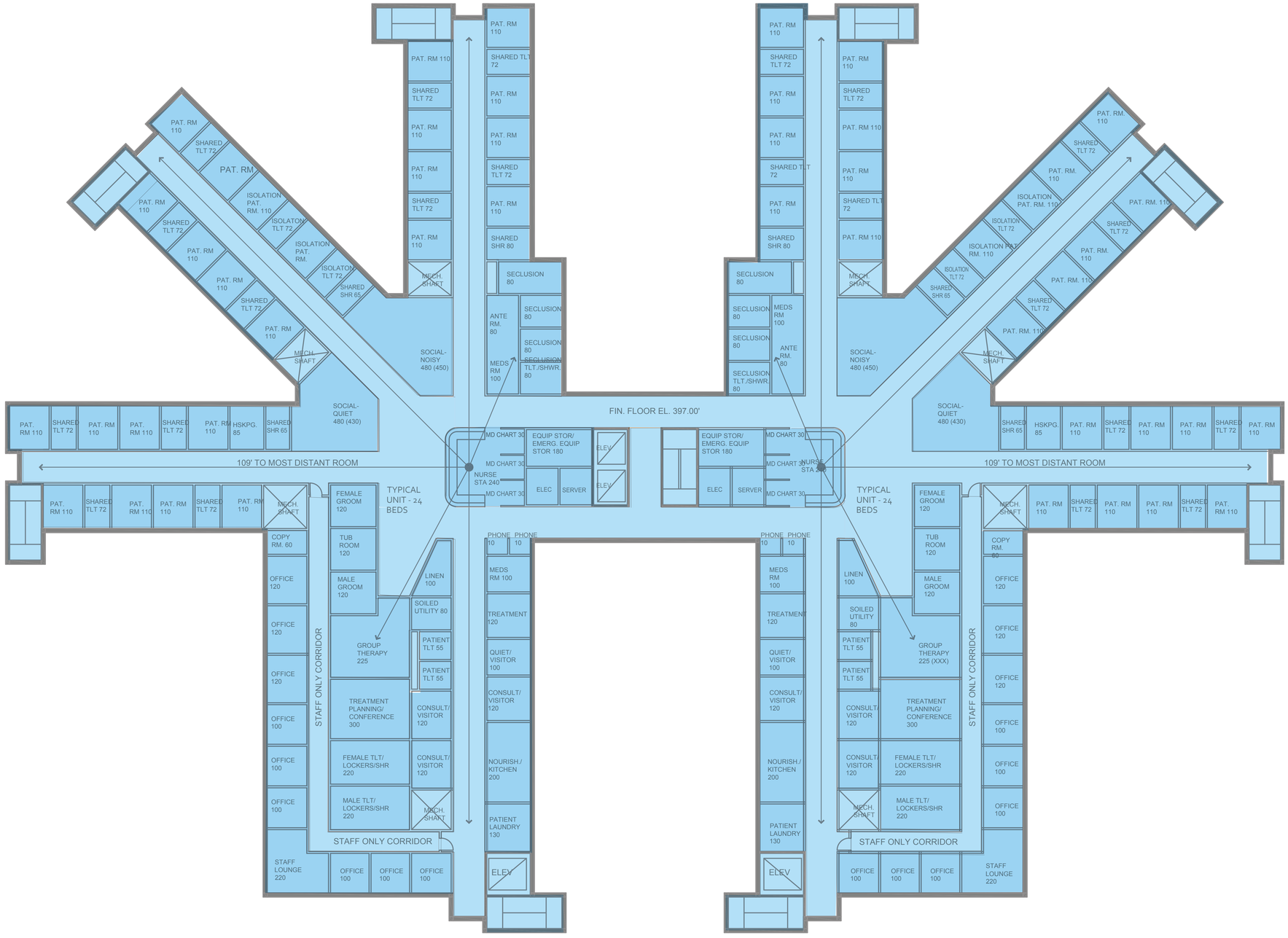

THIRD FLOOR PLAN - NEW GODDARD PATIENT CARE FACILITY

37,400 GSF

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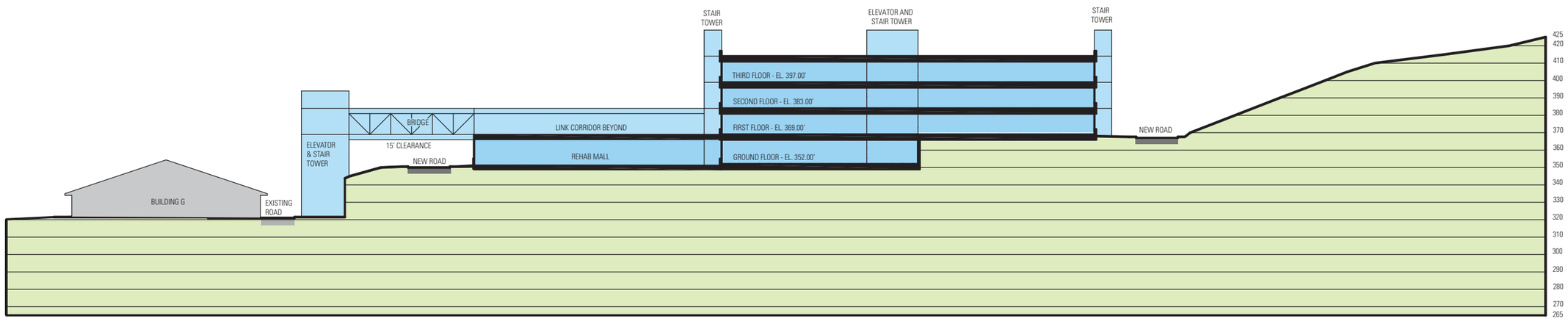
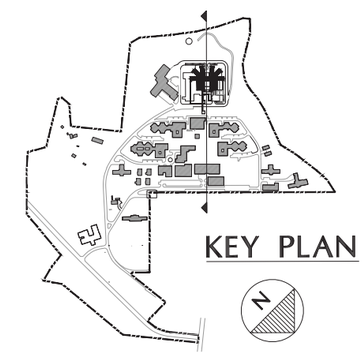
HAWAII STATE HOSPITAL | 2015 MASTER PLAN UPDATE

AUGUST 28, 2015 | DAGS JOB NO. 12-20-2698





BUILDING SECTION - NEW GODDARD PATIENT CARE FACILITY

HAWAI'I STATE HOSPITAL

ARCHITECTS HAWAII LIMITED

HAWAII STATE HOSPITAL | 2015 MASTER PLAN UPDATE

AUGUST 28, 2015 | DAGS JOB NO. 12-20-2698

5.1 FOUNDATIONAL DOCUMENT

5.1 Foundational Document

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

September 17, 2014

Foundational Document used by DAGS in estimating hospital capacity requirements.

TO: The Honorable Dean H. Seki
Comptroller
Department of Accounting and General Services

FROM: Linda Rosen, M.D., M.P.H. Linda Rosen MD MPH
Director of Health

SUBJECT: Estimating Capacity Requirements for Hawaii State Hospital (HSH) Master Plan Activities

Please use the attached as foundational documents in estimating the capacity requirements for inpatient programs for the HSH Master Plan activities.

As we learn of other source materials, we will make these available to you.

If you have any questions, please call Mark A. Fridovich, Ph.D., M.P.A, Administrator, Adult Mental Health Division (AMHD) at 586-4770.

Thank you.

Attachment

Foundational Document used by DAGS in estimating hospital capacity requirements.

Why does Hawaii have to have a State Hospital?

There are two main reasons –
1. To provide for the inpatient clinical (mental health or psychiatric) treatment of individuals (adults and children) where there is no other willing provider (state functions as treatment provider of last resort). This is similar to the State's role with respect to HHSC.

2. To receive court ordered forensic commitments of individuals ordered into the custody of the Director of Health.

Although there is some degree of overlap of these two reasons, during Fiscal 2012 HSH received only forensic commitments; no civil admissions occurred.

The Director of Health has the authority to designate another place, via the contracting process, to receive and treat these patients. The DOH assessment is that there is little, if any, additional available inpatient capacity for purchase and there does not appear to be other providers willing to assume the clinical responsibility and liability for providing these services. Other suitable facilities would have to provide forensic services including access to courts, defense attorneys, forensic examiners, specialized programming to address the legal issues, and community reintegration opportunities, must be accredited and licensed, have the ability to integrate mental and physical health treatment, meet applicable forensic requirements (e.g. custody), and be able to deliver services consistent with state and federal law.

If Hawaii has to provide inpatient hospital services – What is the right number of beds?

There is a relationship between state operated or funded inpatient beds that is approximately inverse to the availability of community inpatient psychiatric beds. In other words, to the degree more inpatient and other levels of care are available in community placements, there is lower demand for state operated inpatient placements; when less community capacity is available, the demand for state placements increases. During the course of FY 2012, a number of individuals were committed to HSH who have acute medical or long term care needs; they were committed to HSH because there was no other available place to provide for their physical health or long term care in the community. The utilization of capacity at the HSH is diminished when there is availability and willingness of other inpatient and long term care settings to admit these individuals. In the absence of adequate community capacity, demand for state hospital beds is higher.

The question has been raised as to whether Hawaii has an adequate number of inpatient beds. The State Health Planning and Development Agency (SHPDA) reported (attachment 5) that Hawaii has 16 % fewer acute beds than the US average (2.3 per 1000 for Hawaii, compared to 2.7 per 1000 nationally). This report was completed before the bankruptcy and closure of Hawaii Medical Center in January 2012.

The question has also been raised as to whether Hawaii has an adequate number of long term care beds. According to a 2006 SHPDA report (attachment 5) Hawaii ranks 48th among the states in number of long term care beds. Both HSH and Healthcare Association of Hawaii (HAH) members report discharge delays due to lack of available bed for the placement of individuals in acute hospitals who require long term care; it is known that a number of admissions to HSH are related to the limited availability of long term care.

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Is there truly inadequate capacity at HSH? If it is crowded and over census, does that mean there are too few beds?

The observation that many people currently in HSH do not require an inpatient level of care doesn't necessarily mean that Hawaii has enough inpatient capacity. It is possible there is a number of potential patients who are not currently referred (for instance, because HSH does not take civil admits or civil transfers) who would be appropriate candidates for transfer if HSH had space available for civil patients who would be more effectively treated there than in community facilities.

What is the optimal size for the State Hospital for Psychiatric Services?

A number of authors have proposed benchmarks to be used in calculating the appropriate amount of public sector, inpatient psychiatric capacity needed for state operated hospitals. These benchmarks range from 14 (beds)/100,000 adult population to 50/100,000. Some benchmarks are empirical; for example, these represent the average of current capacity found across the United States. Some benchmarks make explicit assumptions about potentially offsetting factors (e.g. publicly financed inpatient treatment available in private, private not for profit, or community hospitals; numbers of individuals with severe mental illnesses in jails) and others do not. Drawing conclusions based upon these benchmarks without a clear understanding of the assumptions may lead to incorrect assessments of needed capacity. This report is primarily intended to describe a method for calculating the "optimal" size of the public sector provided inpatient capacity. The scope of the SAT is for Hawaii's adult population, although the methods may be useful in estimating the optimal size of public sector capacity needed for children and adolescents.

Definitions

Optimal size – the level above or below which some significant over utilization, underutilization, or other cost is incurred. The costs incurred could be calculated (cost difference between a hospital and community residential bed) or estimated (e.g. increased probability of a negative outcome associated with inability to hospitalize a person, quantifying risk).

Factors

Population factors (i.e., the higher number of adults at risk of admission, the higher the number of beds needed at the optimal level). This is relatively straightforward to measure.

Socioeconomic Status (SES) adjustment to population (i.e., a lower SES is correlated with an increased risk of having a Severe and Persistent Mental Illness (SPMI), and a higher risk of hospitalization).

There is no reason to believe that prevalence of Serious Mental Illness, or SPMI, is any different in Hawaii than in the rest of the US, after adjusting for SES. There is no reason to believe that the individuals who require hospitalization at HSH present with fundamentally different assessment or treatment challenges than in the rest of the US.

Availability of private sector, community based inpatient services (i.e., a greater availability of community inpatient services is associated with a reduced need for public sector inpatient services).

Availability of private sector, community based outpatient services (i.e., a greater availability of community outpatient services is associated with a reduced need for public sector inpatient capacity).

Foundational Document used by DAGS in estimating hospital capacity requirements.

While HSH and state funded adult inpatient utilization is at or over capacity, private sector and HHSC adult inpatient psychiatric utilization is underutilized relative to available capacity. It is possible, or even likely, that a disproportionate responsibility for inpatient services to adults has been shifted to the state operated facility.

Foundational Document used by DAGS in estimating hospital capacity requirements.

Forecasting Hawaii State Hospital bed capacity

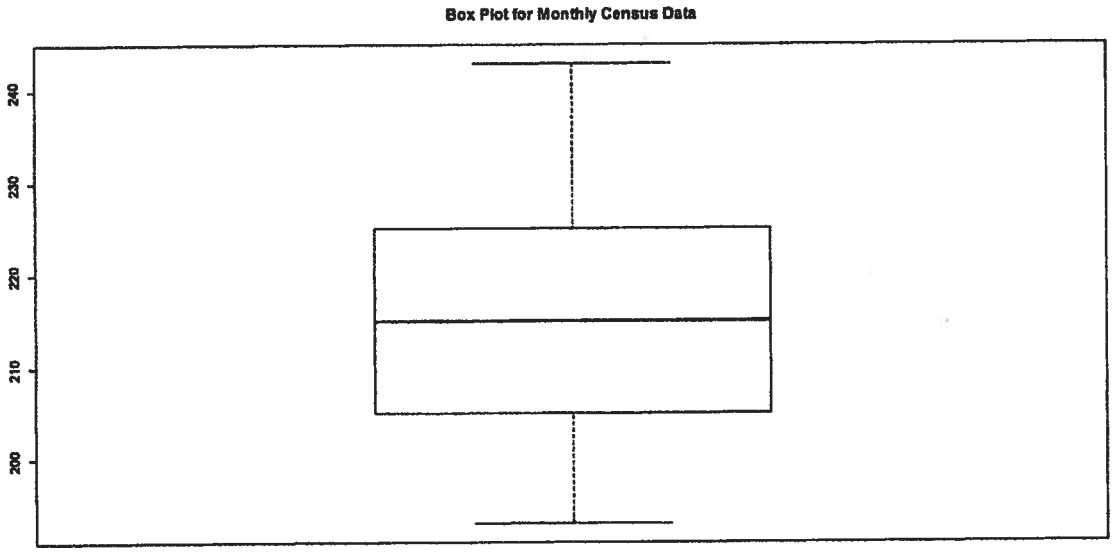
Partha Bolla
Utilization and Management Department
March 24, 2014

Introduction:

The data consist of monthly average census of patients from Hawaii State Hospital and Kahi-Mohala Behavioral Center. The final data available after formatting for analysis is from July 1, 2004 to January 1, 2014 for 115 months. For better understanding of the data, the results of the exploratory data analysis are presented below.

Table1: Descriptive Statistics Monthly Average Census	
Mean	215
Standard Error	1
Median	215
Mode	200
Standard Deviation	11.80
Range	50
Minimum	193
Maximum	243
Count	115

Figure 1:



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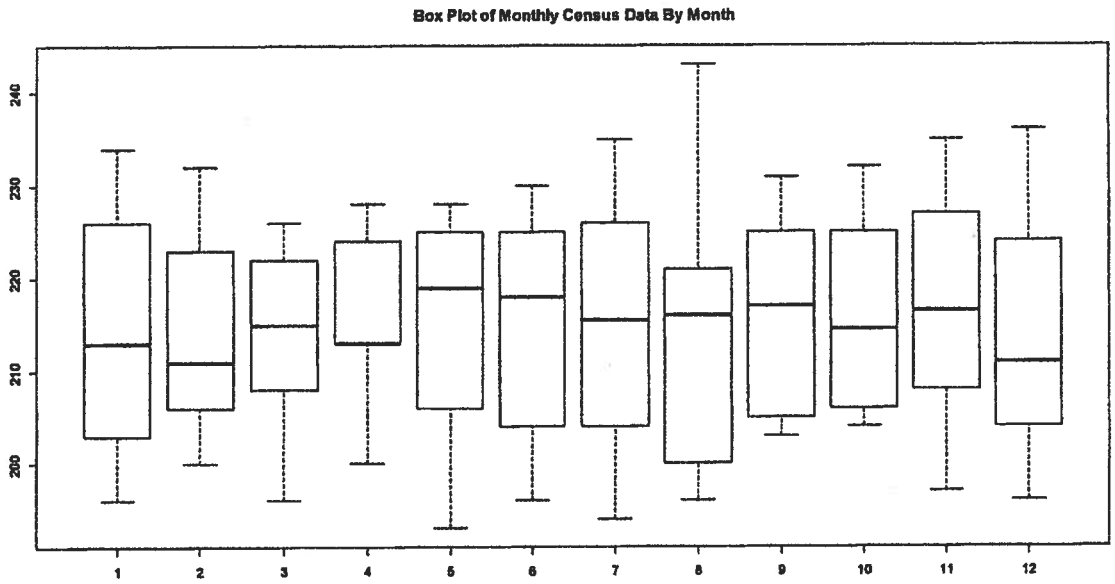
The presence of outliers can affect the estimate of the mean, trend or seasonality. From the Table1, The mean and median have same values, showing the symmetrical nature of the distribution. The values of standard Error, standard deviation, and range explain that the data have no any unusual values or outliers. Figure 1: Box Plot also did not show any outliers except the whisker on the top is slightly longer than the bottom one implying positive Skewness and this is not an issue and hence the data is set for analysis.

Figure 2:



The Box Plot in the Figure 2, comparing twelvemonths for average monthly census of patients, shows that there is significant variation within and between months in the data.

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Figure 3:

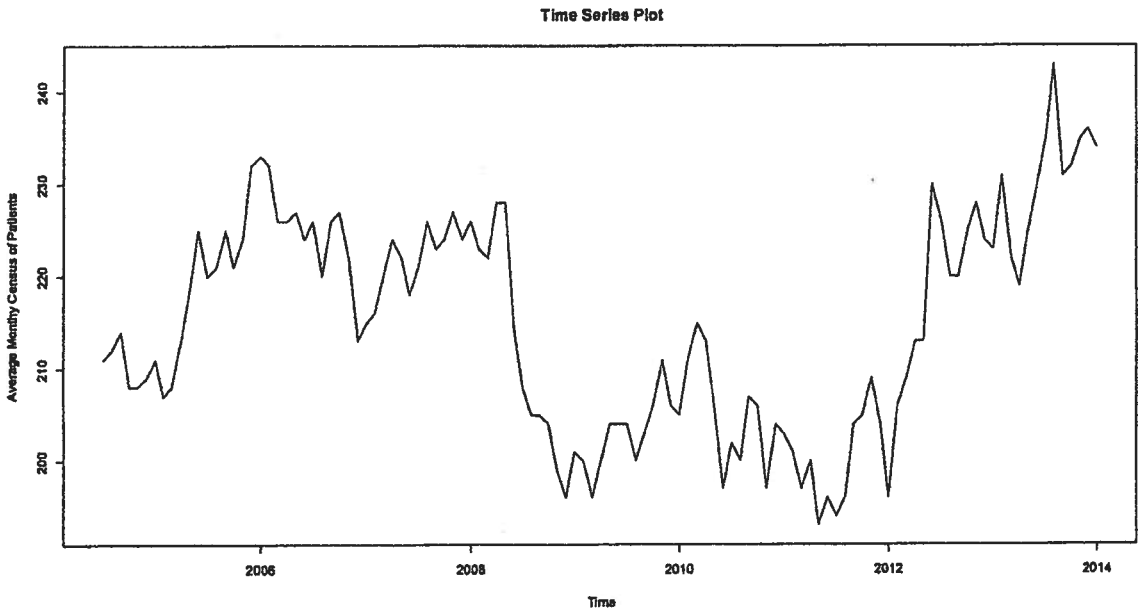
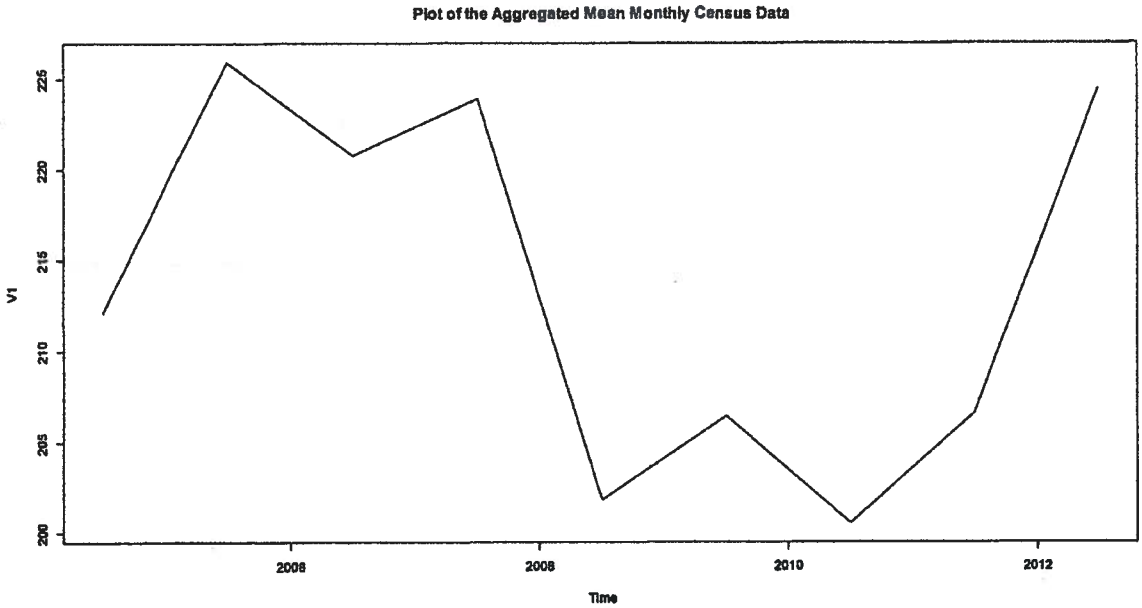


Figure 4:



Model: The goal is to extrapolate the bed capacity based on the historical data. The assumption was made that the future event would conform to the data now available. The accuracy of extrapolation is affected by two major conditions: the accuracy of the historical data and the extent to which underlying conditions will change in the future.

Foundational Document used by DAGS in estimating hospital capacity requirements.

It can be seen from the time plot (Figure 3) that this time series does not show any seasonality but it does consist of a trend component and an irregular component. It is again explained from the aggregate mean monthly plot (Figure 4) that the time series is neither stationary nor seasonal but shows irregular and trend features. That is the time series can be described as using an additive model with increasing trend and no seasonality. Holt's exponential smoothing can be used to make short-term forecasts for the data that have trend and fluctuations.

Holt's exponential smoothing estimates the level and slope at the current time point. Smoothing is controlled by two parameters, alpha, for the estimate of the level at the current time point, and beta for the estimate of the slope b of the trend component at current time point. The parameter alpha and beta have values between 0 and 1, and values that are close to 0 mean that little weight is placed on the most recent observations when making forecast of future values. HoltWinters () function in R was used to make forecasts and to fit a predictive model. The results of the model are discussed below.

Result 1: Holt-Winters exponential smoothing with trend and without seasonal component.
HoltWinters(x = census2ts, gamma = FALSE)
Smoothing parameters:
Alpha: 0.9382056
Beta: 0.01047498
Gamma: FALSE
Coefficients:
a 234.1545781
b 0.5151713
Sum of squares of the errors of the model
[1] 2797.408

The estimated value of alpha is 0.938 very high, explains that the current value of level is based mostly upon very recent observations in the time series. The estimated value of beta parameter is 0.011, explains that the slope of the trend component forecasts are based on both recent and less recent observations (although somewhat more weight is placed on recent observations). This makes good intuitive sense, since the level changes a lot compared to slope over time. The value of the sum-of-squared-errors for the in-sample forecast errors is 2797.4.

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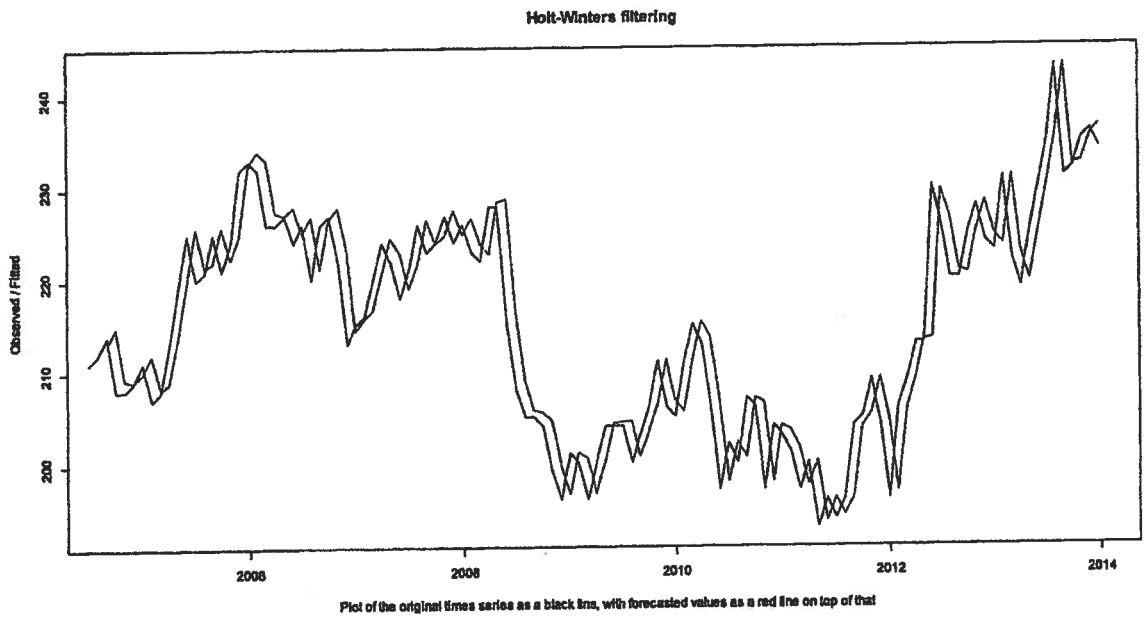
Figure 5:



In Figure 5, the plot of the original time series as a black line, with the forecasted values as a red line on top of that is drawn. It can be seen from the picture that the in-sample forecasts agree pretty well with the observed values, although they tend to lag behind the observed values a little bit.

As for simple exponential smoothing, forecasts are made for future times not covered by the original time series by using the "forecast.HoltWinters () function in R". For this monthly census, the data available for analysis is from July 2004 to January 2014, so the predictions are made for February 2014 to January 2019, i.e., for the next five years (60 more data points), and the forecast plot is given below.

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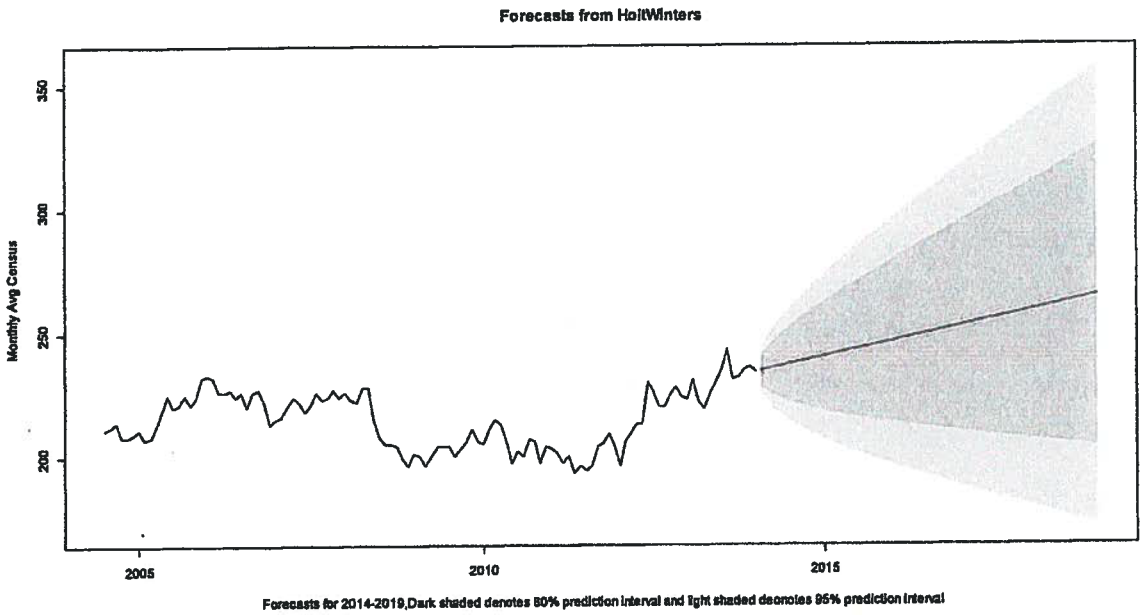
Figure 6:



Forecast is done for five years with an 80% prediction interval, and a 95% prediction interval for the forecast. For example, the forecasted monthly average census for January 2015 is about 240 with a 95% prediction interval of (207, 274). The forecasted estimates of monthly average census for 60 months are given in the Table 2 at the end.

One measure of accuracy of the predictive model is the sum-of-squared-errors (SSE) for the in-sample forecast errors. The in-sample forecast errors are stored in the named element "residuals" of the list variable returned by "forcast.HoltWinters ()". If the predictive model cannot be improved upon, there should be no correlation between forecast errors for successive predictions. In other words, if there are correlations between forecast errors for successive predictions, it is likely that the Holt's exponential smoothing forecasts could be improved upon by another forecasting technique.

To figure out whether this is the case, Correlogram of the in-sample forecast errors for lags 1-20 is obtained and is given below.

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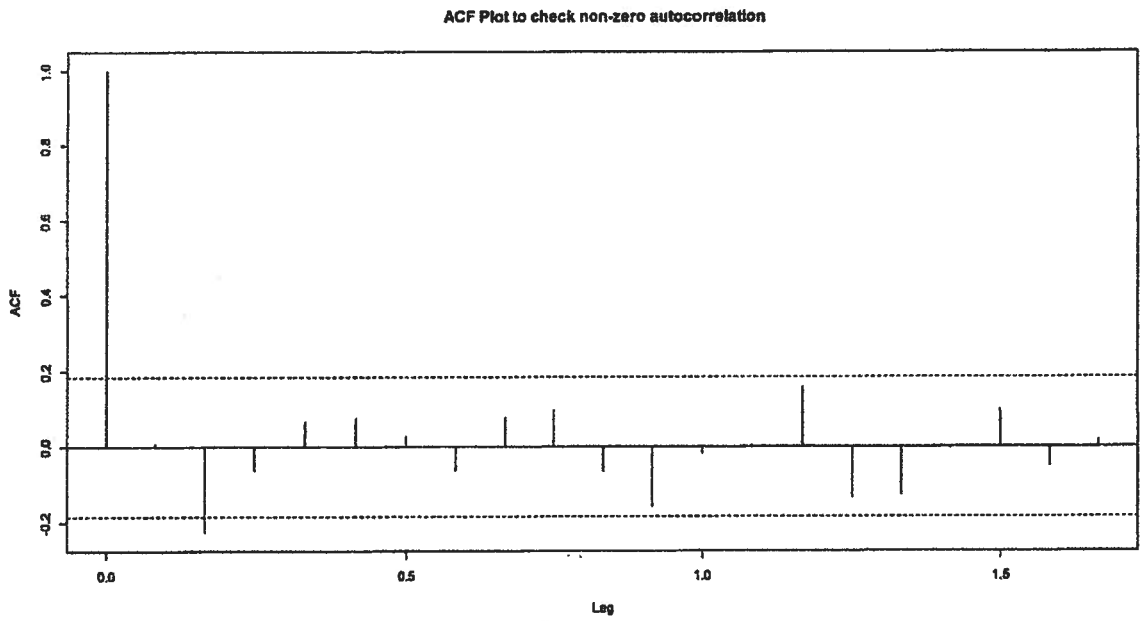
Figure 7:



In the Figure 7, the Correlogram shows that the sample autocorrelation for the in-sample forecast errors at lag 2 exceeds the significance bounds. However, it is expected that one in 20 of the autocorrelations for the first twenty lags to exceed the 95% significance bounds by chance alone. To test whether there is significant evidence for non-zero correlations at lags1-20, the Ljung-Box test was done and the results are given below:

Result 2:

Ljung-Box test

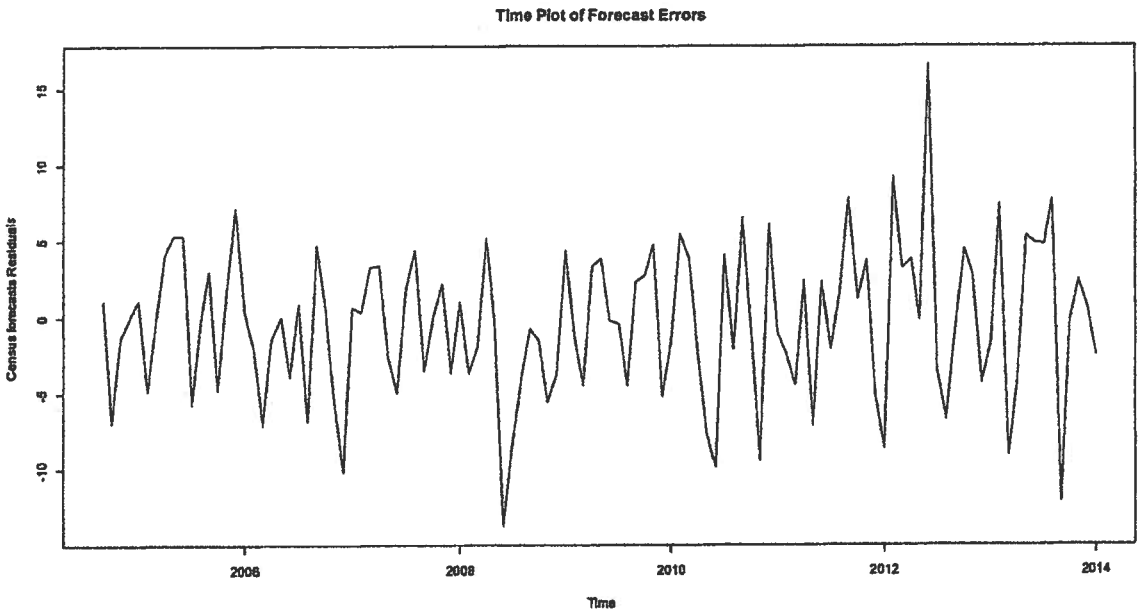
X-squared = 23.5536, df = 20, p-value = 0.2624

Here the Ljung-Box test statistics is 23.6 and the p-value is 0.2624, so there is little evidence of non-zero autocorrelations in the in-sample forecast errors at lags 1-20

To be sure that the predictive model cannot be improved upon, it is also a good idea to check whether the forecast errors are normally distributed with mean zero and constant variance. To check whether the forecast errors have constant variance, a time plot of the in-sample forecast errors is given below:

Foundational Document used by DAGS in estimating hospital capacity requirements.

Figure 8:

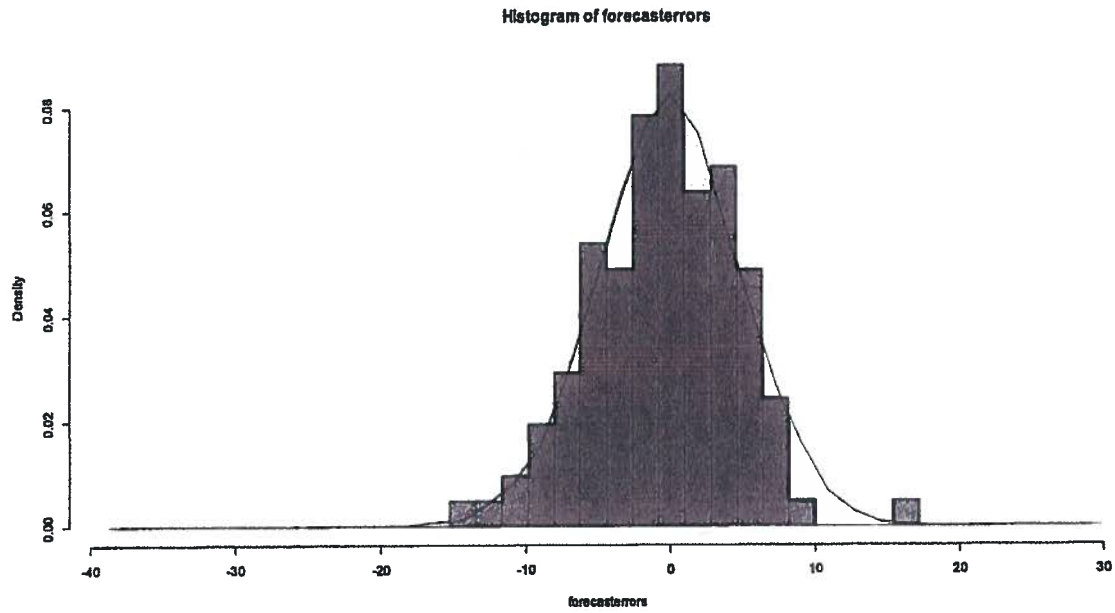


The plot shows that the in-sample forecast errors seem to have roughly constant variance over time.

To check whether the forecast errors are normally distributed with mean zero, a histogram of the forecast errors, with an overlaid normal curve that has mean zero and the same standard deviation as the distribution of forecast errors is plotted and is given below:

Foundational Document used by DAGS in estimating hospital capacity requirements.

Figure 9:



From the histogram of forecast errors, it seems plausible that the forecast errors are normally distributed with mean zero and constant variance.

Conclusion: It is observed that the ACF plot and Ljung-Box test show that there is little evidence of autocorrelations in the forecast errors, while the time plot of forecast errors and histogram of forecast errors show that it is plausible that the forecast errors are normally distributed with mean zero and constant variance. Therefore it could be concluded that Holt's exponential smoothing provides an adequate predictive model for monthly average census, which probably cannot be improved upon. Furthermore, the assumptions that the 80% and 95% predictions intervals were based upon (that there are no autocorrelations in the forecast errors, and the forecast errors are normally distributed wit mean zero and constant variance) are probably valid. These results show that the Monthly Average Census data appear to provide sufficient information for decisions regarding number of beds needed to Hawaii State Hospital.

Table 2:

Month	Point.Forecast	Lo.80	Hi.80	Lo.95	Hi.95
Feb-2014	235	228	241	225	244
Mar-2014	235	226	244	222	249
Apr-2014	236	225	246	219	252
May-2014	236	224	249	217	255
Jun-2014	237	223	251	216	258
Jul-2014	237	222	252	214	261

Foundational Document used by DAGS in estimating hospital capacity requirements.

Aug-2014	238	221	254	213	263
Sep-2014	238	221	256	211	265
Oct-2014	239	220	258	210	268
Nov-2014	239	219	259	209	270
Dec-2014	240	219	261	208	272
Jan-2015	240	218	262	207	274
Feb-2015	241	218	264	206	276
Mar-2015	241	217	265	205	278
Apr-2015	242	217	267	204	280
May-2015	242	216	268	203	282
Jun-2015	243	216	270	202	284
Jul-2015	243	216	271	201	286
Aug-2015	244	215	273	200	288
Sep-2015	244	215	274	199	290
Oct-2015	245	215	275	198	292
Nov-2015	245	214	277	198	293
Dec-2015	246	214	278	197	295
Jan-2016	247	214	280	196	297
Feb-2016	247	213	281	195	299
Mar-2016	248	213	282	195	301
Apr-2016	248	213	284	194	302
May-2016	249	212	285	193	304
Jun-2016	249	212	286	192	306
Jul-2016	250	212	288	192	308
Aug-2016	250	211	289	191	309
Sep-2016	251	211	290	190	311
Oct-2016	251	211	292	189	313
Nov-2016	252	211	293	189	315
Dec-2016	252	210	294	188	316
Jan-2017	253	210	295	187	318
Feb-2017	253	210	297	187	320
Mar-2017	254	209	298	186	321
Apr-2017	254	209	299	185	323
May-2017	255	209	301	185	325
Jun-2017	255	209	302	184	327
Jul-2017	256	208	303	183	328
Aug-2017	256	208	305	183	330
Sep-2017	257	208	306	182	332
Oct-2017	257	208	307	181	333
Nov-2017	258	207	308	181	335
Dec-2017	258	207	310	180	337
Jan-2018	259	207	311	179	339
Feb-2018	259	207	312	179	340
Mar-2018	260	206	314	178	342
Apr-2018	260	206	315	177	344
May-2018	261	206	316	177	345
Jun-2018	261	206	317	176	347

Foundational Document used by DAGS in estimating hospital capacity requirements.

Mar-2018	260	206	314	178	342
Apr-2018	260	206	315	177	344
May-2018	261	206	316	177	345
Jun-2018	261	206	317	176	347
Jul-2018	262	205	319	175	349
Aug-2018	262	205	320	175	350
Sep-2018	263	205	321	174	352
Oct-2018	264	205	323	173	354
Nov-2018	264	204	324	173	355
Dec-2018	265	204	325	172	357
Jan-2019	265	204	326	171	359

5.2 CONCEPTUAL COST ESTIMATE

This page has been prepared by the Department of Accounting and General Services on August 25, 2015 for inclusion into the Hawaii State Hospital - 2015 Master Plan Update report.

The following conceptual construction cost estimate dated August 11, 2015, prepared by Rider Levett Bucknall (RLB) is preliminary. As the project moves through the planning and design phases, there will scope adjustments and additional requirements that are not evident at this early stage. Inflation and, possibly, an unfavorable bidding climate may escalate the cost of construction.

Therefore, a budget of **$153,000,000** in construction funds and **$7,500,000** in design funds are needed to complete this project. Total of **$160,500,000 in CIP bond funds.**

Construction budget for a 144 bed patient care facility with rehab mall, therapy spaces, offices, parking stalls, infrastructure improvements, site work, and related work (including cost escalation to midpoint of construction, contingency for bidding climate, contingency during construction, works of art assessment, utility charges, building commissioning services, DAGS consultant and staff support):

$126,000,000	RLB estimate dated August 11, 2015.
$ 13,000,000	10% for contingency and escalation to mid point of construction.
$ 7,000,000	Contingency during construction work (5%)
$ 1,600,000	Works of Art assessment (1%)
$ 3,000,000	Utility charges (2%)
$ 1,400,000	Building commissioning for energy efficiency (1%)
$ 1,000,000	DAGS support services
$153,000,000	**Construction total**
$ 7,500,000	Fees for Architects and Engineers
$ 7,500,000	**Design total**

Proposed appropriation language for the 2016 Hawaii State Legislative Session:

	APPROPRIATIONS (IN 000'S) FY 2015-2016	FY 2016-2017
HT430- ADULT MENTAL HEALTH- INPATIENT		
430161 HAWAII STATE HOSPITAL, OAHU		
DESIGN AND CONSTRUCTION FOR A NEW PATIENT CARE FACILITY		
DESIGN	7,500	
CONSTRUCTION	153,000	
TOTAL FUNDING	**160,500**	

RLB | Rider Levett Bucknall

5.2 Conceptual Design Cost Estimate (144-Bed Goddard Patient Care Facility)

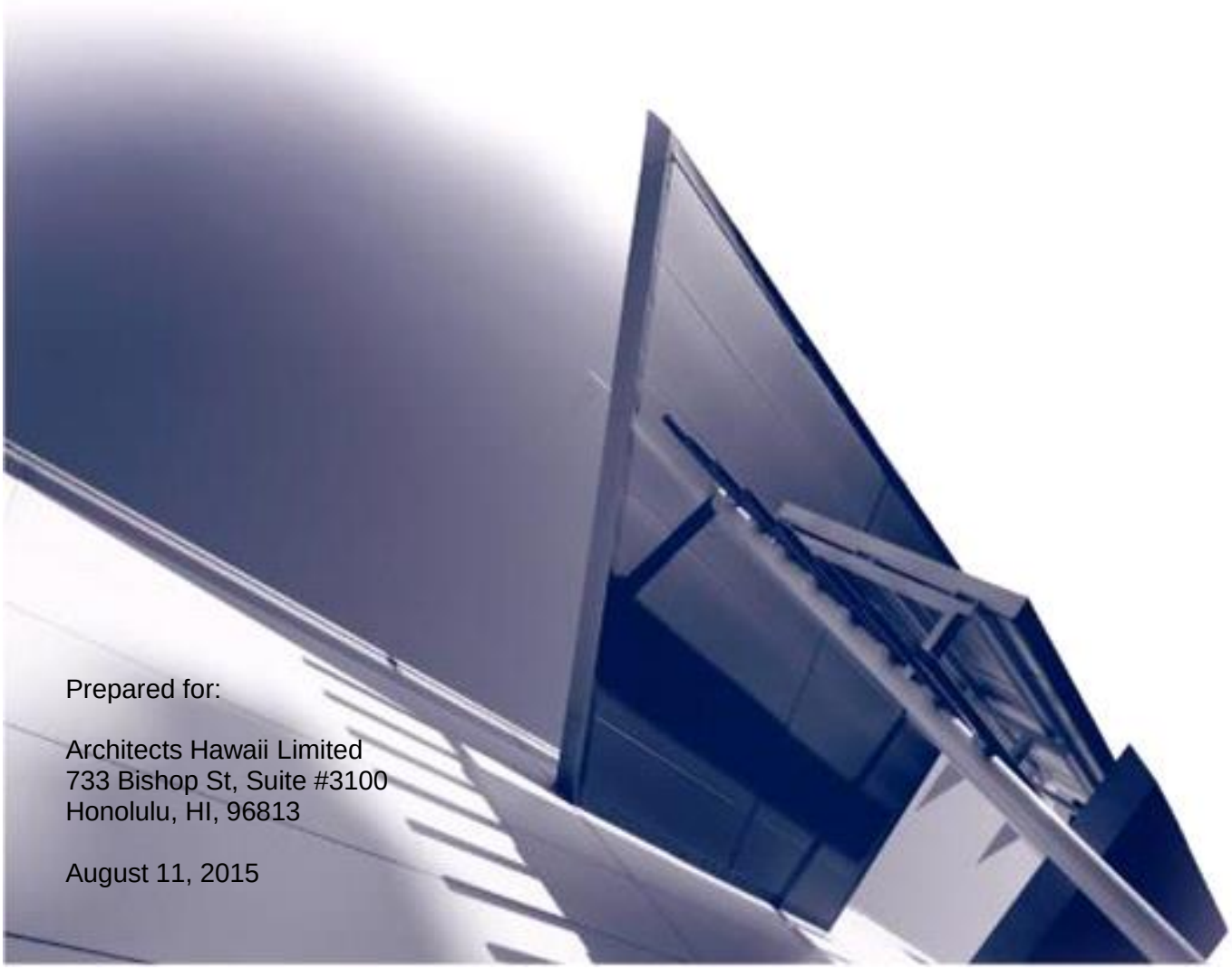
ESTIMATE

CONCEPTUAL DESIGN COST ESTIMATE

Hawaii State Hospital - 2015 Master Plan Update
New 144 Bed Patient Care Facility

DAGS Job No. 12-20-2698

Kaneohe, Hawaii



Prepared for:

Architects Hawaii Limited
733 Bishop St, Suite #3100
Honolulu, HI, 96813

August 11, 2015

RLB | Rider Levett Bucknall

Hawaii State Hospital – 2015 Master Plant Update
Conceptual Design Cost Estimate 8/11/2015
New 144 Bed Patient Care Facility
DAGS Job No. 12-20-2698

Basis of Estimate

This estimate has been prepared at the request of Architects Hawaii Limited and is to provide a Conceptual Design Cost Estimate for a proposed new Patient Care facility located at the Hawaii State Hospital in Kaneohe, Hawaii.

The estimate is based upon measured quantities and built-up rates prepared from the Conceptual Design drawings progress submittal package emailed to RLB on June 17, 2015 & meeting with Architects Hawaii Limited also on June 17, 2015 and benchmarked against similar type psychiatric facilities, hospitals and prisons.

Where information was insufficient, assumptions and allowances were made based on discussions with Architects Hawaii Limited.

General Exercise Tax is calculated at 2%. The subcontractor tax is included in the unit rates. This is a rough calculation based on the 4.712% on the General Contractors self-performing work and contractor markups on the overall estimate.

Unit pricing is based on June 2015 costs. Construction cost escalation has been excluded beyond June 2015. A design and estimating contingency has been included at 20%.

Items Specifically Excluded

- Hazardous materials abatement
- Demolition of existing Goddard building (by others)
- Costs associated with providing approx. 174 additional parking spaces
- Special / drilled shaft foundation systems
- Upgrade to existing site utilities and infrastructure
- Out of hours working
- Furniture, Fittings and Equipment (FF&E)
- Audio / Visual systems
- Telecom / Data systems
- Murals and works of art
- Mock-ups
- Work outside the site boundaries unless noted otherwise
- Special testing & inspections
- Utility tap fees and charges
- Building permits & plan review fees
- CM/GC Preconstruction Services
- Owner's contingency
- Land and legal costs
- Architectural, Engineering and other professional fees
- Project Management Costs
- Geotechnical, traffic and all other studies
- Escalation beyond June 2015
- Items marked as "Excl." in the estimate

RLB | Rider Levett Bucknall

Hawaii State Hospital - 2015 Master Plan Update

Patient Care Facility - Conceptual Estimate 8.11.15

DAGS Job No. 12-20-2698

Rates/estimates current as of June 2015
Adjust costs beyond June 2015

Location			Total Cost
S	**SITE WORK**		**$ 6,627,640**
B	**BUILDING**		**$ 80,919,879**
		ESTIMATED NET COST	**$87,547,519**
MARGINS & ADJUSTMENTS			
General Conditions		8.0 %	$7,003,802
Insurances and Bonds		2.0 %	$1,891,026
Overhead & Profit		6.5 %	$6,268,753
General Excise Tax		2.0 %	$2,054,222
Contingency		20.0 %	$20,953,064
Escalation			Excl.
		ESTIMATED TOTAL COST	**$125,718,386**

Hawaii State Hospital - 2015 Master Plan Update

Patient Care Facility - Conceptual Estimate 8.11.15

DAGS Job No. 12-20-2698

Rates/estimates current as of June 2015
Adjust costs beyond June 2015

S SITE WORK

Description		Unit	Qty	Rate	Total
G1020	**Site Demolition and Relocations**				
02	**Existing Conditions**				
32	Site demolition and clearing allowance	SF	220000	0.5	110000
36	Demolish existing road complete	SF	90181	12	1082172
37	Building demolition works to existing Goddard building - Not In Contract	LS	1		Excl.
	Existing Conditions				***$1,192,172***
	Site Demolition and Relocations				***$1,192,172***
G1030	**Site Earthwork**				
02	**Existing Conditions**				
33	Bulk excavation to sloping site	CY	69093	20	1381860
34	Site erosion control and maintenance allowance	SY	24445	5	122225
	Existing Conditions				***$1,504,085***
	Site Earthwork				***$1,504,085***
G1040	**Hazardous Waste Remediation**				
02	**Existing Conditions**				
31	Hazardous materials & abatement	LS	1		Excl.
	Existing Conditions				***Excl.***
	Hazardous Waste Remediation				***Excl.***
G2010	**Roadways**				
32	**Exterior Improvements**				
38	Concrete curb and gutter	LF	5145	35	180075
39	Asphalt concrete pavement, site road	SF	47244	10	472440
40	Base course to AC pavement, site road	CY	875	80	70000
41	Linemarking to roads	SF	90181	1	90181
49	Asphalt concrete pavement, Service Yard	SF	21272	10	212720
50	Base course to AC pavement, Service Yard	CY	394	80	31520
135	Asphalt concrete pavement, additional parking 56 spaces	SF	21665	10	216650
136	Base course to AC pavement, additional parking 56 spaces	CY	803	80	64240
	Exterior Improvements				***$1,337,826***
	Roadways				***$1,337,826***
G2020	**Parking Lots**				
32	**Exterior Improvements**				
42	Concrete driveway apron	SF	1301	20	26020

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S SITE WORK (continued)

Description		Unit	Qty	Rate	Total
43	Base course to driveway	CY	49	80	3920
	Exterior Improvements				***$29,940***
	Parking Lots				***$29,940***
G2030	**Pedestrian Paving**				
32	**Exterior Improvements**				
120	Pedestrian paving allowance	LS	1	60000	60000
	Exterior Improvements				***$60,000***
	Pedestrian Paving				***$60,000***
G2040	**Site Development**				
32	**Exterior Improvements**				
25	Site perimeter security fence	LF	660	500	330000
44	Housekeeping pad to cooling towers	SF	1942	12	23304
45	Base course to pad	CY	36	80	2880
46	Site signage allowance	LS	1	20000	20000
116	Sallyport allowance	LS	1	100000	100000
119	Bike rack allowance	LS	1	10000	10000
125	Miscellaneous site development allowance	LS	1	75000	75000
127	Automated security gate to perimeter security fence	No	2	10000	20000
	Exterior Improvements				***$581,184***
	Site Development				***$581,184***
G2050	**Landscaping**				
32	**Exterior Improvements**				
47	Landscaping, small tree allowance	SF	68277	12	819324
48	Landscaping, large tree allowance	LS	1	30000	30000
117	Irrigation system	SF	68277	3.5	238970
118	Maintenance period, 90 days	SF	68277	0.5	34139
	Exterior Improvements				***$1,122,433***
	Landscaping				***$1,122,433***
G4030	**Site Communications & Security**				
28	**Electronic Safety and Security**				
130	Site Communications & Security, allowance	LS	1	550000	550000
	Electronic Safety and Security				***$550,000***
	Site Communications & Security				***$550,000***
G9091	**Site Utilities**				

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S SITE WORK (continued)

Description	Unit	Qty	Rate	Total
33 Utilities				
115 Upgrade to existing site utilities & infrastructure	LS	1		Excl.

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S SITE WORK (continued)

	Description	Unit	Qty	Rate	Total
131	Connections of existing site utilities and minor modifications	LS	1	250000	250000
	Utilities				***$250,000***
	Site Utilities				***$250,000***
	SITE WORK				***$6,627,640***

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B BUILDING

Description		Unit	Qty	Rate	Total
A1010	**Standard Foundations**				
03	**Concrete**				
5	Elevator pit	EA	8	25000	200000
	Concrete				***$200,000***
	Standard Foundations				***$200,000***
A1020	**Special Foundations**				
03	**Concrete**				
4	Standard foundation system, assume Standard	SF	73503	15	1102545
	Concrete				***$1,102,545***
	Special Foundations				***$1,102,545***
A1030	**Slab on Grade**				
02	**Existing Conditions**				
3	Base course below slab on grade	CY	1362	80	108960
	Existing Conditions				***$108,960***
03	**Concrete**				
1	Slab on garde	SF	73503	14.5	1065794
2	Vapor barrier below slab on grade	SF	73503	1.75	128630
	Concrete				***$1,194,424***
	Slab on Grade				***$1,303,384***
A2020	**Basement Walls**				
03	**Concrete**				
6	Basement walls	SF	11393	60	683580
7	Waterproofing to basement walls	SF	11393	15	170895
	Concrete				***$854,475***
	Basement Walls				***$854,475***
B1010	**Floor Construction**				
03	**Concrete**				
8	Suspended floor structure including beams	SF	103203	38	3921714
30	Columns	SF	179490	10	1794900
133	Suspended floor structure including beams, link bridge	SF	1660	75	124500
	Concrete				***$5,841,114***
05	**Metals**				
112	Structural steel allowance	SF	177830	1.5	266745
	Metals				***$266,745***

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B BUILDING (continued)

Description	Unit	Qty	Rate	Total
Floor Construction				***$6,107,859***

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Adjust costs beyond June 2015

B BUILDING (continued)

Description		Unit	Qty	Rate	Total
B1020	**Roof Construction**				
03	**Concrete**				
9	Suspended roof structure including beams	SF	74787	38	2841906
10	Perimeter upturn wall to roof	SF	6797	45	305865
	Concrete				***$3,147,771***
	Roof Construction				***$3,147,771***
B2010	**Exterior Walls**				
04	**Masonry**				
11	Exterior CMU walls	SF	120658	30	3619740
	Masonry				***$3,619,740***
09	**Finishings**				
12	Paint finish to facade	SF	127455	2	254910
	Finishings				***$254,910***
	Exterior Walls				***$3,874,650***
B2020	**Exterior Windows**				
08	**Openings**				
13	Exterior heavy duty windows (assume 20% of exterior walls)	SF	24134	200	4826800
	Openings				***$4,826,800***
	Exterior Windows				***$4,826,800***
B2030	**Exterior Doors**				
08	**Openings**				
15	Loading dock door, overhead coiling door	No	1	50000	50000
16	Exterior double door	No	5	5000	25000
17	Exterior single door	No	5	3000	15000
126	Exterior glazed automatic sliding doors	No	2	15000	30000
	Openings				***$120,000***
	Exterior Doors				***$120,000***
B3010	**Roof Coverings**				
07	**Thermal and Moisture Protection**				
14	Waterproof & membrane to concrete roof	SF	74787	14	1047018
	Thermal and Moisture Protection				***$1,047,018***
	Roof Coverings				***$1,047,018***
C1010	**Partitions**				
03	**Concrete**				

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B BUILDING (continued)

Description		Unit	Qty	Rate	Total
20	Interior elevator shaft walls	SF	12112	45	545040
	Concrete				***$545,040***

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B BUILDING (continued)

Description		Unit	Qty	Rate	Total
04	**Masonry**				
19	Interior CMU walls	SF	202251	30	6067530
132	Premium allowance for additional protection to CMU walls	SF	525160	5	2625800
	Masonry				***$8,693,330***
09	**Finishings**				
18	Interior stud partition walls	SF	11284	15	169260
	Finishings				***$169,260***
	Partitions				***$9,407,630***
C1020	**Interior Doors**				
08	**Openings**				
21	Single, high impact hollow metal door to patient rooms, shared & individual with glass opening and secure hardward	No	230	5200	1196000
22	Single, high impact hollow metal door to seclusion patient rooms with glass opening and secure hardward	No	24	5500	132000
99	Single fire rate door to stairs	No	27	2500	67500
100	Single hollow metal doors	No	166	2250	373500
101	Double swing double door to kitchens	No	6	3000	18000
102	Single hollow metal doors to medical treatment rooms	No	16	3000	48000
103	Double hollow metal doors	No	5	4000	20000
104	Single doors to back of house areas	No	24	2250	54000
129	Centrally controlled button activated zone dividing door, highly durable and secure door leaf, frame and hardware	No	9	8000	72000
	Openings				***$1,981,000***
	Interior Doors				***$1,981,000***
C1030	**Fittings**				
10	**Specialties**				
24	Signage allowance	SF	177830	1.5	266745
105	Staff toilet accessories	EA	6	5000	30000
106	Lockers allowance	LS	3	20000	60000
134	Toilet accessories to patients	EA	144	400	57600
	Specialties				***$414,345***
	Fittings				***$414,345***
C2010	**Stair Construction**				
03	**Concrete**				
26	Stairs including landings and balustrade	FT/R	512	1400	716800
	Concrete				***$716,800***

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B BUILDING (continued)

Description	Unit	Qty	Rate	Total
Stair Construction				***$716,800***

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B BUILDING (continued)

Description		Unit	Qty	Rate	Total
C3010	**Wall Finishes**				
09	**Finishings**				
73	Wall finish to patient rooms, shared, individual and seclusion	SF	143234	1.75	250660
74	Wall finish to corridor	SF	168621	1.75	295087
75	Wall finish to office spaces, conference rooms and visitor areas	SF	83930	1.5	125895
76	Wall finish to kitchen	SF	7290	20	145800
77	Wall finish to laundry	SF	3864	1.75	6762
78	Wall finish to triage & treatment spaces	SF	4872	1.75	8526
79	Wall finish to toilets & showers, tile	SF	10752	20	215040
80	Wall finish to BOH areas	LS	4		Nil
81	Wall finish to Recreational Therapy room	SF	7072	1.75	12376
82	Wall finish to Occupational Therapy room	SF	12512	1.75	21896
83	Wall finish to Rehabilitation Therapy room	SF	5100	1.75	8925
84	Wall finish to toilets & showers, paint	SF	10752	1.5	16128
	Finishings				***$1,107,095***
	Wall Finishes				***$1,107,095***
C3020	**Floor Finishes**				
09	**Finishings**				
51	Flooring to patient rooms, shared, individual and seclusion	SF	26504	8	212032
52	Flooring to corridor	SF	53962	6	323772
53	Flooring to office spaces, conference rooms and visitor areas	SF	17556	10	175560
54	Flooring to kitchen	SF	2822	20	56440
55	Flooring to laundry	SF	792	5	3960
56	Flooring to triage & treatment spaces	SF	938	10	9380
57	Flooring to toilets & showers	SF	4815	20	96300
58	Flooring to BOH areas	SF	39866	3.5	139531
59	Flooring to Recreational Therapy room	SF	10695	10	106950
60	Flooring to Occupational Therapy room	SF	12330	10	123300
61	Flooring to Rehabilitation Therapy room	SF	5170	10	51700
121	Rubber base	LF	20209	5	101045
122	Tile base	LF	1755	20	35100
123	Flooring to dining room	SF	2380	20	47600
	Finishings				***$1,482,670***
	Floor Finishes				***$1,482,670***

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Adjust costs beyond June 2015

B BUILDING (continued)

Description		Unit	Qty	Rate	Total
C3030	**Ceiling Finishes**				
09	**Finishings**				
62	Ceiling finish to patient rooms, shared, individual and seclusion	SF	26504	25	662600
63	Ceiling finish to corridor	SF	53962	14	755468
64	Ceiling finish to office spaces, conference rooms and visitor areas	SF	17556	14	245784
65	Ceiling finish to kitchen	SF	2822	14	39508
66	Ceiling finish to laundry	SF	792	14	11088
67	Ceiling finish to triage & treatment spaces	SF	938	14	13132
68	Ceiling finish to toilets & showers	SF	4815	20	96300
69	Ceiling finish to BOH areas	SF	39866		Nil
70	Ceiling finish to Recreational Therapy room	SF	10695	14	149730
71	Ceiling finish to Occupational Therapy room	SF	12330	14	172620
72	Ceiling finish to Rehabilitation Therapy room	SF	5170	14	72380
124	Ceiling finish to dining room	SF	2380	14	33320
	Finishings				***$2,251,930***
	Ceiling Finishes				***$2,251,930***
D1010	**Elevators & Lifts**				
14	**Conveying Equipment**				
27	Hospital elevator traveling 4 levels, 2 elevator	Stop	8	40000	320000
28	Hospital elevator traveling 2 levels, 4 elevator	Stop	8	40000	320000
29	Hospital freight elevator traveling 4 levels, 2 elevator	Stop	8	50000	400000
113	Elevator cab finishes	No	8	25000	200000
114	Elevator steel incl ladder, hoist beam, sump, miscellaneous	No	8	15000	120000
	Conveying Equipment				***$1,360,000***
	Elevators & Lifts				***$1,360,000***
D4010	**Sprinklers**				
21	**Fire Suppression**				
111	Sprinklers	SF	177830	7	1244810
	Fire Suppression				***$1,244,810***
	Sprinklers				***$1,244,810***
D5030	**Communications & Security**				
28	**Electronic Safety and Security**				
110	Communications & security	SF	177830	45	8002350
	Electronic Safety and Security				***$8,002,350***

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B BUILDING (continued)

Description		Unit	Qty	Rate	Total
	Communications & Security				***$8,002,350***
E1030	**Vehicular Equipment**				
11	**Equipment**				
97	Loading dock equipment	LS	1	20000	20000

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B BUILDING (continued)

Description		Unit	Qty	Rate	Total
98	Parking equipment	LS	1	15000	15000
	Equipment				***$35,000***
	Vehicular Equipment				***$35,000***
F1020	**Integrated Construction**				
09	**Finishings**				
85	Fitout of Recreational Therapy room	SF	10695	50	534750
86	Fitout of Occupational Therapy room	SF	12330	50	616500
87	Fitout of Rehabilitation Therapy room	SF	5170	50	258500
88	Fitout to kitchen	SF	2822	200	564400
89	Fitout to office spaces, conference rooms and visitor areas	SF	17556	50	877800
90	Fitout to patient rooms, shared, individual and seclusion	SF	26504	3	79512
91	Fitout to corridor	SF	53962	10	539620
93	Fitout to laundry	SF	792	50	39600
94	Fitout to triage & treatment spaces	SF	938	50	46900
96	Fitout to BOH areas	SF	39866	2.5	99665
	Finishings				***$3,657,247***
	Integrated Construction				***$3,657,247***
D2000	**Plumbing Services**				
22	**Plumbing**				
107	Plumbing services	SF	177830	27.5	4890325
	Plumbing				***$4,890,325***
	Plumbing Services				***$4,890,325***
D5000	**Electrical Services**				
26	**Electrical**				
108	Electrical Services	SF	177830	47.5	8446925
	Electrical				***$8,446,925***
	Electrical Services				***$8,446,925***
D3000	**Mechanical Services**				
23	**Heating, Ventilating, and Air Conditioning**				
109	Mechanical Services	SF	177830	75	13337250
	Heating, Ventilating, and Air Conditioning				***$13,337,250***
	Mechanical Services				***$13,337,250***
	BUILDING				***$80,919,879***

5.3 PARKING STUDY

5.3 PRELIMINARY PARKING STUDY

INTRODUCTION

This study provides an estimate of the total number of parking spaces that will be required at three future conditions. The study also provides an estimate of the number of new parking spaces that will need to be added at each increment of future development.

Condition 1: When construction of the 144-Bed Goddard Patient Care Facility has been completed. At that point the Hospital will have 252 patient beds. See the Short-Term Master Plan in Section 2 for additional details.

Condition 2: When construction of a second 144-Bed Patient Care Facility has been completed on the Guensberg site. At that point the Hospital will have 396 beds. See the Long-Term Master Plan in Section 2 for additional details.

Condition 3: When construction of a third 144-Bed Patient Care Facility has been completed on the J-Pad site. At that point the Hospital will have 516 beds. This is the full-build-out condition envisioned in the Long-Term Master Plan. See Section 2 for additional details.

EXECUTIVE SUMMARY - PRELIMINARY PARKING REQUIREMENTS

Condition 1: **682** total parking spaces required (**410** existing spaces + **272** new spaces).
98 of the new spaces will be located adjacent to the 144-Bed Goddard Patient Care Facility.
The remaining **174** new spaces will be located in Planning Zones 7, 8, 10, 14, or15.

Condition 2: **1,072** total parking space required (**590** existing spaces + **482** new spaces).
The **482** new spaces will be located in Planning Zones: 7, 8, 10, 14, or 15.

Condition 3: **1,397** total parking spaces required (**1,072** existing spaces + **325** new spaces).
The 325 new spaces will be located in Planning Zones: 7, 8, 10, 14, or 15.

5.3 PRELIMINARY PARKING STUDY

REGULATORY PARKING REQUIREMENTS

Article 6 of the Land Use Ordinance (Revised Ordinances of Hawaii, Chapter 21) defines the parking requirements for projects on Oahu. The formulas listed in Table 21-6.1 can be used to determine the minimum number of parking spaces required for most land uses. However, the Land Use Ordinance (LUO) does not provide specific parking requirements for hospitals. Hospital parking requirements fall under the Social and Civic Service category in the Parking To Be Determined By The Director (Table 21-6.1). In practice this means that parking requirements for hospitals are determined during the PRU process.

ASSUMPTIONS

The following assumptions are used to estimate future parking requirements:

- The number of parking spaces required is proportional to the number of Hospital beds
- The current (i.e. 2015) peak parking demand establishes a baseline for estimating the number of parking spaces required to support future increases in the number of beds
- The peak demand for parking spaces occurs during the afternoon period when the day shift staff and evening shift staff overlap
- Parking requirements are based on the number of spaces required at the peak demand period (i.e. not on the number of spaces required to accommodate the staff on a single shift)

BASELINE (CURRENT PEAK PARKING DEMAND)

Patient Beds [(1)(2)]	178	
Peak Parking Demand [(3)]	374	Day shift staff
	82	Nurses (evening shift)
	1	Officer of the Day (evening shift)
	5	State Operated Special Residential Program staff (evening shift)
	(10)	Deduct for staff car poolers
	20	State-owned vehicles
	10	Visitors
	482	spaces required at peak demand period
Existing Spaces [(3)]	**450**	(32 spaces short at peak demand)

5.3 PRELIMINARY PARKING STUDY

PEAK PARKING DEMAND (CONDITION 1)

The following calculations provide an estimate of the number of parking spaces that will be required after construction of the new 144-Bed Goddard Patient Care Facility.

Patient Beds [4] [5] = **252**

Peak Parking Demand = 252 beds x 482 spaces (current peak demand) = **682** total spaces required
178 current beds

Existing Spaces= 450 spaces – 40 demolished spaces on Goddard site = **410** spaces

Additional Spaces = 682 total spaces – 410 existing spaces = **272** new spaces required

Note: The Conceptual Design Cost Estimate (Appendix 5.2), prepared by Rider Levett Bucknall, includes the cost of **98** new surface parking spaces located adjacent the Goddard Patient Care Facility. The costs associated with providing the additional **174** new spaces (located in Planning Zones 7, 8, 10, 14, or 15) are not included in the Conceptual Design Cost Estimate.

PEAK PARKING DEMAND (CONDITION 2)

The following calculations provide an estimate of the number of parking spaces that will be required after construction of the 144-Bed Goddard Patient Care Facility and the 144-Bed Guensberg Patient Care Facility.

Patient Beds [6] = **396**

Peak Parking Demand = 396 beds x 482 spaces (current peak demand) = **1,072** total spaces required
178 current beds

Existing Spaces = 682 spaces (provided in Condition 1) – 36 demolished spaces on Guensberg site – 56 demolished spaces on Goddard site = **590** existing spaces

5.3 PRELIMINARY PARKING STUDY

Additional spaces = 1,072 spaces – 590 existing spaces = **482** new spaces required

PEAK PARKING DEMAND (CONDITION 3)

The following calculations provide an estimate of the number of parking spaces that will be required after construction of the future 144-Bed Goddard Patient Care Facility, the future 144-Bed Patient Care Facility on the Guensberg site, and the future 144-Bed Patient Care Facility on the J-Pad site.

Patient Beds [7] [8] = **516**

Peak parking demand = $\frac{\text{516 beds x 482 spaces (current peak demand)}}{\text{178 current beds}}$ = **1,397** total spaces required

Additional spaces = 1,397 spaces – 1,072 existing spaces (provided in Condition 2) = **325** new spaces required

Footnotes

1. Guensberg (70) + Unit E (36) + Unit F (28) + Unit H (20) + Unit I (24) = 178 beds
2. Excludes the 40 patients currently housed at Kahi Mohala Behavioral Health in Ewa Beach. The staff and visitors for those patients don't contribute to the Hospital's current peak parking demand.
3. Current peak demand parking statistics and existing number of parking spaces provided by Hospital.
4. Goddard Patient Care Facility (144) + Unit E (36) + Unit F (28) + Unit H (20) + Unit I (24) + Guensberg (0) = 252 beds
5. Guensberg is demolished
6. Guensberg Patient Care Facility (144) + Goddard Patient Care Facility (144) + Unit E (36) + Unit F (28) + Unit H (20) + Unit I (24) = 396 beds
7. "J-Pad" Patient Care Facility (144) + Guensberg Patient Care Facility (144) + Goddard Patient Care Facility (144) + Unit E (36) + Unit F (28) + Unit H (20) + Unit I (0) = 516 beds
8. Unit I demolished prior to construction of second increment of the "J-Pad" Patient Care Facility

5.4 BISHOP BUILDING LETTERS

5.4.1 DOH Letter to SHPD (re: Bishop Demolition)

DAVID Y. IGE
GOVERNOR OF HAWAI'I

ADDRESS ONLY
ADMINISTRATOR
HAWAI'I STATE HOSPITAL

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DEPARTMENT OF HEALTH
HAWAI'I STATE HOSPITAL
45-710 KEA'AHALA ROAD
KANE'OHE, HAWAI'I 96744-3528

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

PLEASE REFER TO
FILE NO.

June 12, 2015

Mr. Alan Downer, Ph.D., Administrator
State Historic Preservation Division (SHPD)
Department of Land and Natural Resources (DLNR)
601 Kamokila Boulevard, Suite 555
Kapolei, HI 96707

Dear Dr. Downer:

Subject: Proposed Demolition of the Bishop Building
Hawaii State Hospital (HSH)
Tax Map Key (1) 4-5-023: 002

This is in response to your September 30, 2014 letter (attached for your reference) which restarted the discussion on the proposed demolition of the Bishop Building. We provide our understandings from your letter:

1. We understand that:

   a. SHPD must review public building applications to see if historic properties will be affected and must concur with the project in order for it to move forward to design and construction.

   b. Interested parties may have opportunity to comment on SHPD's effect determination and appeal the Hawaii Historic Review Board.

   c. An environmental assessment, for compliance with Hawaii Revised Statutes 343 and Hawaii Administrative Rules 11-200, will be completed by our Developer before the construction of the new Long Term Care Hospital (LTCH)/Skilled Nursing Facility (SNF).

d. SHPD requires the Bishop Building demolition to be mitigated by either preservation or architectural recordation.

Subsequent to the execution of the DOH/DLNR September 13, 2005 letter, the DOH moved to execute a public-private developer partnership to construct a new LTCH/SNF at the site of the Bishop building. The DOH is now ready to:

1. Execute a contract with the Developer to process permits, approvals, etc. and design and construction of the LTCH/SNF subject to the confirmation of funding.

2. Execute the lease of approximately 5.0 acres of land for the development of the LTCH/SNF. See attachment 1 for the lease area.

Following a series of more recent meetings between HSH and SHPD staffs, we now have the following understandings about the Bishop building demolition:

1. SHPD has accepted the HSH's conclusion that the Bishop building must indeed be removed to make way for a successful new LTCH/SNF. (The DOH believes that a suitable sized LTCH/SNF cannot be achieved on the 5.0 acre site without the demolition and removal of the Bishop building. The DOH came to this conclusion after numerous interested developers explored the operational, financial and constructability analyses for the facility, and explored a wide variety of site and facility layout options. In each analysis, the best outcome was to demolish the Bishop Building.)

2. SHPD is requiring the following mitigation requirements for the Bishop building prior to its demolition:

   Completion of the requirements of an **Intensive Level Survey (ILS)** as outlined in the ***Guidelines: Architectural Historic Resource Surveys*** published by SHPD (document not dated). See Attachment 2. (The public-private developer partnership will fund and implement the ILS requirements and submit the documents to SHPD for review and approval.)

On behalf of the public-private developer, the HSH assures the successful completion and delivery of this ILS Report to the SHPD for review and approval prior to any demolition of the Bishop building. Once this ILS is approved by SHPD, we understand public-private developer will have completed its mitigation obligations for the Bishop building and will then be clear to proceed with the other permits, approvals, and finally its demolition.

Again, thank you for your cooperation in this process. Our understandings will make future progress easier and efficient as the campus of HSH evolves to meet the ever-changing needs of the people we serve. Feel free to contact me at 236-8237 if any further information is required.

Sincerely,

WILLIAM J. MAY
Administrator

c: Ms. Anna E. Broverman, State Architectural Historian w/attachments
Dr. Virginia Pressler, M.D., Director of Health w/attachments
Ms. Lynn N. Fallin, Deputy Director for Behavioral Health w/attachments
Dr. Mark A. Fridovich, Ph.D., M.P.A., Adult Mental Health Administrator w/attachments

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

JESSE K. SOUKI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

DATE: September 30, 2014

LOG: 2014.01494
DOC: 1409AB66

TO: Linda Rosen, M.D., M.P.H
Director of Health
State of Hawaii Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

SUBJECT: **Section 6E-8 Historic Preservation Review**
Project: Demolition – Bishop Building
Owner Name: Hawaii State Hospital
Building Permit: None Submitted
Address: Hawaii State Hospital – Keaahala Road
Tax Map Key: (1) 4-5-023:001

Date Received by THE SHPD: April 3, 2014

SHPD would like to thank Hawaii State Hospital for resubmitting its project proposal and meeting with SHPD staff on September 26, 2014. The purpose of the meeting was to reestablish communication between the DOH and SHPD and restart the discussion regarding the proposed demolition of the Bishop Building. Recent staff turnover in both divisions has led to confusion over the project's status. It is important that current staff have a comprehensive understanding of previous consultation on this project in order to make an accurate and fair determination that serves the public interest and the state's obligations pursuant to HRS § 6E-8.

The Bishop Building is a long narrow structure located on the southeastern side of the Hawaii State Hospital campus. The building was constructed in the early 1930s, and is listed on the Hawaii State Register of Historic Places under Criteria A and C as a contributing resource to the Territorial Hospital campus. Although not individually distinctive, the building, when placed in the context of the hospital complex, makes a strong architectural statement related to the philosophy of providing more humane treatment and environments for the mentally ill.

The proposed project consists of demolishing the Bishop Building and constructing a new Long Term Care Hospital. Pursuant to HRS § 6E-8, SHPD must review public building applications to see if historic properties will be affected and concur with the project in order for it to move forward. Additionally, interested parties will have the opportunity to comment on SHPD's effect determination and appeal to the Hawaii Historic Review Board if they disagree with it. The project must also be reviewed under HRS § 6E-10 as it listed on the Hawaii Register of Historic Places. HRS § 6E-10 requires SHPD to review any proposed construction, alteration, disposition or improvement of any nature to listed historic properties and concur before the project moves forward. Pursuant to HRS § 343-5 (a)(4) an environmental assessment shall be required for actions that propose any use within any historic site or designated in the National Register or Hawaii Register, as provided for the Historic Preservation Act of 1966, Public Law 89-665, or Chapter 6E.

Demolishing the Bishop Building does constitute an adverse effect under HRS § 6E-8 and has to be mitigated. Mitigation for this project must be either preservation or architectural recordation. Preservation may include avoidance and protection, stabilization, rehabilitation, restoration, reconstruction, or exhibition with interpretation of significance. Architectural recordation involves the photographic documentation and possibly the measured drawing of a building, structure or object prior to its destruction.

Initial consultation on the demolition of the Bishop Building occurred in 2004/2005 when the Department of Health was proposing demolishing the Goddard, Guensberg, Iolani, Haloa, Bishop, Cooke, M, N, O and P buildings. Over the next several months, the project scope was limited to the demolition the Goddard, Guensberg and Cooke Buildings. The other structures were to be evaluated for demolition at a later time. Mitigation was agreed upon for the demolition of the three buildings above. One actually agreed upon mitigation requirement was the reuse of the Bishop Building as the site of an information/education area pending a structural assessment of the building and a conceptual analysis which would determine whether the building could be renovated or should be demolished. The rest of the mitigation obligations can be found in the reference timeline under September 13th, 2005.

In order to move forward with the proposed project, the Department of Health must decide whether this previous consultation will be followed or if the Chapter 6E consultation will be reinitiated. If the previously agreed upon mitigation will be followed, a structural assessment and conceptual analysis for the reuse of the Bishop Building must be completed before considering demolition.

Alternately, if the DOH does not want to follow the mitigation outlined in the previous agreement, consultation must be reinitiated. In this case, DOH must notify SHPD about the proposed project and request a letter of determination. DOH must include in its letter the number of historic properties within the proposed project area, their significance, the impact of the proposed project on the historic properties, and any proposed mitigation measures. SHPD will either concur or not concur with DOH's effect determination and explain why. A good way to expedite the process would be to gather those working on the project, such as architects and planners, with SHPD to discuss possible solutions prior to submitting a letter. Information presented at the meeting should include DOH's master plan, a clearly defined project scope, programmatic needs of the hospital, and project alternatives.

The SHPD understands that this is a very important project for the hospital, and we are eager to work with the DOH to form the best solution possible for the hospital, its unique historic properties, and the people of Hawaii.

Please contact Anna Broverman, the SHPD Architectural Historian, at Anna.E.Broverman@hawaii.gov if you have any questions or concerns.

Aloha,

Alan Downer
Deputy State Historic Preservation Officer

CC: William J. May, Administrator
Hawaii State Hospital
45-710 Keaahala Road
Kanoehe, HI 96744
william.may@doh.hawaii.gov

Kiersten Faulkner
Historic Hawaii Foundation
680 Iwilei Road
Honolulu, HI 96817
kiersten@historichawaii.org

Jay L. King
Office of U.S. Representative Tulsi Gabbard
Prince Jonah Kuhio Kalanianaole Federal Building
300 Ala Moana Blvd. Suite 5-104
Honolulu, HI 96850
Jay.King@mail.house.gov

Project Consultation Timeline for Reference

March of 2004: The SHPD received a letter from the State Public Works Administrator requesting to demolish the Goddard, Guensberg, Iolani, Haloa, Cooke, Bishop Buildings, as well as Buildings M, N, O, & P and various cottages on the property.

July 28th, 2004: The SHPD responded to the previous letter on stating that the Iolani, Haloa, Cooke and Bishop Buildings were significant as the first and only major insane asylum in Hawaii, and that the Goddard building was, "significant as an exception record of mental health treatments and how they were approached and expressed structurally in Hawaii". The SHPD's determination was "effect with proposed mitigation commitments involving one or more forms of mitigation to reasonably mitigate adverse effects of short and long term plans for the hospital complex. [L2004.1373, D0404st04 &0407TL101]. Options for mitigation included:

- Research and documentation of the significant buildings or structures
- Preparation and establishment of a preservation plan based on the above report in coordination with the Hawaii State Hospital campus master plan. It should prioritize historic buildings, save elements of the buildings for re-use, or reuse space as a public information resource center.
- Create a written evaluation of functional analysis, an explanation of new theme, a cost estimate of program requirements, and a good faith effort for adaptive re-use/relocation of function or partial demolition/relocation in adaptive reuse based on priorities set above.
- Salvage certain elements from the Goddard Building
- Provide graphics to illustrate the proposed resolutions
- HABS recordation and written histories for each demolished building

September of 2004: The SHPD received a report on Historic and Potentially Historic Buildings at Hawaii State Hospital from Mason Architects. The report recounted the history of the hospital through 1956, and gave individual histories and descriptions for each of the building proposed for demolition. All of the buildings were found to be significant under Criteria A and C. Recommendations for the territorial buildings included their inclusion in a preservation plan for the district which maintains and/or restores their historic character. The report also recommended the Goddard Building be reused, and that the Guesnberg Building's significance be reassess once it was 50 years old.

October 11, 2004: A Master Planning Update from this date that showed concept options for retaining/demolishing/altering the Goddard Building and using the Bishop and Cooke Building sites.

December 17th, 2004: SHPD received a letter from the Department of Health (DOH) addressed to Chairperson Peter T. Young of the Department of Land and Natural Resources. The letter stated that the DOH had completed an assessment of the subject buildings and that they proposed to demolish the Goddard, Guensberg and Cooke Buildings. However, they planned to retain the Iolani, Haloa, and Bishop Buildings and would reassess the buildings later. The letter states that the DOH did not agree that the Goddard Building was significant and that they had created plans for its redevelopment, which were included in the submittal packet. DOH proposed the following list of items as mitigation for the demolition of the Goddard, Guensberg, Cooke, and possibly Bishop Buildings, but the SHPD has no record of then Chairperson Young's concurrence by signature with the proposal.

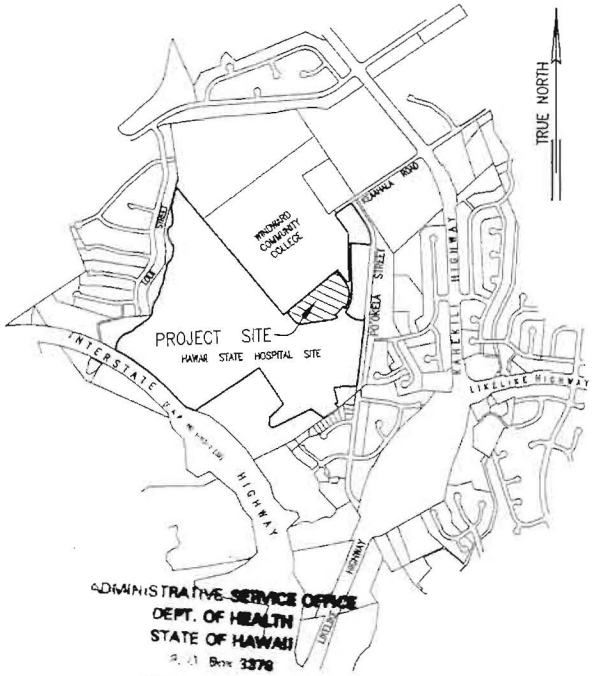
- An information/education area near the front of the Hawaii State Hospital Campus that would allow visitors to view artifacts from the buildings and learn about the history of the hospital.
- The center could be in a new building or in the Bishop Building, and a conceptual analysis would be done to see if the Bishop Building should be renovated or demolished.
- Display salvaged items from the various buildings, including certain items or rooms from the Goddard Building
- Assuming the Bishop Building could be renovated and floor space added, the center could accommodate a replica of patient housing in the Goddard Building.

September 13th, 2005: The Director of Health sent another letter to Chairperson Young. This letter again states that an assessment of the subject buildings had been completed, and that DOH wanted to demolish and retain the same buildings. Here, the DOH agrees that the Goddard Building is significant and proposes new mitigation for the demolition of the Goddard, Guensberg and Cooke Buildings. Chairperson Young signed this document, concurring with the following mitigation actions.

- In the Hawaii State Hospital Master Plan, a visitor's center with an information/education area near the front entrance to the HSH campus that would allow visitors to view hospital items and displays and learn about the history of the hospital. The center would include a permanent photo gallery, and the SHPD would be included in the planning of this facility.

- The information/education area would be in the existing Bishop Building pending a structural assessment of the building and a conceptual analysis which would determine whether the building could be renovated or should be demolished.
- The information/education area could display items salvaged from the various hospital buildings. The items could include
    - Two cast-stone grilles in a floral and leaf pattern from the Goddard Building
    - Two sliding gates of decorative metal grille in an oriental/geometric motif and side panels of the same design from the Goddard Building
    - Wrought iron decorative work
- Assuming the Bishop Building is renovated, floor space could be added so that the enlarged building could accommodate:
    - A replica of the patient care and living spaces (circa 1950's).
    - A replica of Goddard's operating room
    - Courtyards that provide open space and bring the outdoors into the building just like the Goddard Building
- Prior to the demolition of the Goddard, Guensberg, and Cooke buildings (and possibly the Bishop Building), HABS documentation and written histories would be completed for each of the buildings.

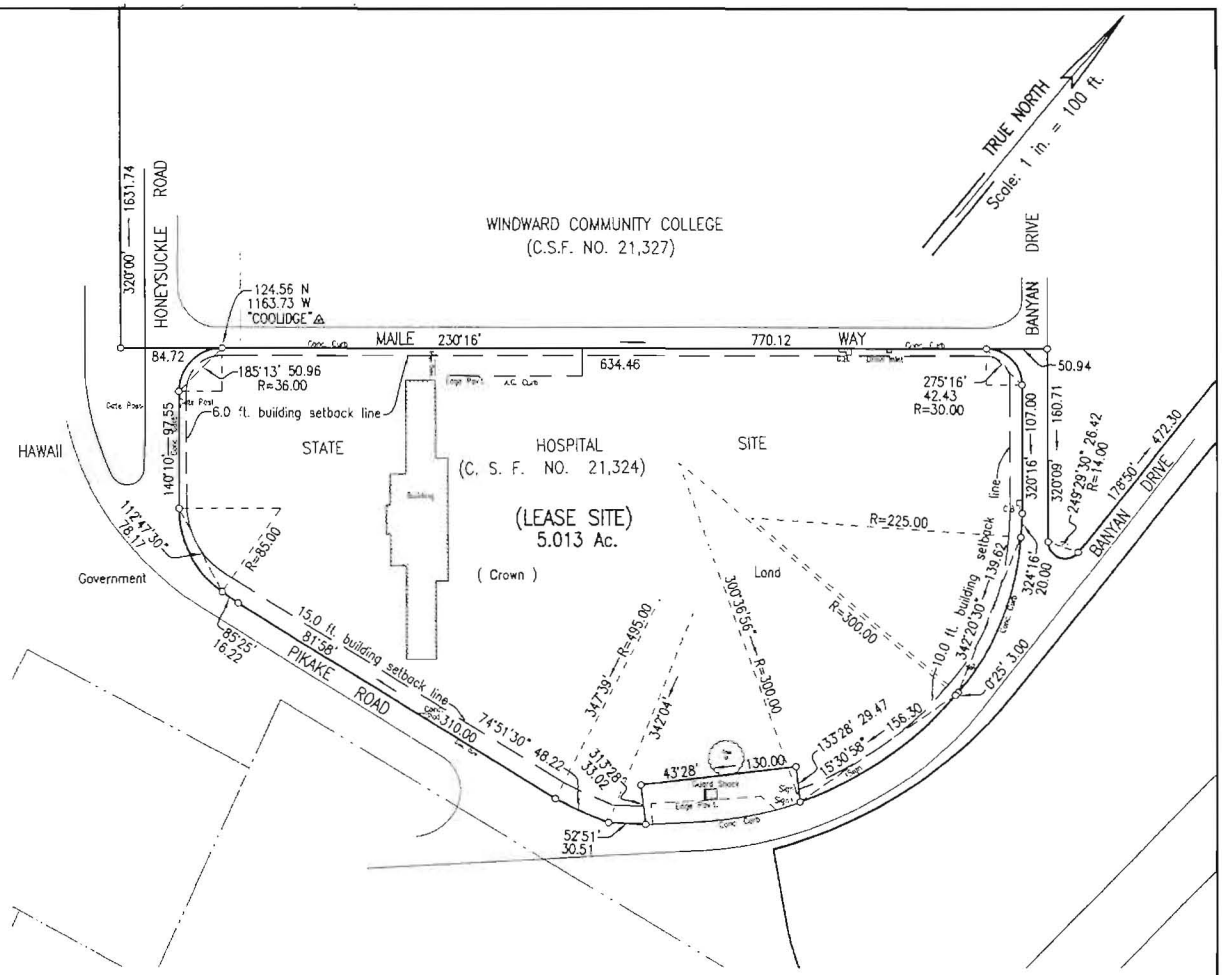
March 25, 2014: The director of health sent SHPD a letter requesting to demolish the Bishop Building.



ADMINISTRATIVE SERVICE OFFICE
DEPT. OF HEALTH
STATE OF HAWAII
P.O. Box 3378
Honolulu, Hawaii 96801

APPROVED
J. Messina
DEC 28 2009

12/4/09



PLAN SHOWING

LONG-TERM CARE FACILITY (LEASE SITE)

BEING A PORTION OF HAWAII STATE HOSPITAL

AT KEAAHALA, KANEOHE, KOOLAUPOKO, HAWAII

This work was prepared by me
or under my direct supervision

By: _____
Licensed Professional Land Surveyor
Certificate Number 3499
License Expires 4/10

FN: acad-09165-start.dwg

TMK: 4-5-23: 2 (por)
Job No. 09165

CONTROLPOINT SURVEYING, INC.
1150 SOUTH KING STREET, SUITE 1200
HONOLULU, HAWAII 96814

11" X 17"
December 2, 2009
FB 2917 Pg. 25

5.4.2 SHPD Letter to DOH (re: Bishop Demolition)

DAVID Y. IGE
GOVERNOR OF HAWAII

CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

W. ROY HARDY
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

LOG NO: 2015.02762
DOC NO: 1507AB24

SHPD Review
**Follow Up Required*

July 17, 2015

William J. May, Administrator
Hawaii State Hospital
Department of Health
State of Hawaii
45-710 Keaahala Road
Kaneohe, HI 96744

Dear Mr. May:

SUBJECT: Chapter 6E-8 Historic Preservation Review
Building Permit
Application No. None Submitted
45-710 Keaahala Road – Demolition
Kaneohe Ahupuaa, Koolaupoko District, Island of Oahu
TMK: (1) 4-5-023:002
Owner Name: Hawaii State Hospital

On June 19, 2015, the State Historic Preservation Division (SHPD) received the submittal for Section 6E-8 Historic Preservation Review. The Area of Potential Effect (APE) is **TMK (1) 4-5-023:002**, which measures approximately 84 Acres. The project scope of work includes demolishing the Bishop Building.

The Bishop Building is a long narrow structure located on the southeastern side of the Hawaii State Hospital campus. The building was constructed in the early 1930s and is now listed on the Hawaii State Register of Historic Places under Criteria A and C as a contributing resource to the Territorial Hospital campus. The building is not individually distinctive, but when placed in the context of the hospital complex, it makes a strong architectural statement related to the philosophy of providing more humane treatment and environments for the mentally ill.

The State Historic Preservation Division (SHPD) has consulted with the Hawaii and State Hospital and Department of Health multiple times over the previous year. The demolition of the Bishop Building had been stalled due to the fact that its preservation was a mitigation commitment for the demolition of the Goddard Building, which is also located on the Hawaii State Hospital Campus. This mitigation requested that the Bishop Building be kept and rehabilitated as a public information/education area for Hawaii State Hospital if possible. Through several meetings, Hawaii State Hospital agreed that the Bishop Building was not a reasonable location for a public information/education area because of the hospital's need for additional patient housing, security concerns regarding its close proximity to the hospital, and in order to respect the privacy of current hospital patients. Demolition of the Bishop Building will negatively affect the historic integrity of the historic hospital campus.

Based on the above information, SHPD's determination is **"historic properties affected".**

(Continued on Reverse)

***SHPD requests the following actions to be completed before permit issuance:**

ARCHITECTURE
- ☐ HABS[2] Choose an item.
- ☐ HAER[3] Choose an item.
- ☐ HALS[4] Choose an item.
- ☒ Intensive Level Survey
- ☐ Reconnaissance Level Survey
- ☐ Submit Floor Plans & Photographs
- ☐ Salvage Structure(s)

HISTORY & CULTURE
- ☐ Verify Protective Measures
- ☐ Site Visit

ARCHAEOLOGY
- ☐ Verify Preservation Measures
- ☐ Archaeological Inventory Survey
- ☐ Archaeological Monitoring Plan[1]
- ☐ Preservation Plan
- ☐ Field Inspection by Archaeologist

☒ Other: Continued Consultation (see below)

Hawaii State Hospital and SHPD have agreed that an Intensive Level Survey (ILS) will be the best mitigation for the demolition of the Bishop Building. SHPD looks forward to receiving the completed Intensive Level Survey (ILS) form, which can be found on SHPD's website under the Review and Compliance – Forms subsection. SHPD will notify you when the requested material has been reviewed, accepted, and SHPD's part of the review process is complete. SHPD acceptance of requested material is required prior to issuance of the permit. Any future work outside of the proposed scope identified in this review may be subject to additional SHPD review.

Additionally, SHPD and Hawaii State Hospital must continue discussions regarding an appropriate information/education area for the hospital's historic artifacts as required per the Goddard Building mitigation commitments. SHPD looks forward to continually working with Hawaii State Hospital to resolve this issue.

For **Architecture** questions, please contact Anna Broverman at (808) 692-8028 or at anna.e.broverman@hawaii.gov.
For **Archaeology** questions, please contact Susan A. Lebo, PhD at (808) 692-8019 or at susan.a.lebo@hawaii.gov.
For **History & Culture** questions, burials, or other cultural resources, please contact Regina Hilo at (808) 692-8026 or at regina.hilo@hawaii.gov

Mahalo,

Alan S.Downer, PhD
Administrator, Deputy State Historic Preservation Officer

---

1. Archaeological Monitoring Plan (AMP) for all ground disturbance activities associated with the project
2. Historic American Buildings Survey (HABS)
3. Historic American Engineering Record (HAER)
4. Historic American Landscape Survey (HLS)

In the event that historic resources, including human skeletal remains, cultural layers, cultural deposits, features, artifacts, or sinkholes, lava tubes or lava blisters/bubbles are identified during construction and/or other activities, cease all work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division (SHPD) immediately at (808) 692-8015 (Oahu)

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to
File

June 22, 2015

The Honorable John Morton
Vice President for Community Colleges
2444 Dole Street, Bachman 207
Honolulu, Hawaii 96822

5.4.3 DOH Letter to Community Colleges (re: Bishop Land Exchange)

Dear Mr. Morton:

Subject: ***Proposed Land Exchange with the Department of Health's Hawaii State Hospital***

This is in response to Chancellor Dykstra's presentation on May 21, 2015 at the Kaneohe Neighborhood Board which mentioned a proposed land exchange with the Hawaii State Hospital (HSH). The HSH understands that the Windward Community College (WCC) would like the HSH's "Bishop parcel" in exchange for an undeveloped area physically separate from the HSH campus.

The Department of Health's (DOH) Administration has reviewed the offer and has decided that it is not in the best interest of the Hawaii State Hospital (HSH) to relinquish any land to the WCC or any other entity that does not provide services in support of the DOH's mission. Therefore, the WCC should look for alternate sites that do not involve the HSH property when planning future development.

The HSH has recently completed its master plan, which includes the development of a long term care facility on the site of the Bishop Building. This public/private partnership will help to alleviate overcrowding in the Hospital. The master plan also outlines development at other locations at the HSH. All locations at the HSH campus will be utilized for patient care or ancillary services with the intent of upgrading the level of services for future patients.

The HSH is committed to working with the WCC, however it must be understood that the population of persons with severe mental illness will not diminish, and will most likely increase in the future. This places an enormous burden on the HSH to expand capacity.

It should be further noted that the HSH was constructed in Kaneohe at a time when there were few close neighbors. Over the years, the once vacant land around the Hospital was developed, to the point where the Hospital now has very close neighbors. Despite this fact, the Kaneohe community and the residents of this state continue to acknowledge the "Kaneohe Hospital" as the state's haven for treating persons with mental illness.

The HSH wishes to remain good neighbors with the WCC and hopes that we can work together on issues of mutual concern. Please contact me whenever an issue arises that must be mutually resolved so that we can move forward in improving our services for the residents of the Kaneohe community and the state of Hawaii.

Thanks John.

Sincerely,

Virginia Pressler, M.D.
Director of Health

c: Ms. Lynn Fallin Deputy Director for Behavioral Health Administration
Mr. Doug Dykstra, Chancellor, Windward Community College

5.5 2015 MASTER PLAN UPDATE PARTICIPANTS

5.5 PARTICIPANTS

The following DOH, Hospital, and DAGS staff members gave generously of their time and provided valuable input.

Department of Health

Dr. Virginia Pressler, Director

Lynn Fallin, Deputy Director, Behavioral Health Administration

Dr. Mark A. Fridovich, Administrator, Adult Mental Health Division

John Messina, Capital Improvements Coordinator

Hawaii State Hospital

William May, Administrator

Dr. William Sheehan, Medical Director

Robin Denton, Plant Operations Manager

Additional Hawaii State Hospital Staff:

Katrina Alabanza, Reynaldo Baguso, Peter Bediz, John Bryant, Robert Burns, Joseph Buxton, Dr. John Buzanoski, Katherine Carsten, Vivien Cayetano, Michael Champion, Nadine Correa, Catherine Davis, William Elliot, Stephan Espinueva, Mark Fleming, Curtis Fujimoto, Joan Fukumoto, Eileen Ganotisi, Rev. Jessica Gibo, Margaret Grant, Leona Guest, Karen Hara, Tracy Harada, Eddie Harrell, Nina Harrington, Run Heidelberg, Esther Hsu, Lawrence Imada, Mack Kalahiki, Lisa Kanda, Billy Kekuna, Gwen Kondo, Robert Kulesa, Carol LaFlamme, Faye Luke, Franklin Magnani, Lisa Matsumoto, Mark Mierwza, Allen Miho, James Nakanishi, Ron Nimcheski, Daylena Odom, Alicia Oh, Janet Phillips, Michael Quinn, Adrian Russell, Claude Saclusa, Patrick Sanchez, Tasi Santos, Lauri Saplad, Teri Silva, Anna Kanahele Simeona, Candace Sullivan, Clyde Tanabe, Glen Tani, Abe Tokioka, Ph.D., Brad Tolstedt, Edwin Ulsh, Deborah Wright, Gail Yoshimura, Leann Young

Department of Accounting & General Services

Brian Isa, Project Engineer, Planning Branch, Public Works Division

Joseph Earing, Section Head, Planning Branch, Public Works Division

Ralph Morita, Chief of Planning Branch, Public Works Division

5.5 PARTICIPANTS

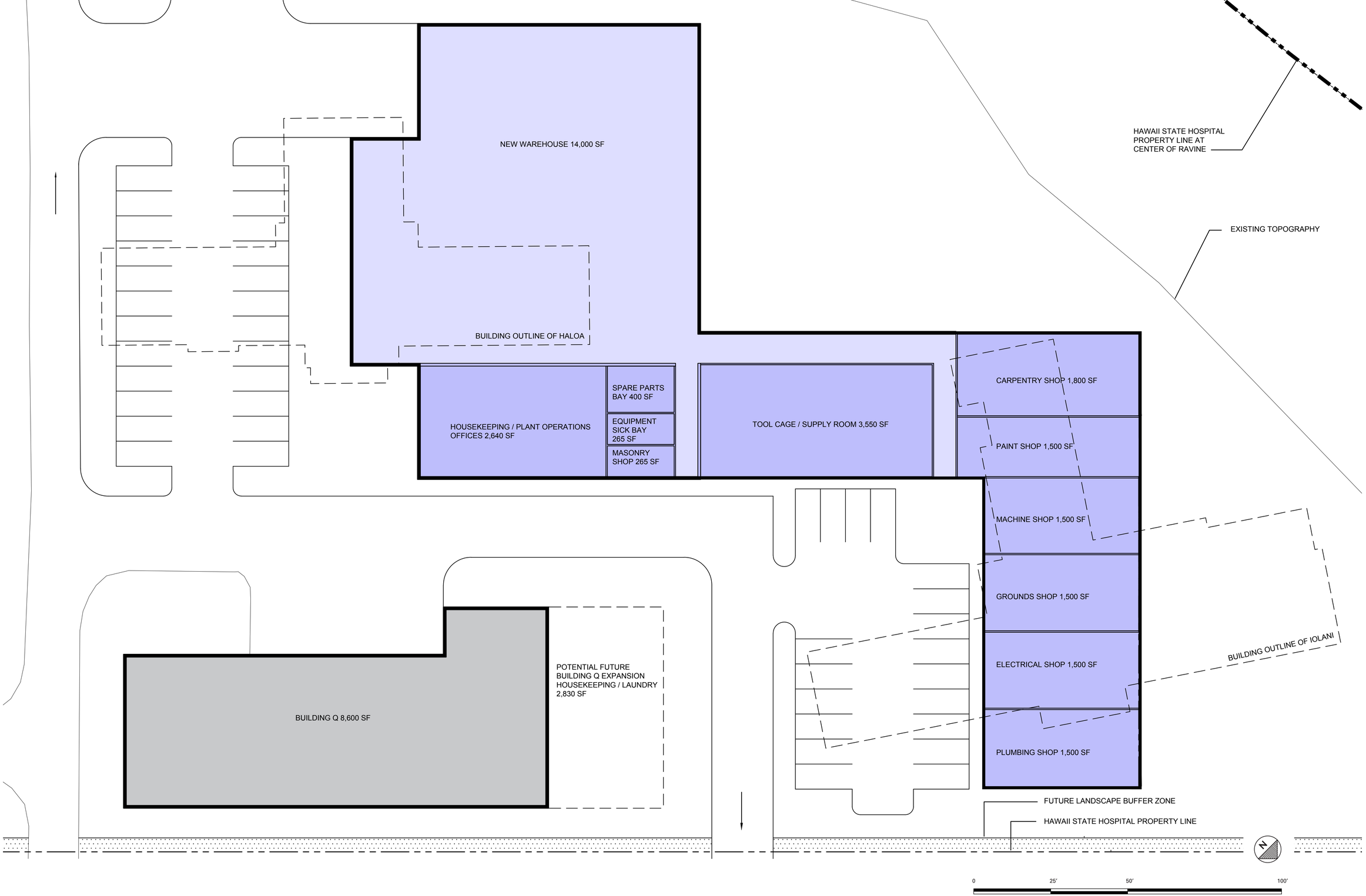
Architects Hawaii Project Team

Gary Marshall, Director of Healthcare

Mariel Moriwake, Associate, Planner

Mayleen Cuestas

5.6 PLANT OPERATIONS & WAREHOUSE PLAN



FUTURE PLANT OPERATIONS AND WAREHOUSE FACILITY CONCEPTUAL PLAN

33,440 GSF

HAWAI'I STATE HOSPITAL

ARCHITECTS HAWAII LIMITED

HAWAII STATE HOSPITAL | 2015 MASTER PLAN UPDATE

AUGUST 28, 2015 | DAGS JOB NO. 12-20-2698

5.7 SDOT BASE YARD LETTERS

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

JESSE K. SOUKI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 14, 2014

Ref. No.: EO4470

5.7.1 DLNR Letter to DOH (re: Executive Order No. 4470)

MEMORANDUM

TO: Linda M. Rosen, M.D., M.P.H., Director
Department of Health

FROM: William J. Aila, Jr., Chairperson
Board of Land and Natural Resources

SUBJECT: Governor's Executive Order No. 4470 Withdrawing Lands at Kaneohe, Koolaupoko, Oahu, TMK (1) 4-5-023:por.002

Enclosed for your records is one copy of Governor's Executive Order No. 4470 withdrawing 3.618 acres from Executive order No. 3504.

At its meeting of March 27, 1992, under agenda item F-9 (copy enclosed), the Board of Land and Natural Resources approved of and voted to recommend to the Governor the issuance of the subject executive order. The establishment of the subject baseyard is part of the highway improvements project in the neighborhood, including certain portions of the improved highway will be transferred to the City and County of Honolulu for future maintenance. Maps and legal description for the final configurations of the parcels were completed eventually.

If there are any questions, please feel free to contact Barry Cheung at 587-0430. Thank you for your attention to this matter.

Enclosures

11232

LAND COURT SYSTEM | REGULAR SYSTEM

Return by Mail ( ) Pickup ( ) To:

Total Number of Pages:

Tax Map Key No. (1) 4-5-023:Portion of 002

FROM: STATE OF HAWAII
DEPARTMENT OF HEALTH

TO: STATE OF HAWAII
BOARD OF LAND AND NATURAL RESOURCES
1151 Punchbowl Street
Honolulu, Hawaii 96813

EXECUTIVE ORDER NO. 4470

WITHDRAWING LAND FROM THE OPERATION OF
GOVERNOR'S EXECUTIVE ORDER NO. 3504
DATED FEBRUARY 14, 1991

WHEREAS, by Governor's Executive Order No. 3504 dated February 14, 1991, recorded in the Office of the Assistant Registrar of the Land Court of the State of Hawaii as Document No. 1803154, Transfer Certificate of Title No. 38,333, issued to the State of Hawaii as successor to the Territory of Hawaii, certain lands situate at Heeia, Keaahala, Kaneohe, Koolaupoko, Oahu, Hawaii were set aside for State Hospital Site Purposes; and

WHEREAS, the Board of Land and Natural Resources at its

meeting of March 27, 1992, approved the withdrawal of a portion of land from Executive Order No. 3504 dated February 14, 1991, for baseyard purposes.

NOW, THEREFORE, I, NEIL ABERCROMBIE, Governor of the State of Hawaii, by virtue of the authority vested in me under Section 171-11, Hawaii Revised Statutes, as amended, do hereby order that the following described land, identified as "Withdrawal Portion of Parcel 1 of Hawaii State Hospital Site, Governor's Executive Order 3504," situate at Keaahala, Kaneohe, Koolaupoko, Oahu, Hawaii, containing an area of 3.618 acres, more particularly described in Exhibit "A" and delineated on Exhibit "B," both of which are attached hereto and made parts hereof, said exhibits being respectively, a survey description and survey map prepared by the Survey Division, Department of Accounting and General Services, State of Hawaii, being designated as C.S.F. No. 25,347 and dated December 11, 2013, is hereby withdrawn from the Operation of Governor's Executive Order No. 3504 dated February 14, 1991.

SUBJECT to disapproval by the Legislature by two-thirds vote of either the Senate or the House of Representatives or by majority vote of both, in any regular or special session next following the date of this Executive Order.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Hawaii to be affixed. Done at the Capitol at Honolulu this 30th day of October, 2014.

Neil Abercrombie

pp NEIL ABERCROMBIE
Governor of the State of Hawaii

APPROVED AS TO FORM:

Pamela K. Matsukawa

PAMELA K. MATSUKAWA
Deputy Attorney General

Dated: Sept. 18, 2014

STATE OF HAWAII

Office of the Lieutenant Governor

THIS IS TO CERTIFY That the within is a true copy of Executive Order No. 4470 withdrawing land from the operation of Executive Order No. 3504, the original of which is on file in this office.

IN TESTIMONY WHEREOF, the Lieutenant Governor of the State of Hawaii, has hereunto subscribed his name and caused the Great Seal of the State to be affixed.

SHAN S. TSUTSUI
Lieutenant Governor of the State of Hawaii

DONE in Honolulu, this 3rd day of November, A.D. 2014

Department of the Attorney General

STATE OF HAWAI'I
SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
HONOLULU

C.S.F. No. 25,347

December 11, 2013

WITHDRAWAL
PORTION OF PARCEL 1 OF HAWAII STATE HOSPITAL SITE
Governor's Executive Order 3504

Keaahala, Kaneohe, Koolaupoko, Oahu, Hawaii

Being a portion of the Government (Crown) Land of Keaahala.

Being also Parcel 4 of Kaneohe Baseyard and Castle Hills Replacement Access Road, Project No. HWY-0-05-91.

Beginning at the northeast corner of this parcel of land, at the southeast corner of Koolaupoko District Courthouse and Other Allied Purposes Site, Governor's Executive Order 4199 and on the west side of Pookela Street, the coordinates of said point of beginning referred to Government Survey Triangulation Station "COOLIDGE" being 845.97 feet North and 265.76 feet West, thence running by azimuths measured clockwise from True South:-

1. 4° 32' 815.25 feet along the west side of Pookela Street;

2. Thence along the remainder of Parcel 1 of Hawaii State Hospital Site, Governor's Executive Order 3504 on a curve to the right with a radius of 30.00 feet, the chord azimuth and distance being: 49° 32' 42.43 feet;

3. 94° 32' 12.92 feet along the remainder of Parcel 1 of Hawaii State Hospital Site, Governor's Executive Order 3504;

EXHIBIT "A"

4. Thence along the remainder of Parcel 1 of Hawaii State Hospital Site, Governor's Executive Order 3504 on a curve to the right with a radius of 220.00 feet, the chord azimuth and distance being: 112° 24' 134.99 feet;

5. 130° 16' 58.73 feet along the remainder of Parcel 1 of Hawaii State Hospital Site, Governor's Executive Order 3504;

6. Thence along the remainder of Parcel 1 of Hawaii State Hospital Site, Governor's Executive Order 3504 on a curve to the left with a radius of 382.00 feet, the chord azimuth and distance being: 197° 07' 21" 239.75 feet;

7. 178° 50' 538.21 feet along the remainder of Parcel 1 of Hawaii State Hospital Site, Governor's Executive Order 3504;

8. 274° 32' 220.28 feet along Koolaupoko District Courthouse and Other Allied Purposes Site, Governor's Executive Order 4199 to the point of beginning and containing an AREA OF 3.618 ACRES.

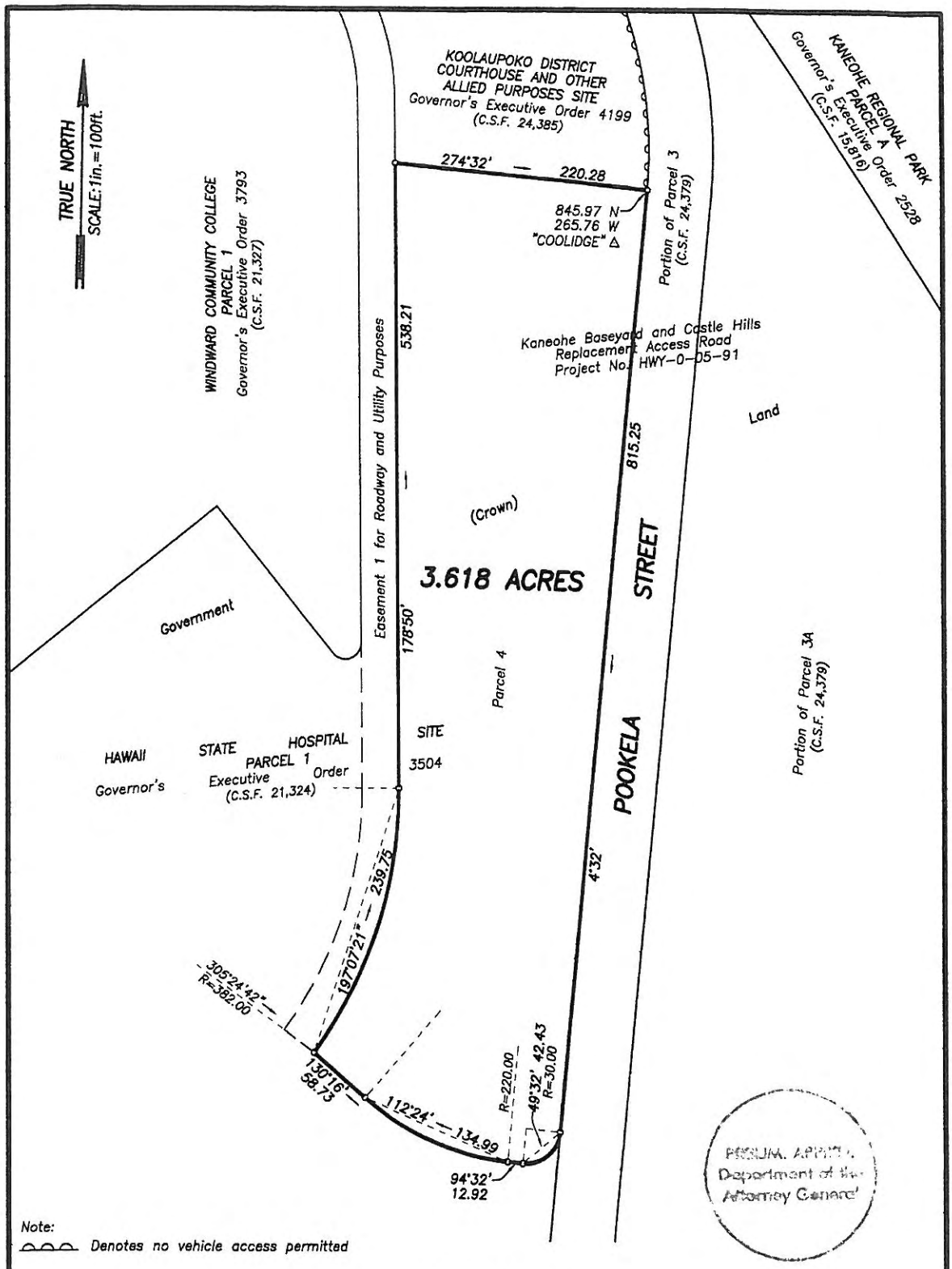
SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

By: _____
Gerald Z. Yonashiro
Land Surveyor

ry

Compiled from D.O.T. R-O-W map
and other Govt. Survey Records.

FILEUM, ARCHIVES
Department of the
Attorney General



WITHDRAWAL
PORTION OF PARCEL 1 OF HAWAII STATE HOSPITAL SITE
Governor's Executive Order 3504
Keaahala, Kaneohe, Koolaupoko, Oahu, Hawaii

Scale: 1 inch = 100 feet

JOB 0-284(13)

C. BK.

REDUCED NOT TO SCALE

EXHIBIT "B"

TAX MAP 4-5-23: Por. 02

SURVEY DIVISION
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
STATE OF HAWAII

C.S.F. NO. 25,347

GZY December 11, 2013

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF LAND MANAGEMENT
P. O. BOX 621
HONOLULU, HAWAII 96809

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

March 27, 1992

Board of Land and
Natural Resources
Honolulu, Hawaii

OAHU

SUBJECT: The Department of Transportation Request (1) Cancellation of Executive Order No. 3432, (2) Withdrawal of Land from Executive Order No. 3504, (3) Set Aside to Department of Transportation and Grant Construction Right of Entry State Hospital Site, Kaneohe, Koolaupoko, Oahu, TMK 4-5-23: 1 and Por. 3

STATUTE: Chapter 171-11, Hawaii Revised Statutes

REMARKS: In conjunction with its project 63A-05-68 and Windward Baseyard, the Department of Transportation requests the following:

(1) Cancellation of Executive Order No. 3432.

(2) Withdraw portion of land (14.377 plus acres) from the operation of Governor's Executive Order No. 3504 encumbered by Department of Health.

(3) Reset aside the withdrawn land for highway purposes, baseyard and setback.

(4) Immediate right of entry to State land encumbered by Executive Order No. 3504 to the Department of Health for the purpose of constructing a baseyard and also construct an access roadway across the State land to Castle Hill subdivision.

The Department of Transportation has requested cancellation of Executive Order No. 3432 which set aside the parcel to Department of Transportation for baseyard purposes.

The baseyard was to be located near the intersection of Kahekili Highway and Keaahala Road. However, prior to Department of Transportation occupying the site, it was learned that the Department of Health has future plans to build faculty facilities for the State Mental Hospital located in Kaneohe at the

APPROVED BY THE BOARD OF
LAND AND NATURAL RESOURCES
AT ITS MEETING HELD ON
3-27-92

ITEM F-9

REMARKS: (continued)

site. To date, however, the Department of Health is not prepared at this time to develop the site. The lands will be returned to us as unencumbered State lands.

The subject State lands affected by the project (63A-05-68 and baseyard) are shown on the Department of Transportation right of way map (Castle Hills replacement access road) dated April 23, 1991 labeled Land Board Exhibit A-C and appended to the basic file which are further described as follows:

	Tax Map Key No.	Area/Acreage
Parcel 1 Baseyard	4-5-23:02	3.618
Parcel 1 Easement	4-5-23:02	0.841
Parcel 2 Roadway	4-5-23:02	0.073
Parcel 2 Remainder Remnant	4-5-23:02	0.014
Parcel 3 Roadway	4-5-23:02	2.725
Parcel 3 Remainder Remnant	4-5-23:02	7.066

The public purpose for the project is to provide an ingress and access to Castle Hill Subdivision when the "temporary" access from Likelike Highway is permanently closed in connection with the Kaneohe Interchange of H-3. Also, the project is to provide a baseyard for Department of Transportation for storage of roadway material use for maintenance of H-3 Highway system.

The Department of Health has no objection to withdrawal of land from Executive Order No. 3504. According to the Department of Transportation, they are now in the process of constructing the Windward Baseyard and have plans to commence constructing the (access road) Po'okela Street extension to Castle Hill Subdivision. Estimated construction cost is 1.5 million dollars ($1,500,000.00). The State fund were obtained under Act 229 Session Laws of Hawaii 1990.

The Department of Transportation consulted with the City and County of Honolulu regarding incorporating the remnant areas into the right of way for the access road which in the future will be dedicated to the City and County of Honolulu.

The City preliminary feedback is that they will accept only land needed for the road.

REMARKS: (continued)

Regarding Keaahala Road and the new access road to Castle Hill Subdivision, the Department of Transportation will improve and build the roads to meet City and County of Honolulu's specification for the purpose of dedicating the roadways to the City and County of Honolulu. Department of Transportation will notify Land Management upon completion of the roadway for the purpose of effectuating a withdrawal of the roadway from the Executive Order to convey in fee the roadway to the City and County of Honolulu.

The Department of Transportation has applied to Department of Land Utilization for subdivision approval of the project. In addition, Department of Transportation has prepared and forwarded (June, 1991) the Environmental Assessment and Notice of Negtive Declaration to be published in the Office of Environmental and Quality Control Bulletin as stipulated within Chapter 343, Hawaii Revised Statutes.

RECOMMENDATION:

That the Board:

A. Approve of and recommend to the Governor issuance of an executive order cancelling the operation of Governor Executive Order No. 3432.

B. Approve of and recommend to the Governor issuance of an executive order withdrawing portion of the above-described approximate 14.377 plus acres from the operation of Governor's Executive Order No. 3504.

C. Approve of and recommend to the Governor issuance of an executive order setting aside the aforementioned 14.377 plus acres and portion of Keaahala Road as shown and described on Land Board Exhibit "D" appended to the basic file under the management and jurisdiction of the Department of Transportation, Highways Division for baseyard and road purposes subject to the following:

3 618 [illegible]

1. Disapproval by the legislative by two-third vote of which the Senate or the House of Representative or by the majority vote of both in any regular or special session next followng the date of the set aside.

RECOMMENDATION: (continued)

2. That upon cancellation of the Executive Order No. 3432 and/or abandonment of the premises for the stated purposes, the premises shall be restored to a condition acceptable to the Department of Land and Natural Resources.

E. Grant the State Department of Transportation, Highways Division a right of entry to the above-described State lands for construction purposes, subject to the following conditions:

1. The State Department of Transportation's contractor, as its consultant, agent or representative shall indemnify, defend and hold harmless the State of Hawaii against loss, liability but not limited to interest in or claim for property damage, personal injury or death arising out of any activity of the contractor, its agent, consultant, representative, subcontractor and employees under the right of entry.

2. Actual entry shall be coordinated with the Department of Health.

3. Concurrence of the Governor.

4. In the event any unanticipated site or remains such as shell, bones or charcoal deposits, human burials, rock or coral alignments, paving or wall are encountered during construction activities, the Department of Transportation, its contractor and subcontractor shall stop work immediately and contact the Historic Preservation Office, telephone 587-0045.

5. That the Department of Transportation comply with all applicable statutes, ordinances, rules and regulations of the Federal, State and County governments.

6. That the Department of Transportation, its consultant and/or its contractor, shall act on behalf of the State of Hawaii Department of Land and Natural Resources in obtaining the necessary map and survey for consolidation and subdivision approval.

Board of Land and
Natural Resources

March 27, 1992

RECOMMENDAITON: (continued)

7. Other terms and conditions that the Chairperson may prescribe.

8. Any other terms and conditions as may be prescribed by the Chairperson.

Respectfully submitted,

W. Mason Young

W. MASON YOUNG
Land Management Administrator

APPROVED FOR SUBMITTAL:

John P. Keppeler

WILLIAM W. PATY, Chairperson

NEIL A. ABERCROMBIE
GOVERNOR OF HAWAII

LORETTA J. FUDDY, A.C.S.W., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to
File:
ASO D14-133

September 23, 2013

5.7.2 DOH Letter to DLNR (re: Executive Order No. 4470)

TO: The Honorable William J. Aila, Jr., Chairperson
Department of Land and Natural Resources

FROM: Loretta J. Fuddy, A.C.S.W., M.P.H.
Director of Health

SUBJECT: ***Request to Retain Hawaii State Hospital Property Currently Used by the Department of Transportation***

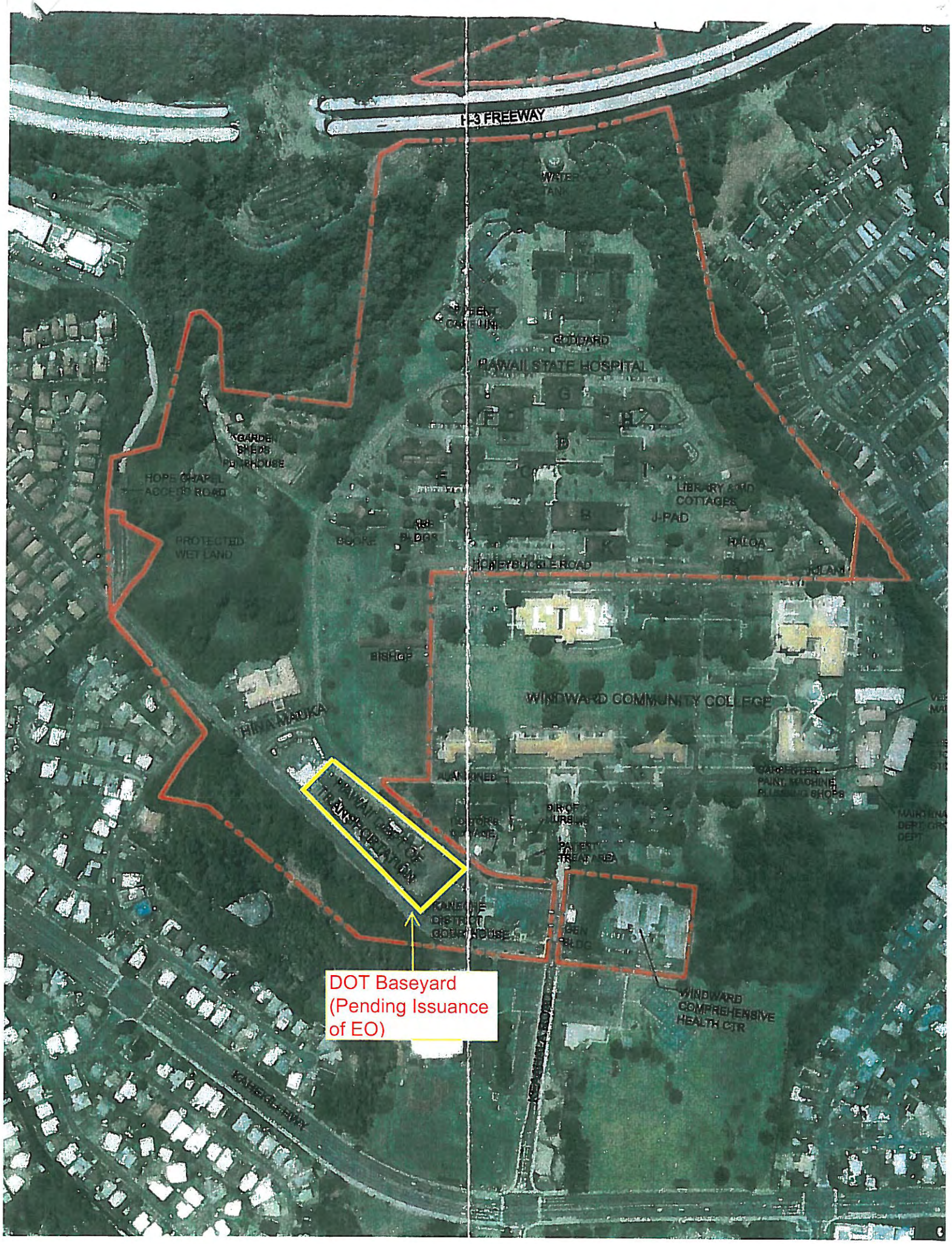
It is my understanding that the Department of Land and Natural Resources (DLNR) is in the process of preparing an Executive Order (EO) to have Hawaii State Hospital (HSH) property, which is currently occupied by the Department of Transportation (DOT), transferred permanently to the DOT.

I am requesting that the EO not be sent to the Governor for approval. The HSH has a definite need for this property, which was designated specifically for use as a hospital for persons with mental illness. The HSH is accepted by the Kaneohe community and, for this reason, must retain all of its property for use as a hospital. It would be a severe hardship for the DOH to secure an alternative location where the HSH will be welcome.

At this time, the DOH wishes to enter into a Memorandum of Understanding to allow the DOT use of the property for a limited period of time. The DOT will be given adequate notice to vacate the site once the DOH receives capital improvement funds for construction or is able to enter into an agreement with a private entity for construction of a facility and provision of services.

Thank you for your consideration in this matter.

Attachment


H-3 FREEWAY
WATER TANK
GODDARD
HAWAII STATE HOSPITAL
HOPE CHAPEL ACCESS ROAD
PROTECTED WET LAND
LIBRARY AND COTTAGES
J-PAD
BISHOP
WINDWARD COMMUNITY COLLEGE
HINA MAUKA
HAWAII DEPT OF TRANSPORTATION
DOT Baseyard (Pending Issuance of EO)
WINDWARD COMPREHENSIVE HEALTH CTR

Appendix F: DOH Memorandums

July 12, 2016; October 20, 2016

- Confirmation of Continued Use and Operation of Guensberg Building after Completion of the 144-Bed New Patient Facility at the Hawai‘i State Hospital;
- Significant Differences Between 2015 Master Plan Update and Draft Environmental Impact Statement (DEIS)

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

DAVID Y. IGE
GOVERNOR

COMPTROLLER'S OFFICE
DAGS
2016 JUL 14 P 2:23

DOUGLAS MURDOCK
COMPTROLLER
AUDREY HIDANO
Deputy Comptroller

(P)1194.6

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

JUL 12 2016

MEMORANDUM

TO: The Honorable Virginia Pressler, M.D.
Director of Health

FROM: Audrey Hidano
Deputy Comptroller

SUBJECT: Confirmation of Continued Use and Operation of Guensberg Building after Completion of the 144-Bed New Patient Facility at the Hawaii State Hospital
DAGS Job No. 12-20-2701

This is to request a written confirmation of the status of Guensberg Building after completion of the New Patient Facility so that we may properly prepare the Draft Environmental Impact Statement (DEIS) for the Hawaii State Hospital. We understand that:

1. In the 2015 master plan update, the plan indicated that after the new 144-bed Patient Facility is built and operational, the Guensberg Building would be vacated (and not used) and later demolished before the new replacement Guensberg patient facility is constructed.

2. Because of the continued high census of patients, the DOH staff indicated a need to retain the Guensberg Building's 70 beds (total) after the new 144-bed Patient Facility is built (for a total of 322 beds on campus) until such time the DOH receives an appropriation for the demolition and construction of a replacement patient facility at the Guensberg site. The DOH understands that this operational decision will impact site parking, utilities, site access, and operation costs and will be noted in the DEIS.

Please confirm our understanding by signing below. We request a response by July 15, 2016 to keep our project on schedule.

13972

16-003255

If you have any questions, please call me at 586-0402 or your staff may call Mr. Brian Isa of the Public Works Division at 586-0484.

BI:mo

The DOH requests that the Environmental Impact Statement reflect the hospital's need to retain the Guensberg Building and continuance of the 70-bed facility operations after the new 144-bed Patient Facility is completed, until such time the DOH receives an appropriation for the demolition and construction of a replacement patient facility at the Guensberg site.

Date: 7-14-16

VIRGINIA PRESSLER, M.D.

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
EMD/CWB

10004PDCL.16

October 17, 2016

MEMORANDUM

To: John Messina, Capital Improvement Coordinator
Administrative Services Office

From: Alec Wong, P.E., Chief
Clean Water Branch

SUBJECT: Notice of Intent (NOI) to Request Coverage Under the National Pollutant Discharge Elimination System (NPDES) Small Municipal Separate Storm Sewer System (MS4) General Permit for the Department of Health (DOH) State Hospital Island of Oahu, Hawaii File No. HI 11KD929

The Department of Health (DOH), Clean Water Branch (CWB) has reviewed your NOI submission to request coverage under the NPDES Small MS4 general permit. Based on our review, it appears that this facility does not meet the definition of a small MS4 found in Hawaii Administrative Rules 11-55-1 and 40 CFR 122.26(b)(16)(iii). From 40 CFR 122.26(b)(16): "Small municipal separate storm sewer system means all separate storm sewers that are: (i) Owned and operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States. (ii) Not identified as "large" or "medium" municipal separate storm sewer systems pursuant to paragraphs (b)(4) and (b)(7) of this section, or designated under paragraph (a)(1)(v) of this section. **(iii)** This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. **The term does not include separate storm sewers in very discrete areas, such as individual buildings.**"

If you wish to withdraw your NOI, please inform the DOH-CWB Engineering Section, else your NOI will be terminated on December 6, 2016, the date the Small MS4 general permit expires.

If you would like to obtain coverage under the NPDES Small MS4 general permit, please contact the CWB as soon as possible, as the Notice of General Permit Coverage will need to be issued, and you must submit the renewal NOI.

Please note that while it appears that your facility is not subject to a NPDES MS4 permit, you could still be designated under 40 CFR 122.26(a)(1)(v) or 40 CFR 122.26(a)(9)(i)(C) or (D). Further, regardless of permit status (permitted or unpermitted), you are still required to comply with Hawaii Administrative Rules, Chapters 11-54 and 11-55.

If you have any questions, please contact Mr. Darryl Lum of the Engineering Section, CWB, at (808) 586-4309.

DCL:st

c: Mr. John Messina, DOH [via e-mail john.messina@doh.hawaii.gov]
Mr. Corey Matsuoka, SSFM International, Inc.
[via e-mail cmatsuoka@ssfm.com only]

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
COMPTROLLER

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

OCT 20 2016

(P)1304.6

MEMORANDUM

TO: The Honorable Virginia Pressler, M.D., Director
Department of Health

FROM: Audrey Hidano
Deputy Comptroller

SUBJECT: Significant Differences Between 2015 Master Plan Update and Draft Environmental Impact Statement (DEIS)
Hawaii State Hospital, Patient Facility
DAGS Job No. 12-20-2701

This is to request your concurrence of the following significant differences between the 2015 Master Plan Update and the proposed New Patient Facility program changes as presented in the DEIS for the New Patient Facility and Campus Master Plan Development. The differences are as follows:

A. 2015 Master Plan Update shows a pedestrian bridge with elevator that would link Building G to the 2nd floor the New Patient Facility.

Propose to delete pedestrian bridge from Building G to the 2nd floor of the New Patient Facility.

Background: During the New Patient Facility program update phase, it was decided to have one main entry into the building for better management and control of staff and visitors that would be located on the mauka side of the building. Thus, a makai side pedestrian bridge into the building would not be practical and not needed. To provide for pedestrian and staff accessibility, a new elevator and stairway is proposed to link the lower campus (Building G level) to the ground level of the New Patient Facility which will also have a walkway leading to the mauka side building entrance.

B. 2015 Master Plan Update shows floor to floor heights of 14 feet and a flat roof.

Propose to increase the floor to floor heights which would increase the overall building height. Also, propose to have a sloped roof which would also increase the overall building height.

Background: During the New Patient Facility program update phase, the building's floor to floor height was increased from 14 feet to 17 feet to allow for structural and infrastructure clearances (beams, air conditioning ducts, cable trays, etc.) and to allow for finished ceiling heights varying from 11 feet to 12 feet. A sloped roof is being proposed to comply with the Master Plan Design Guidelines.

C. 2015 Master Plan Update did not indicate a long term chiller plant plan. The 2005 Master Plan indicated three (3) options for the main chiller plant.

Propose to have the New Patient Facility provide a new chiller plant that will serve the New Patient Facility and be expandable for a future Patient Facility at the Guensberg Building site. Also propose that, in the future, long term planning include the upgrade of the current chiller plant at Building Q to serve the entire campus, thereby removing the chiller plant from the New Patient Facility.

Background: The option to create a main chiller plant at the location of the New Patient Facility is space limited and not feasible. The option to upgrade the existing main chiller plant to accommodate the New Patient Facility was not implemented. Thus, the remaining option is as noted above.

Please confirm your acceptance of the significant differences from the Master Plan by signing below. We request a response before October 24, 2016 to keep our project on schedule.

If you have any questions, please call me at 586-0402 or your staff may call Mr. Brian Isa of the Public Works Division at 586-0484.

c: Mr. John Messina, DOH
Mr. Harold Inouye, Anbe, Aruga & Ishizu, Architects, Inc.

☑ CONCUR ☐ DO NOT CONCUR

Virginia Pressler

Date: OCT 20 2016

VIRGINIA PRESSLER, M.D.
Director of Health

Appendix G: Kāne‘ohe Neighborhood Board Presentation

September 15, 2016

Hawai‘i State Hospital New Patient Facility & Campus Update Fact Sheet

Hawai‘i State Hospital New Patient Facility & Campus Update Presentation Slides

Hawai‘i State Hospital New Patient Facility & Campus Update Meeting Agenda

Hawai‘i State Hospital New Patient Facility & Campus Update Meeting Minutes

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

HAWAI'I STATE HOSPITAL

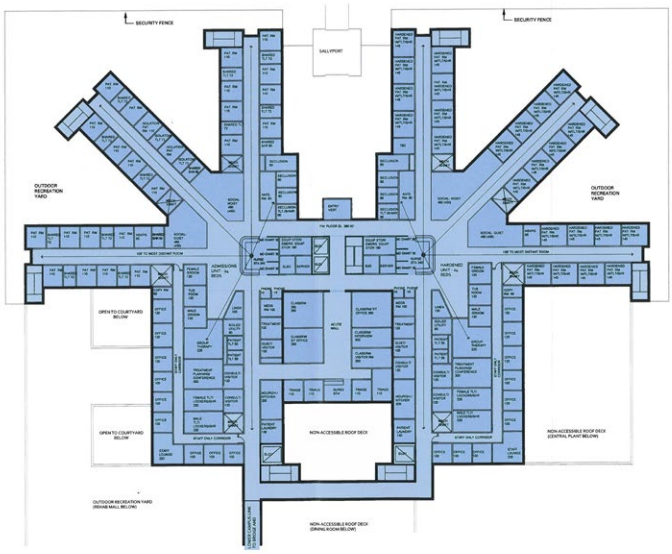
NEW PATIENT FACILITY & CAMPUS UPDATE

HOSPITAL BACKGROUND

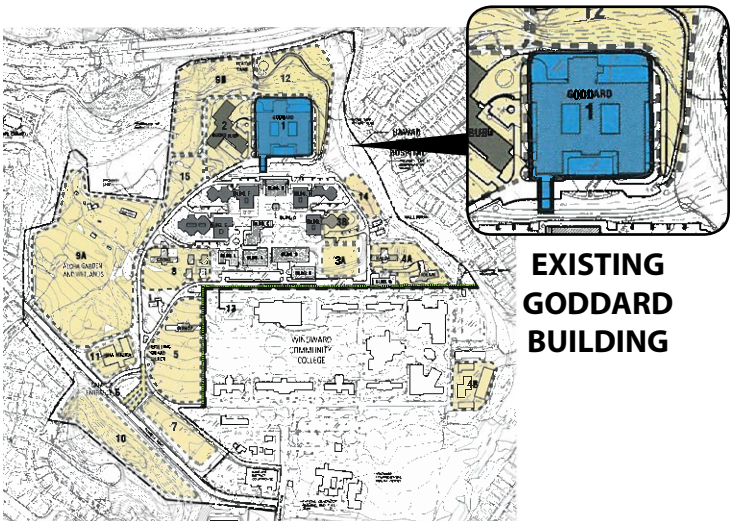
- Originally built in 1932 as the Territorial Hospital to replace the O'ahu Insane Asylum on School Street
- Later renamed to Hawai'i State Mental Hospital; and, now Hawai'i State Hospital (HSH)
- Owned and operated by the State of Hawai'i Department of Health (DOH) Adult Mental Health Division (AMHD)
- Only hospital in the state where patients are admitted and discharged according to judicial order

EXISTING CONDITIONS

- 92-acre campus naturally isolated by ravines, steep mountains, and residential communities
- The Hawai'i State Department of Health developed the Hawai'i State Hospital Master Plan in 2005 and Master Plan Update in 2015 to address the increasing patient population by specifically designing care for high-risk patients; improve safety for patients, staff and the public; and maximize operational efficiency to ensure the ongoing viability of the hospital's operations



CONCEPTUAL FIRST FLOOR PLAN - NEW PATIENT FACILITY



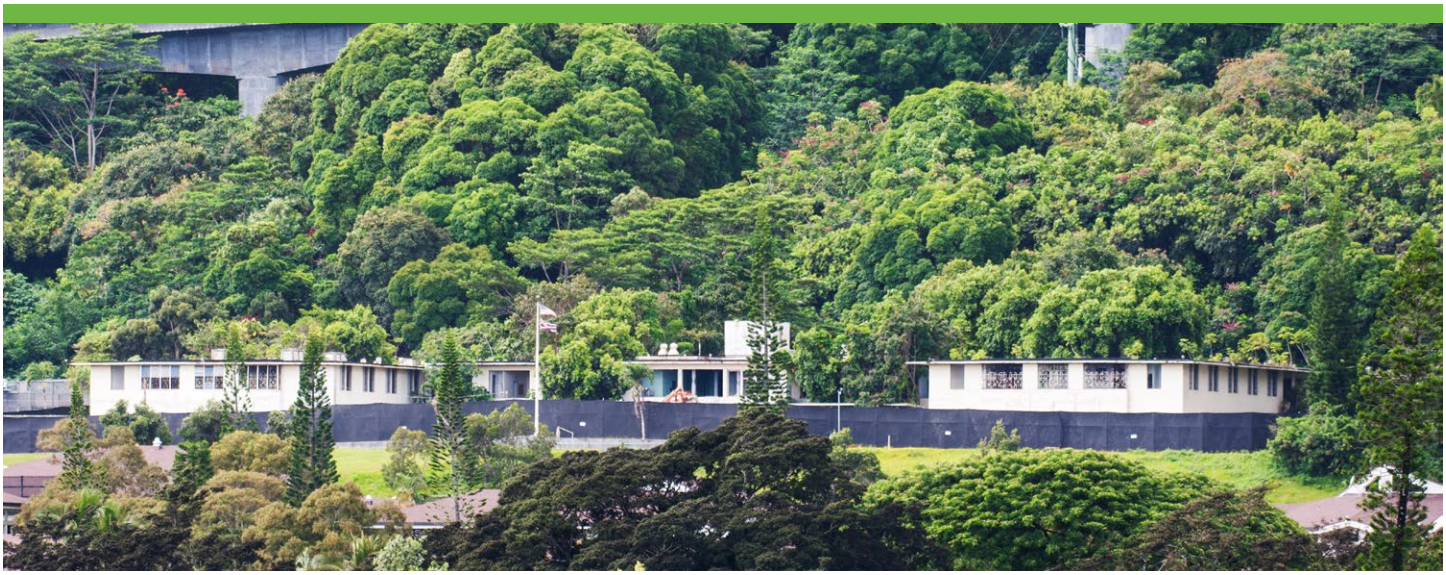
EXISTING GODDARD BUILDING

MASTER PLAN FEATURES

- 15 planning zones
- Increase patient capacity from existing 178 beds to grow with rising census figures
- Improve safety for patients, employees and the surrounding community
- Define boundaries between the hospital and Windward Community College campus through landscaping
- Replace dilapidated and defunct Goddard Building with a New Patient Facility
- EIS for the New Patient Facility & HSH Master Plan is currently in development

FIRST PHASE: NEW PATIENT FACILITY

- There is an urgent need to move forward with the EIS and PRU review process in order to move forward with construction of the new facility
- The 2016 Legislature appropriated $160 million for the planning, design and construction of the new facility
- New Patient Facility will replace the existing Goddard Building (which is currently being demolished under a separate project) and has been vacant for over a decade
- 144 new beds with rehabilitation mall, dining room, central courtyard, gym and recreational area to provide self contained care and minimize patient travel
- Security fencing, lighting and closed circuit television to reduce the potential for patient elopement and enhance community safety
- Design to provide clear lines of sight from a central nursing station



Existing Goddard Building

LONG-TERM PLAN MAIN FEATURES

- Five existing patient care buildings (E, F, H, I and Guensberg) totaling 178 beds will remain in operation
- Upon completion of the new facility, HSH will evaluate its resources and needs in order to determine its plan for the Guensberg Building
- A Skilled Nursing Facility will be constructed (as a separate project) at the existing Bishop Building site, and its environmental impacts will be evaluated and addressed in a separate document
- Maintenance shop and plant operations will be relocated from shared Windward Community College property
- Site entrance and gateway improvements
- Additional site parking

NEXT STEPS

OCTOBER 2016
Draft Environmental Impact Statement (EIS) completed and published. 60-day public comment period begins.

DECEMBER 2016
Goddard Building demolition completed

MID 2017
City Plan Review Use (PRU) Application processed

APRIL 2017
Final EIS completed and published

LATE 2017
Request for Proposals (RFP) from contractors issued

MID 2018
New Patient Facility construction awarded

DEC 2020
New Patient Facility construction completed

FOR MORE INFORMATION CONTACT: BRIAN ISA, DAGS PROJECT ENGINEER AT **(808) 586-0484** OR **BRIAN.S.ISA@HAWAII.GOV**

HAWAI'I STATE HOSPITAL

HAWAIʻI STATE HOSPITAL

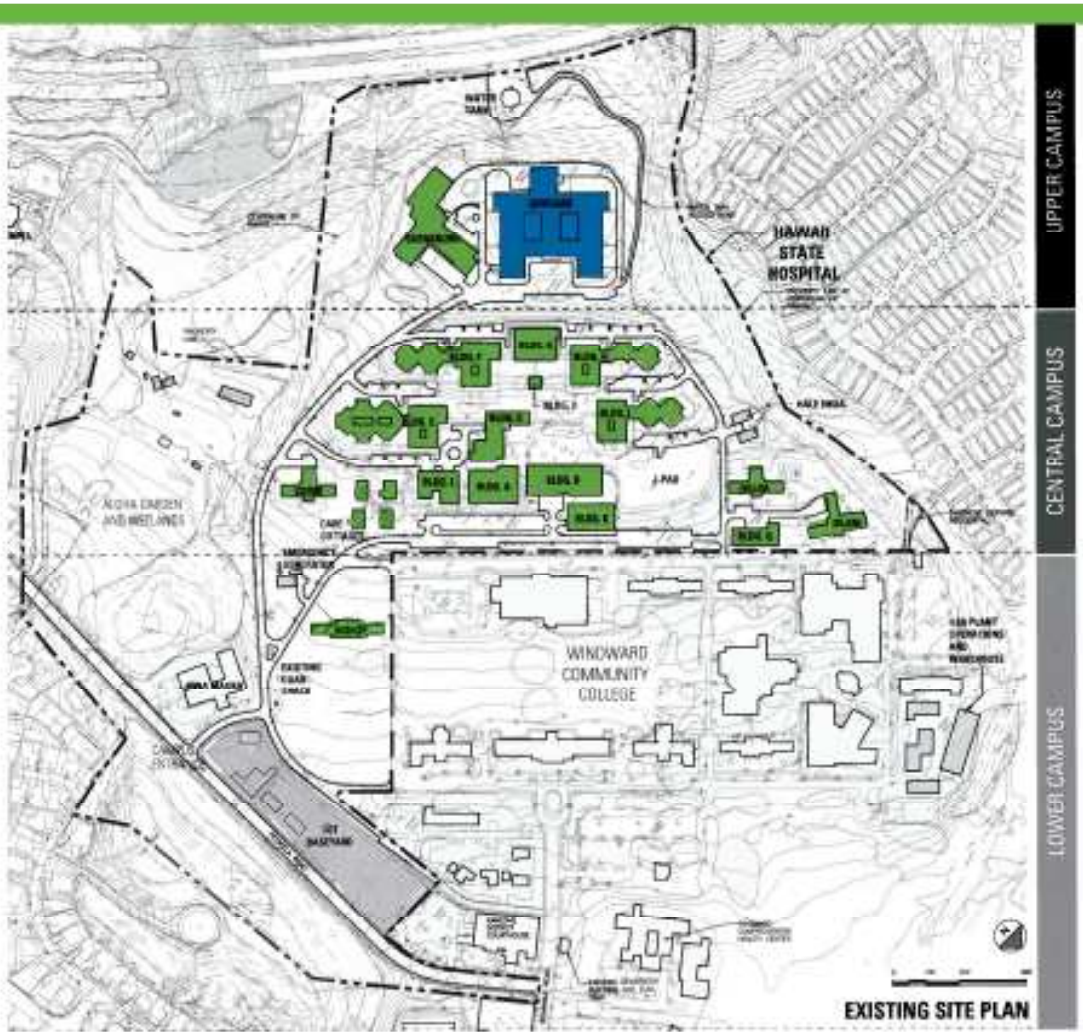
NEW PATIENT FACILITY & CAMPUS

KĀNEʻOHE NEIGHBORHOOD BOARD PRESENTATION

9 . 15 . 2016

BACKGROUND

- Originally built in 1932 as the Territorial Hospital and replaced the Oʻahu Insane Asylum on School Street
- Later renamed to Hawaiʻi State Mental Hospital; and, now Hawaiʻi State Hospital (HSH)
- Owned and operated by the State of Hawaiʻi Department of Health (DOH) Adult Mental Health Division (AMHD)
- Only hospital in the state where patients are admitted and discharged according to judicial order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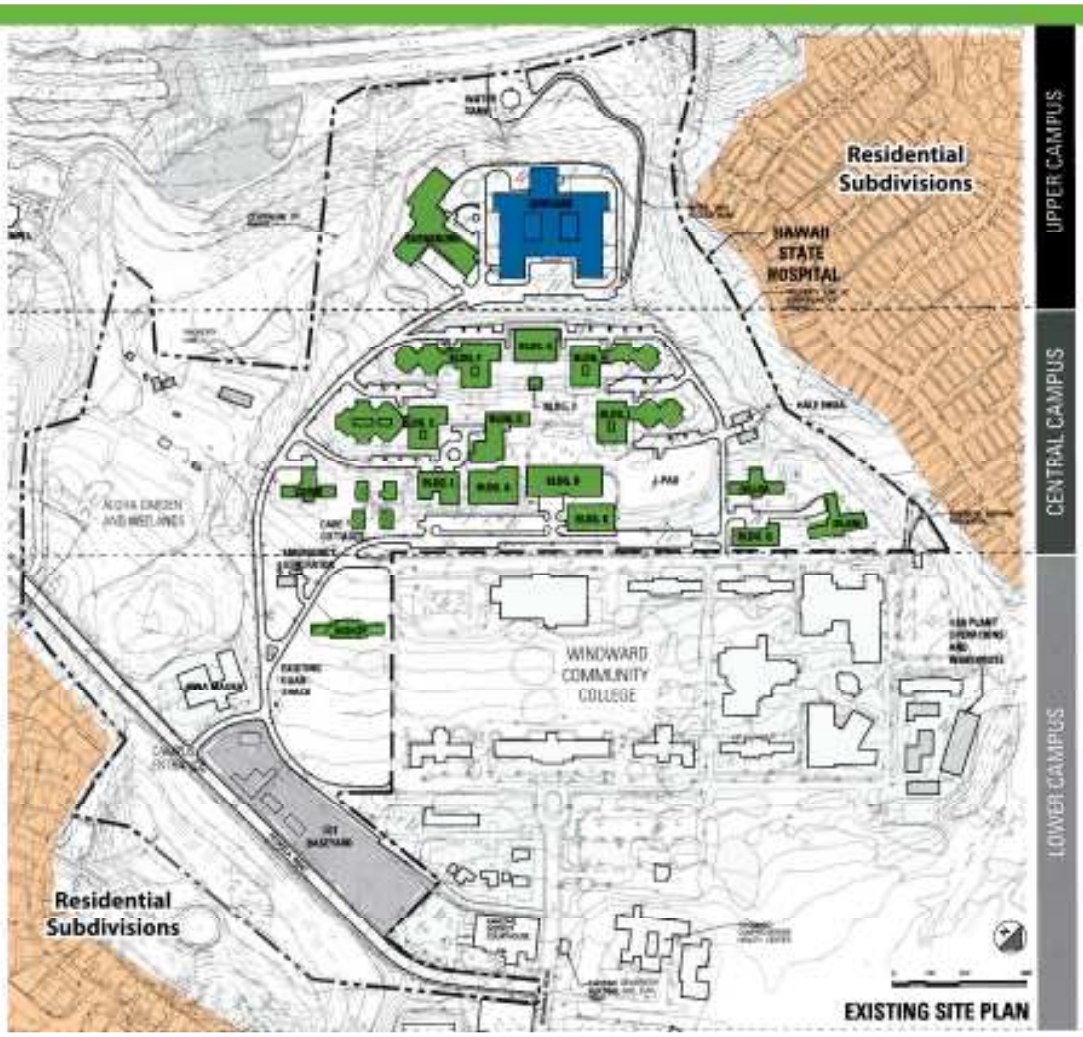
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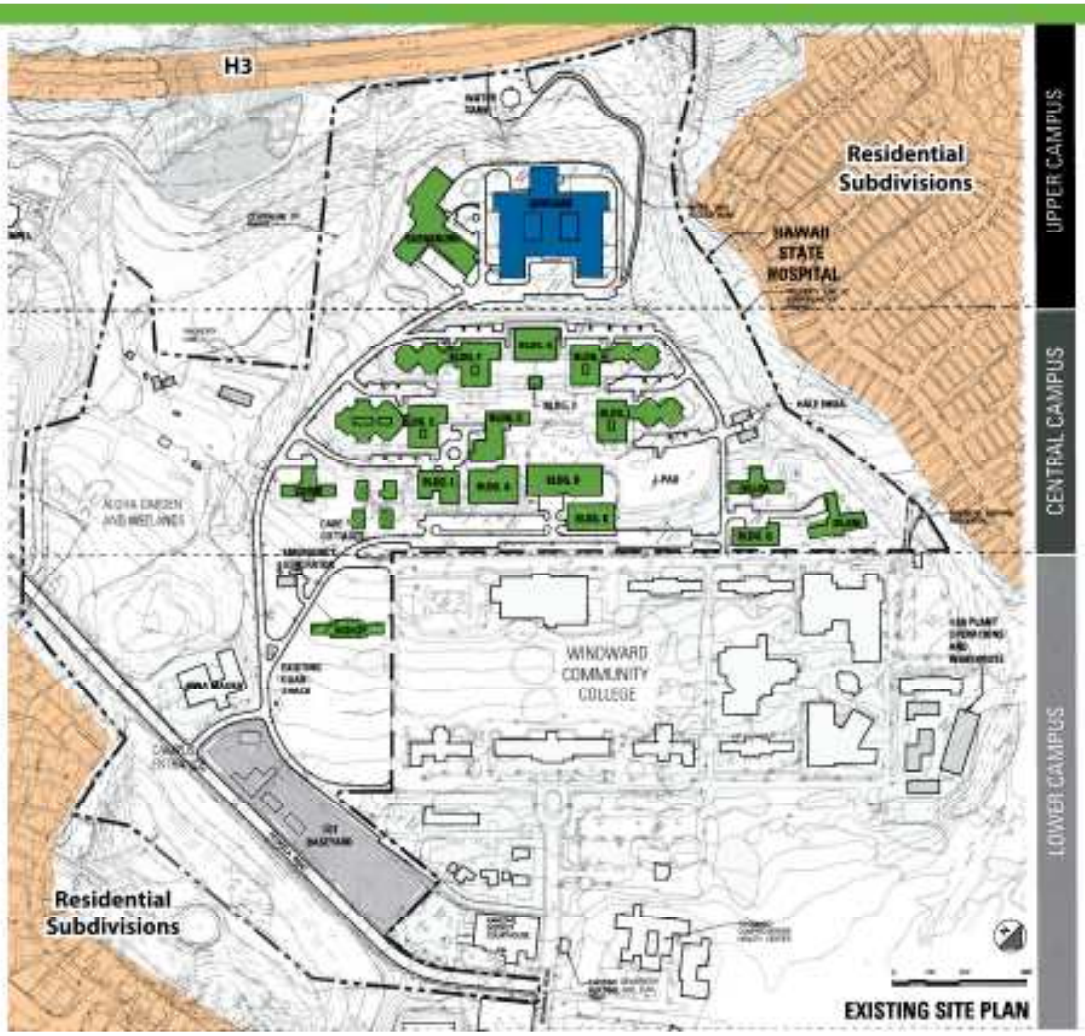
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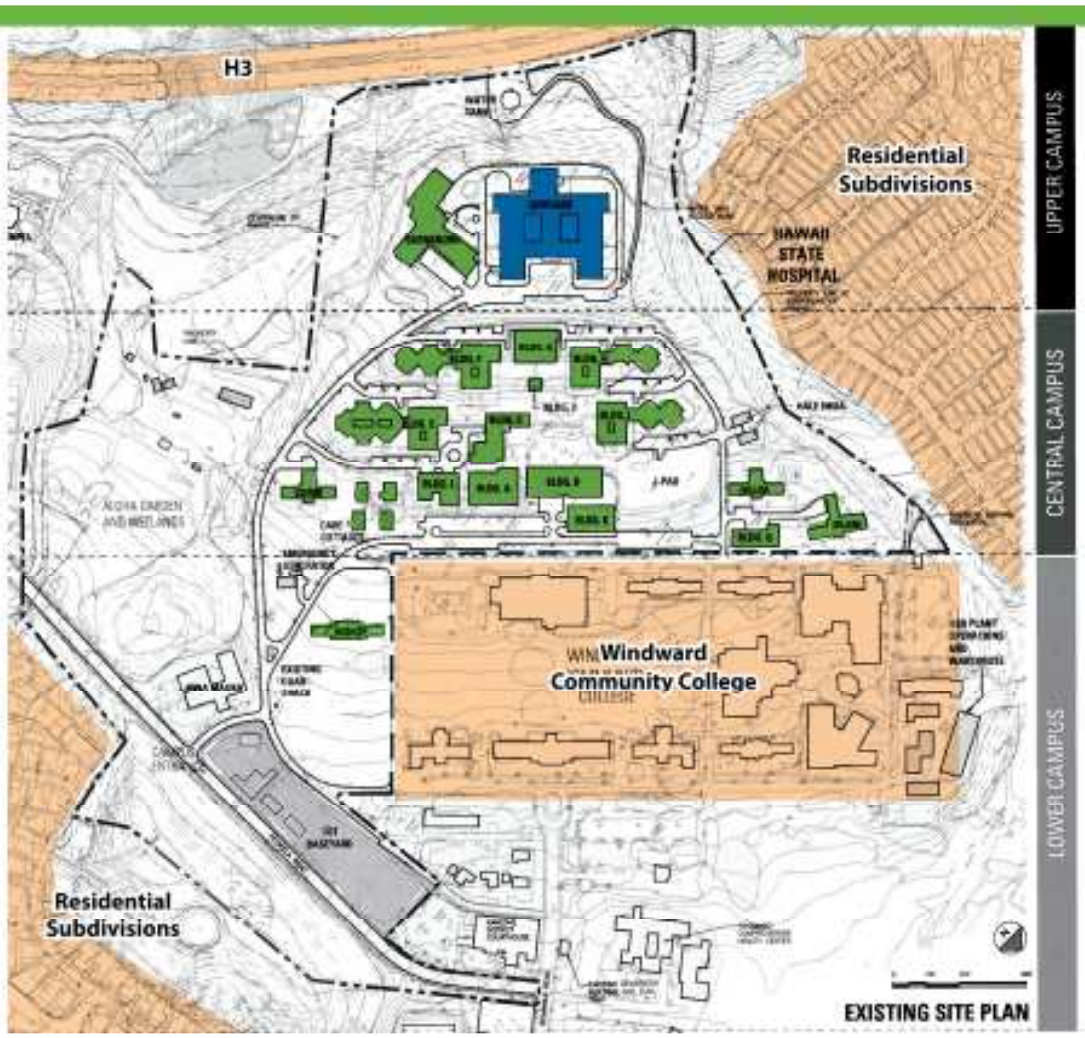
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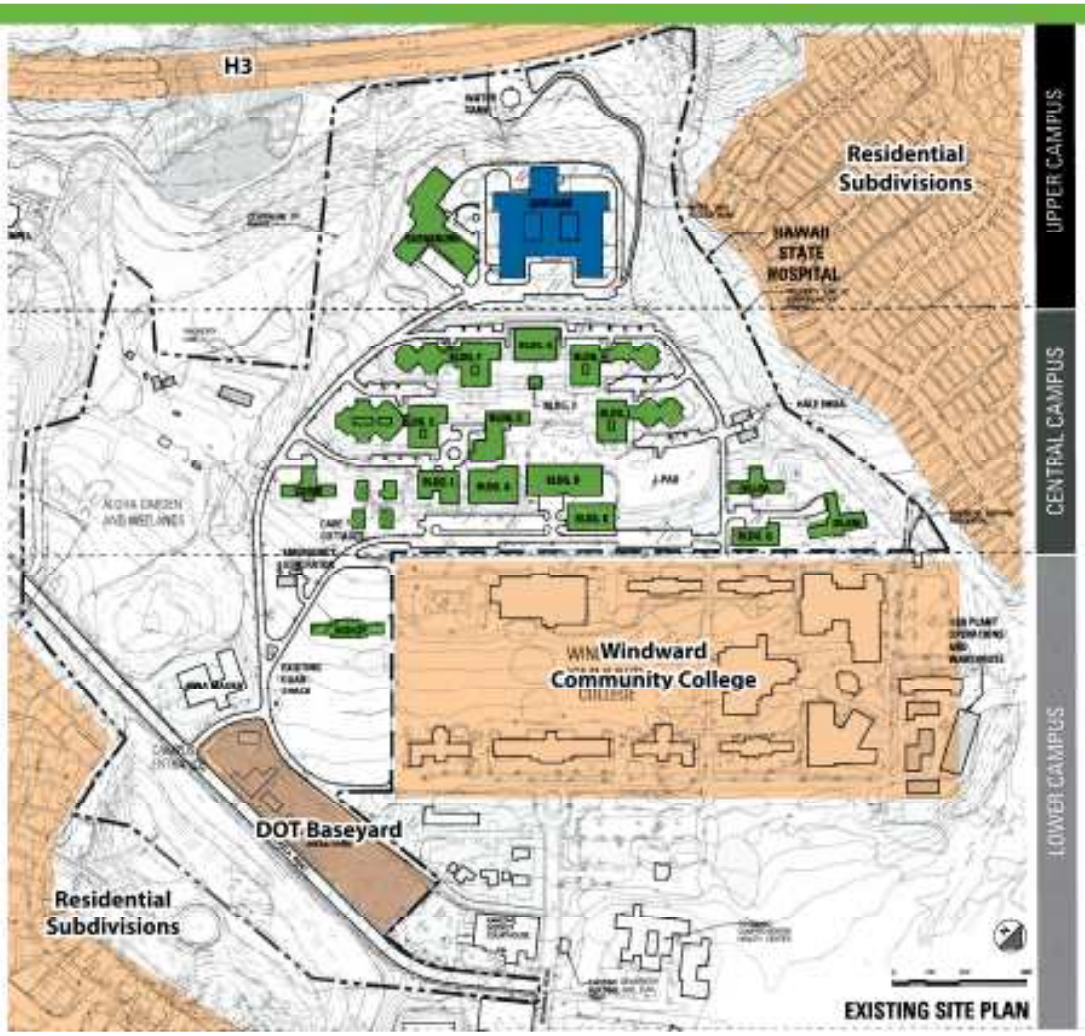
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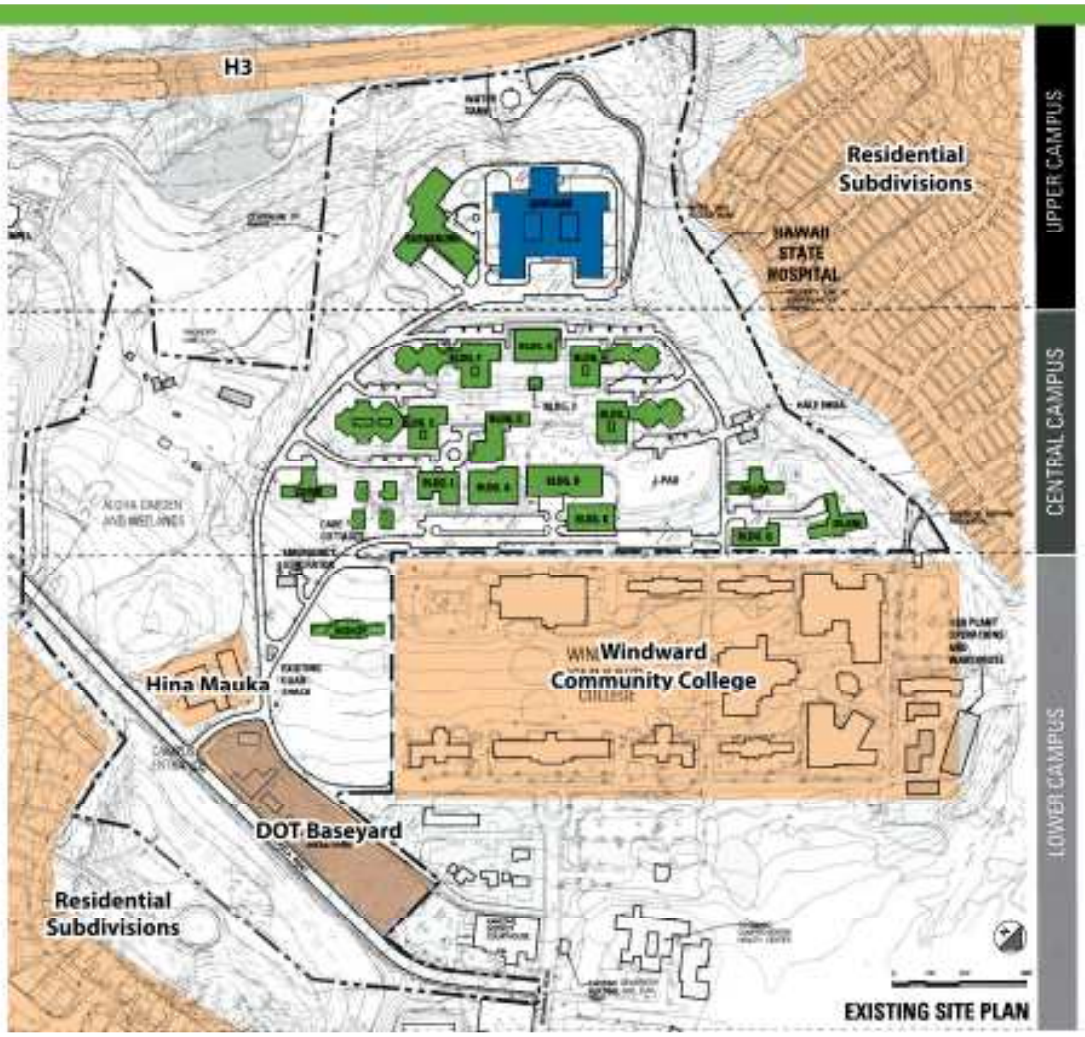
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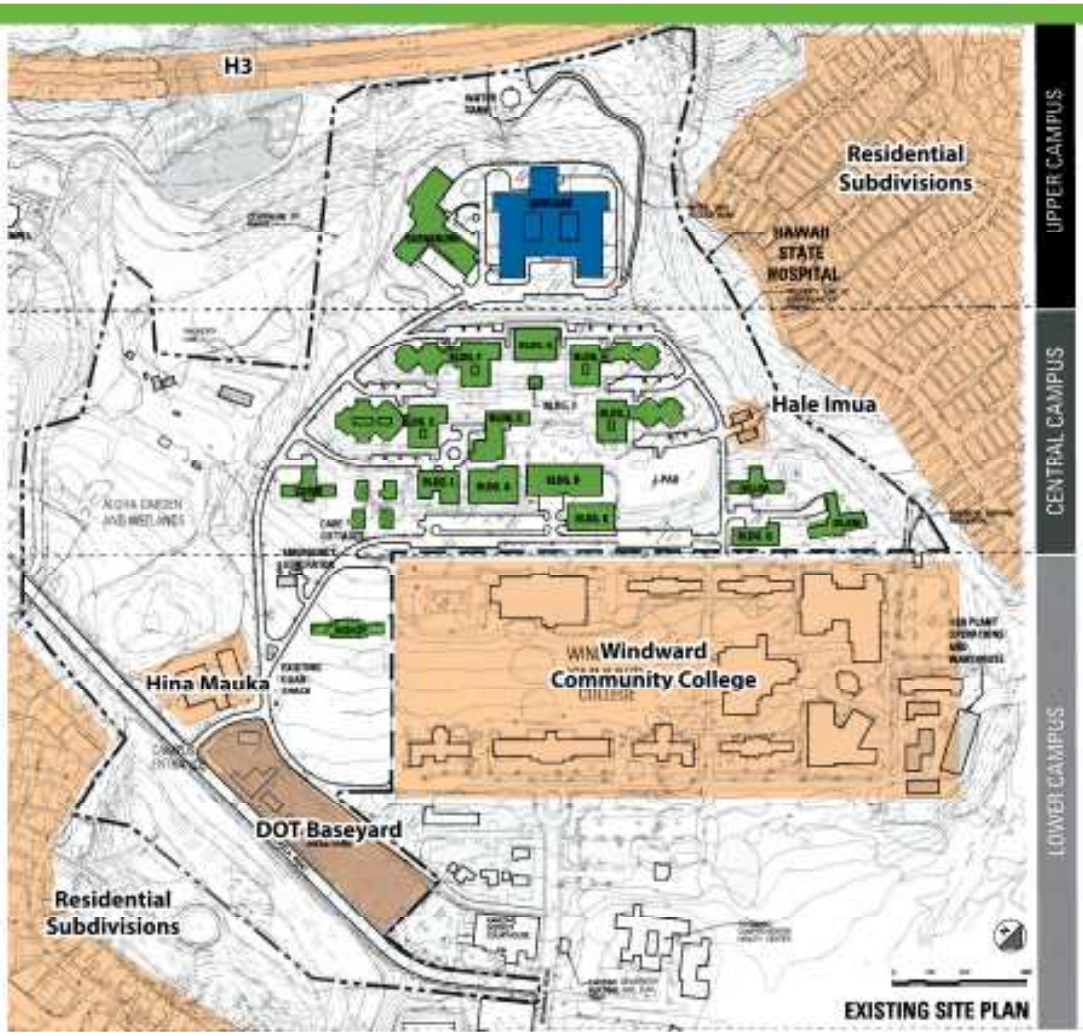
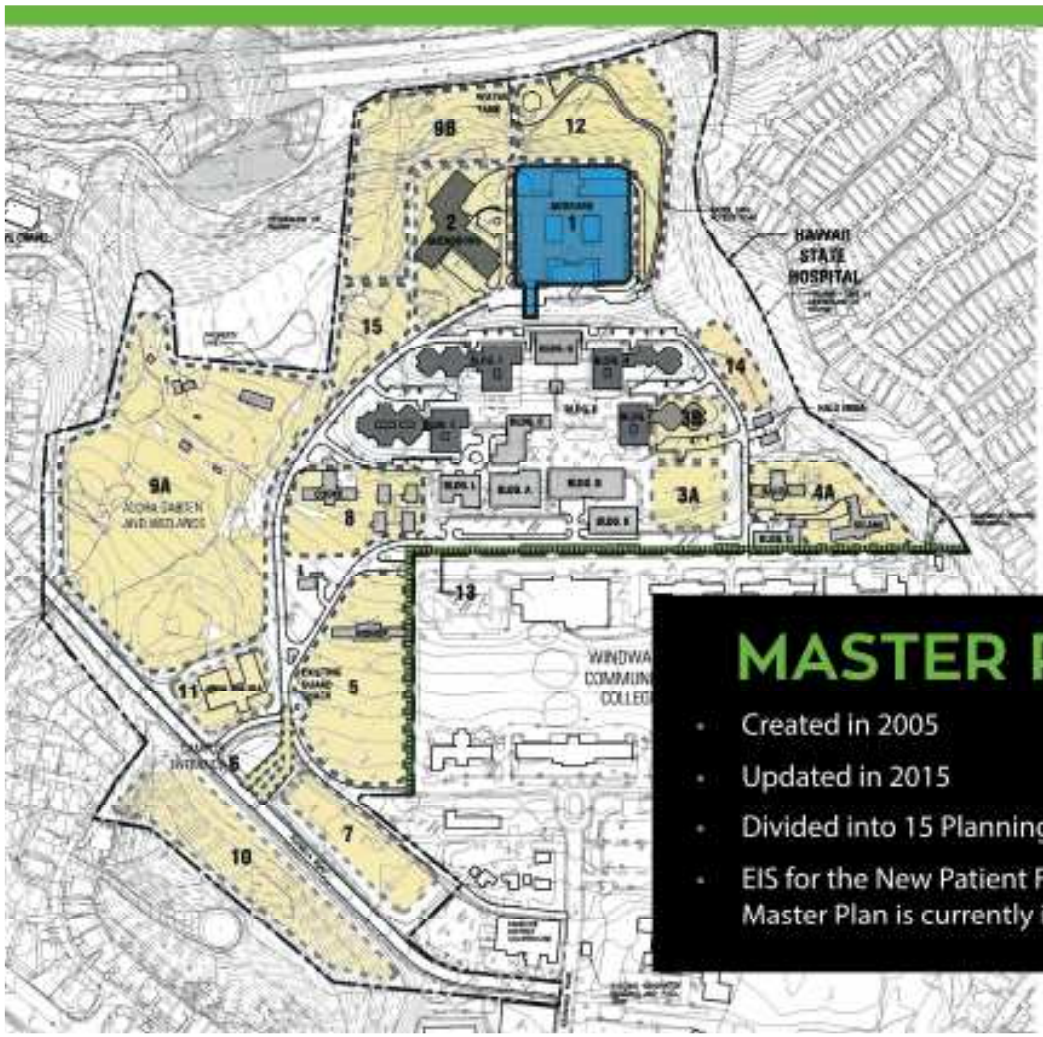
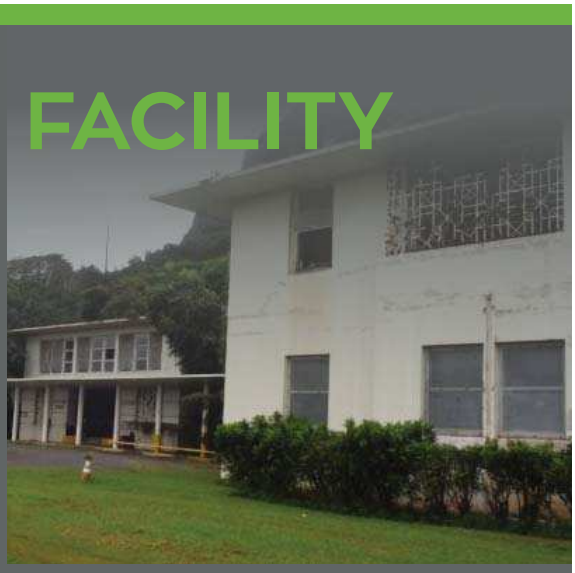




MASTER PLAN

- Created in 2005
- Updated in 2015
- Divided into 15 Planning Zones
- EIS for the New Patient Facility & HSH Master Plan is currently in development

NEW PATIENT FACILITY

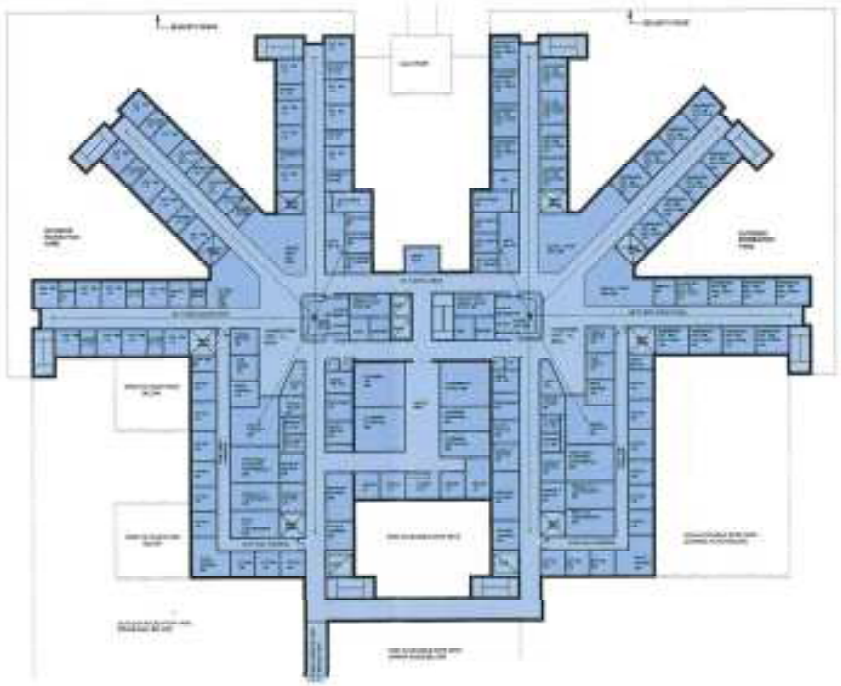


- Replace dilapidated and defunct Goddard Building with a New Patient Facility
- Demolition of the Goddard Building, built in 1947 and abandoned more than a decade, is in process with a targeted completion of December 2016

NEW PATIENT FACILITY

- In its place, a New Patient Facility will provide 144 additional beds, reduce the potential for patient elopement and enhance hospital staff and community safety
- The 2016 Legislature appropriated $160 million for the planning, design and construction of the new facility

NEW PATIENT FACILITY FEATURES



CONCEPTUAL FIRST FLOOR PLAN - NEW PATIENT FACILITY

- Four floors
- 144 beds
- Rehabilitation Area
- Dining Room
- Courtyard
- Gym
- Recreational Area
- Security fencing
- Lighting
- Closed circuit television
- Secure perimeter & sally port
- Self-contained facility
- Clear line of sight from a central nursing station
- Off-unit areas for offices & meeting rooms
- Separation for high and low acuity patients

SAFETY & SECURITY FEATURES

- Exterior yards with 16-foot high fencing with screen covering to prevent objects from entering
- Minimal landscaping for easy visual check of the property
- Metal detector and baggage check at entrance
- Plexiglass type exterior and interior windows
- Breakaway doors that would not allow patient to barricade inside room
- Restraint rooms with padding on floors and walls

LONG-TERM PLAN MAIN FEATURES

- Five existing patient care buildings (E, F, H, I and Guensberg) totaling 178 beds will remain in operation
- Upon completion of the new facility, HSH will evaluate its resources and needs in order to determine its plan for the Guensberg Building
- A Skilled Nursing Facility will be constructed (as a separate project) at the existing Bishop Building site, and its environmental impacts will be evaluated and addressed in a separate document
- Maintenance shop and plant operations will be relocated from shared Windward Community College property
- Site entrance and gateway improvements
- Additional site parking

NEXT STEPS

OCTOBER 2016
Draft Environmental Impact Statement (EIS) completed and published. 60-day public comment period begins.

DECEMBER 2016
Goddard Building demolition completed

MID 2017
City Plan Review Use (PRU) Application processed

APRIL 2017
Final EIS completed and published

LATE 2017
Request for Proposals (RFP) from contractors issued

MID 2018
New Patient Facility construction awarded

DEC 2020
New Patient Facility construction completed

MAHALO

For more information contact:
Brian Isa,
DAGS Project Engineer
(808) 586-0484
brian.s.isa@hawaii.gov

KANEOHE NEIGHBORHOOD BOARD NO. 30

c/o NEIGHBORHOOD COMMISSION • 530 SOUTH KING STREET ROOM 406 • HONOLULU, HAWAII, 96813
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET: http://www.honolulu.gov

REGULAR MEETING AGENDA

Thursday, September 15, 2016 7:00 p.m.
Benjamin Parker School Cafeteria
45-259 Waikalua Road, Kāneʻohe, 96744

Rules of Speaking: To ensure the maximum opportunity for all attendees to be heard, the following guidelines will apply: Anyone wishing to speak is asked to raise their hand and when recognized by the Chair, to address their comments to the Chair. All official reports, comments or concerns shall be three (3) minutes or less.

Please Kōkua: Silence all electronic devices – show respect for speakers – presentation timelines are approximate. Presenters should be prepared to present when called.

Note: The Board may take action on any agenda item. As required by the State Sunshine Law (HRS 92), specific issues not noted on this agenda cannot be voted on, unless added to the agenda. A two-thirds vote (12) of this 17-member Board is needed to add an item to the agenda. Items may not be added if they are of major importance and will affect a significant number of people.

I. CALL TO ORDER – Chair Mo Radke — 7:00 - 7:01

II. FILLING OF VACANCIES ON BOARD - There are two (2) Vacancies in Sub-districts 8(Kapunahala), and 9(Piikoiloa). — 7:01 - 7:02

III. CITY/STATE MONTHLY REPORTS (Three (3) minutes each) — 7:02 - 7:11
- A. Honolulu Fire Department
- B. Honolulu Police Department
- C. Marine Corps Base Hawaii

IV. RESIDENTS / COMMUNITY CONCERNS (Three (3) minutes each) — 7:11 - 7:27

V. ELECTED OFFICIALS — 7:27- 7:47
- A. Governor Ige's Representative
- B. Mayor Kirk Caldwell's Representative
- C. Councilmember Ikaika Anderson
- D. Senator Jill Tokuda
- E. Representative Ken Ito
- F. Representative Jarrett Keohokalole

VI. COMMUNITY ORGANIZATIONS — 7:47 - 7:57
- A. Windward Community College
- B. Hawaii Pacific University
- C. Blue Zones Project

VII. BOARD BUSINESS
- A. Kira Downing of DTL Hawaii: State Hospital Master Plan Update — 7:57 - 8:07
- B. Supporting victims' rights resolution (Bill sager) with decision making — 8:07 - 8:12
- C. Adoption of the August 18, 2016 Regular meeting minutes. — 8:12 - 8:13
- D. Adoption of the September 6, 2016 Agenda Planning meeting minutes

VII. COMMITTEE REPORTS (SPECIAL) (Limited to three (3) minutes each) — 8:13 – 8:20
- A. Haiku Stairs Special Task Force – Holly Sevier
- B. Emergency Management Planning Committee – Bill Sager

COMMITTEE REPORTS (Standing)

A. Treasurers Report – Felipe San Nicolas
B. State Legislature Committee – Co Chairs – Jon Hanks, Mo Radke
C. City and County Ordinance Committee –
D. Public Health and Safety – Chair Felipe san Nicolas
E. Safety Committee – Co-Chairs Felipe San Nicolas, Bill Sager
F. Planning Committee – Chair Mahealani Cypher
G. Transportation Committee – Chair Holly Sevier
H. Education Committee – Chair Lori Zakahi
I. Environmental Committee – Chair Bill Sager
J. Windward Civilian/Military Committee –
K. OMPO Citizen Advisory Committee – Chair Dennis Sanada
L. Community Engagement Committee – Chair Bill Sager
M. Kaneohe Bay Regional Council – Board Rep: Mo Radke
N. Homelessness Committee- Chair Deborah Collins
O. Hawaii State Hospital – Chair Bill Sager

IX. ANNOUNCEMENTS

A. Next Regular Board Meeting – Thursday October 20, 2016 at 7:00 p.m. at Benjamin Parker School Cafeteria.

B. Next Agenda Planning Meeting – Tuesday October 4, 2016 at 7:00 p.m. at Kaneohe Community and Senior Center as follows:

1. Call to Order
2. Proposed Briefings
    a. Community Concerns
3. Board Business
    a. Committee discussions
4. Announcements
5. Adjourn

X. ADJOURNMENT

A mailing list is maintained for interested persons and agencies to receive this board's agenda and minutes. Additions, corrections, and deletions to the mailing list may be directed to the Neighborhood Commission Office (NCO) at Honolulu Hale, Room 406, 530 South King Street, Honolulu, Hawaii 96813; Telephone (808) 768-3710 Fax (808) 768-3711; or call Neighborhood Assistant James Skizewski at (808) 768-3705 or e-mail James.Skizewski@honolulu.gov. Agendas and minutes are also available on the internet at www1.honolulu.gov/nco. Any individual wishing to attend a Neighborhood Board meeting who has questions about accommodations for a physical disability or a special physical need should call the NCO at 768-3710 between 8:00 a.m. and 4:00 p.m. at least 24 hours before the scheduled meeting.

KANEOHE NEIGHBORHOOD BOARD NO. 30

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REGULAR MEETING MINUTES
THURSDAY, SEPTEMBER 15, 2016
BENJAMIN PARKER ELEMENTARY SCHOOL CAFETERIA

CALL TO ORDER: Chair Mo Radke called the meeting to order at 7:02 p.m. **Quorum was established with 11 members present.** Note: This 17-member Board requires nine (9) members to establish quorum and to take official Board action.

Board Members Present: Gloria Carlile, Deborah Collins, Donald Dawson, Nancy Davlantes, Warren B. Ditch Jr., Marie Gavigan, Felipe San Nicolas, Jon Hanks, Mo Radke, Bill Sager, Holly Sevier, and Lori Zakahi (arrived at 7:24 p.m.).

Board Members Absent: Mahealani Cypher and Stuart Saito.

Guests: Lieutenant John Asing (Honolulu Police Department); Captain Paul Bass (Honolulu Fire Department); Tiffany Patrick (Marine Corps Base Hawaii); Lori Kahikina Director of Environmental Sciences (City and County of Honolulu); Roderick Becker (State of Hawaii Governor David Ige's Representative); Richard Haru (Representative Ken Ito); Councilmember Ikaika Anderson and Francisco Figueiedo (Councilmember Ikaika Anderson's Representative); Brigitte Mukai, Quinton Jennell, Crystal Lee, Claren Afong (Hawaii Pacific University); Doug Dykstra (Windward Community College); Lynn Fallin and Mark Fridovich (Department of Health); Mary Camille Salvador and Lisa Lepere (University of Hawaii Nursing); Carol Lee, Glenn Uyeshiro, Ben Baniaga, KC Connors, Mathew May, Jasmine Barber, Kathleen Merriam, Robert Harter, Bonnie Beatson, and Ron Barber (Residents); Liane Briggs (Kaneohe Community Gardens); and James Skizewski (Neighborhood Commission Office).

FILLING OF VACANCIES ON BOARD: There are two (2) vacancies in Sub-districts 8 and 12. There were no nominations or volunteers.

CITY/STATE MONTHLY REPORTS

Honolulu Fire Department (HFD): Captain (Cpt.) David Kubo reported the following:

- August 2016 Fire Statistics: There was 1 brush fire and 9 activated alarms (no fire). There were 99 medical responses, 6 motor vehicle crash/collisions, 1 mountain rescue, 1 ocean rescue, and 1 hazardous materials incident.
- Unusual Incident: Cpt. Kubo reported that at the scene of a rollover accident a citizen pulled a victim out of the rolled over car exposing himself to the victim's blood and cutting himself in the process. He has been inquiring if he needs to get tested for any blood-borne diseases. The Fire and Emergency Medical Services are not allowed to divulge any personal information. Good Samaritans should evaluate whether the risk to themselves outweighs the aid to another person and decide accordingly.
- Dryer Safety Tip: The leading cause of home clothes dryer fires is the failure to properly maintain them. Follow these simple safety tips to prevent clothes and dryer fires in homes:
    - Have your dryer installed and serviced by a professional.
    - Clean the lint filter before and after each cycle.
    - Clean the back of the dryer where lint can build up.
    - Check the venting system behind the dryer to ensure it is not damaged or restricted.
    - Ensure the outdoor vent covering is open while the dryer is operating.

Questions, comments, and concerns followed:

1. Glove Training: Sager emphasized the importance of the use of gloves and Cpt. Kubo agreed that especially in the instance of a rolled vehicle gloves are important to protect from glass.
2. Hazardous Materials: A resident asked and Cpt. Kubo responded that he will try to get more details pertaining to the hazardous materials incident.

Honolulu Police Department (HPD) District 4: Lieutenant (Lt.) John Asing circulated a handout and reported the following:

- August 2016 Statistics: There were 13 motor vehicle thefts, 8 burglaries, 47 thefts, and 16 unauthorized entries into motor vehicles (UEMV).

- Pua Alowalo Street: Lt. Asing noted that Pua Alowalo Street has been monitored and tickets have been given for speeding.

Questions, comments, and concerns followed:

1. Pua Alowalo Street: Collins aske and Lt. Asing responded that four (4) tickets were given in the Pua Alowalo Street area. Lt. Asing added that the area is still being monitored.
2. Drug Busts: Resident Baniaga asked and Lt. Asing responded that he does not know how many drug busts occurred in July 2016. Baniaga raised concerns about drug activity in the Bayview Sewer Treatment Center area.
3. H-3 Tunnel Accident: Gavigan asked and Lt. Asing responded that he will try to get information regarding the car that was on fire in the H-3 tunnel area last month.
4. Homeless: Resident Connors thanked Officer Raymond Craig for his efforts helping with the homeless.

Kaneohe Marine Corps Base Hawaii (MCBH): No representative present, no report provided.

ELECTED OFFICIALS' REPORTS

Governor David Ige's Representative: Roderick Becker Deputy Director of the Department of Finance circulated Governor Ige's newsletter Capital Connection and reported the following:

- Like Like Highway: Becker reported that the Department of Transportation (DOT) sent crews to make repairs to Like Like Highway and work orders have been put in for additional repairs along the area.
- Bonds: The State of Hawaii will be issuing bonds during the week of Monday, September 26, 2016, for those who would like to purchase bonds please contact the Department of Finance. Becker added that the State of Hawaii's bond rating was evaluated by Standard and Poor's (S&P), Moody's, and Fitch. Two (2) of the three (3) agencies upgraded the state's bond rating.

Questions, comments, and concerns followed:

1. Bonds: Chair Radke asked and Becker responded that the funds generated from the bond issuance will be used for capital improvement projects.
2. Windward Mall: Collins asked and Becker responded that he will look into the validity of changing the entrance into Windward Mall to an exit allowing for easier access to the major roadway.
3. Kamehameha Highway: Resident Baniaga urged Governor Ige to fix Kamehameha Highway before another major storm hits.
4. Pua Alowalo Street: Resident Lee urged Governor Ige to consider changing the speed limit on Pua Alowalo Street.
5. Homeless Alliance: Resident Connors thanked Governor Ige for sending a representative to the Homeless Alliance meeting. Connors requested information regarding a homeless outreach and veteran's outreach coordinator. Chair Radke noted he sits on a Homeless Veterans Council.

Lori Zakahi arrived at 7:24 p.m., 12 members present.

Mayor Kirk Caldwell's Representative: Lori Kahikina Director of Environmental Sciences (ENV) circulated Mayor Caldwell's City News and reported the following:

- Follow Up on Last Months Concerns:
  - Kaneohe Community Gardens: The Honolulu Botanical Gardens (HBG) reported that Kaneohe Community Garden is fenced on three (3) sides; HBG does not currently have the resources to install additional fencing or to catch stray animals such as dogs and/or cats. Garden members have been instructed to report any sightings of stray animals within the garden to the police department.
  - Park and Ride: The Department of Transportation Services (DTS) is aware there is interest among Windward residents in having a park-and-ride facility in Kaneohe. DTS is examining various options to realign the way bus service is currently provided in Kaneohe by Routes 55, 56, 65 and 77, including consideration of ways to provide park-and-ride accommodations at locations convenient for transit riders who will be using the realigned service. Proposed options will be presented to the Neighborhood Board/community/public early next year.
  - Homelessness: The Fiscal Year (FY) 2017 Operating budget includes $5.4 million to pay for rent and support services for homeless individuals, island-wide. An additional Grants in Aid award of $41,073 was awarded to the Institute of Human Services to provide employment-focused homeless outreach complementing housing in Council District III. There is no specific CIP funding for the homeless in Kaneohe.

- Pua Alowalo Street: DTS will be conducting an investigation, which may require research, site observations, and an analysis of the traffic history. DTS will apprise the board of the results of their findings by the end of the year.

Questions, comments, and concerns followed:

1. Crosswalk Button: Sevier stated that the crosswalk button near the intersection of Pookela Street and Keaahala Road at the skate park is broken. Chair Radke urged the community to use the City and County of Honolulu 3-1-1 application that allows reporting of City and County of Honolulu issues.
2. Illegal Transient Rentals: Resident Connors expressed the need for additional monies to fund illegal transient rentals investigating. Kahikina responded that the investigation of illegal rentals is only a small portion of the investigators duties and money for the investigating of illegal transient rentals is still present.
3. Waikalua Road: Resident Baniaga requested the paving schedule for Waikalua Road and Kahikina responded that the prioritized schedule of road paving can be found online. Kahikina added that she could show Baniaga where to find the paving schedule.

Senator Jill Tokuda: No representative present, no report provided.

Councilmember Ikaika Anderson: Councilmember Ikaika Anderson circulated a handout and reported the following:

- Namoku Street: Councilmember Anderson thanked Mayor Kirk Caldwell for working in conjunction with his office to get the paving of Namoku Street started. Councilmember Anderson noted that the repaving work is ongoing.
- Waikalua Road: Councilmember Anderson stated that the funding for the repaving of Waikalua Road has been provided and the project is only awaiting a start date to be determined.
- Real Property Tax Deadlines: Councilmember Anderson noted that the deadline for the low income tax credit and the homeowner's exemption is Friday, September 30, 2016. Councilmember Anderson urged the public to file for their Real Property Tax Homeowner Exemptions as it will reduce the rate at which property is taxed. For more information please call Councilmember Anderson's office at (808) 768-5003.

Questions, comments, and concerns followed:

1. Tax Exemptions: Gavigan asked and Councilmember Anderson responded that the best way to find out if one qualifies for the tax exemptions would be to call his office.
2. Wong Residence: Collins asked and Councilmember Anderson responded that the Department of Permitting and Planning continues to work with the community regarding the violations pertaining to the Wong residence. Councilmember Anderson added that he has suggested a foreclosure of the property until Mr. Wong shows that he recognizes the violations and works with the City and County of Honolulu to address the fines and issues regarding the property.
3. Homelessness: Resident Connors asked about the lack of funds to address homelessness in Kaneohe and Councilmember Anderson are responded that his office is looking at the portfolio of city-owned properties in East Honolulu to find a property that could be used for the Housing First Initiative. Councilmember Anderson added that the problem with the Housing First Initiative is that communities often don't want homeless shelters in their area. Councilmember Anderson stated that a site hasn't been found of yet. Councilmember Anderson noted that the City Council appropriates funds but it is up to the administration to administer them accordingly. Councilmember Anderson asked the public if they are open to a Housing First Initiative in this community and Chair Radke responded that the board is open to a presentation regarding the Housing First Initiative and its potential sites in Kaneohe. Councilmember Anderson stated that at first he was against the Housing First Initiative but the alternative of having the homeless on the streets in the public is a worse option. Councilmember Anderson noted that Jun Yang has done his research regarding the Housing First Initiative and added it is the best option.
4. Map: Collins asked and Councilmember Anderson responded that he could provide a map of all city owned properties in the area.
5. Housing First: Gavigan noted that the Housing First Initiative has worked in cities such as New York City. Gavigan asked and Councilmember Anderson responded that Jun Yang is the coordinator on homelessness for the City and County of Honolulu while Peter Borges is the Housing coordinator for the City Council. Gavigan asked and Councilmember Anderson responded that Jun Yang does work with private and public services to address homelessness. Councilmember Anderson concluded that success has been found in regards to addressing homelessness as shown through the works done in the Sand Island area.
6. Census: Resident Baniaga asked and Councilmember Anderson responded that there is no census regarding the homeless in the City and County of Honolulu. Resident Connors noted that she was the only volunteer for the homeless count done for the surrounding area and her best guess to the amount of homeless population in the Kaneohe community is 300.

7. Film Office Assistant: Resident Connors expressed the need for an assistant for Walea Constantinau and asked what committed her issue should be brought before. Councilmember Anderson responded that the City Council Committees were restructured in July 2016 by City Council Chair Martin and that the request should be brought before the Budget Committee who is chaired by Councilmember Ann Kobayashi.

Representative Ken Ito: No representative present, no report was circulated.

Representative Jarrett Keohokalole: No representative present, no report was circulated.

COMMUNITY ORGANIZATIONS

Windward Community College (WCC): Lonnie Breatson reported the following:

- 1776: Breatson announced that the musical 1776 at Paliku Theater has been extended until Sunday, September 25, 2016.
- Windward Ho'olaule'a: Breatson announced that on Saturday, October 1, 2016, a Ho'olaule'a Event will be held at WCC and will feature entertainment by Brother Nolan, Weldon Kekauoha, and Mapuana De Silva's Halau Hula. Breatson added that this event will coincide with Blue Zones' first anniversary.

Questions, comments, and concerns followed: Ho'olaule'a: Sager announced that the Kaneohe Neighborhood Board will have tables at the Ho'olaule'a event and entities such as Red Cross, and the Department of Emergency Management will be in attendance. Sager requested volunteers to help him with the table set up and occupation during the event.

Hawaii Pacific University (HPU): No representative present, no report was circulated.

Blue Zones Project: No representative present, no report was circulated.

BOARD BUSINESS

State Hospital Master Plan Update: Kira Downing of the State Hospital reported the following:

- Master Plan Update: Downing introduced Brian Isa from the Department of Accounting and General Services and Mark Fridovich of the Department of Health. Downing stated that the hospital was initially built in 1932 and is owned and operated by the Department of Health. This is the only hospital in the state that admits and discharged patients by judicial order which has led to issues of overcrowding. Downing continued that the Hawaii State Hospital Plan was created in 2005 and updated in 2015 to address increasing patient population by specifically designing care for high risk patients as well as improve safety for patients, staff and the public. The master plan update will maximize operational efficiency to ensure the ongoing viability of the hospitals operations. The updated plan contains 15 zoning plans that will increase the amount of beds throughout the facility. Downing added that the State Hospital is working toward the entitlement process and developing an Environmental Impact Statement (EIS) which will be completed later this year. The first phase of this project is a new patient facility that will take the place of the Goddard building which is currently being demolished. The new facility will provide 144 additional beds as well as enhance hospital staff safety. The 2016 legislature appropriated $160 million dollars for the planning design and construction of the new facility. The coming facility will have four (4) floors and be totally self-contained with proper security fencing and lighting. Additionally, the central nursing stations will be designed with clear view lines to allow for easy access to the facility and patients. Five (5) existing patient care building will remain in operation. Upon completion of the new patient facility the Hawaii Sate Hospital will evaluate its resources and needs in order to determine its plan for the Guensberg Building. A skilled nursing facility will be constructed as a separate project at the existing Bishop Building site, and its environmental impacts will be evaluated and addressed in a separate EIS which will be brought before the board. Maintenance shop and plant operations will be relocated from shared Windward Community College property. Site entrance, gateway, and parking improvements will be made. The EIS draft pertaining to this new facility project will be presented on Thursday, October 6, 2016, the public will have 60 days to provide comments. The final EIS of the Goddard Building Project will hopefully be finished in early 2017 targeting a mid-2020 completion date. For any questions email Brian Isa at brian.s.isa@hawaii.gov.

Questions, comments, and concerns followed:

1. Sally Ports: Sevier asked and Fridovich responded that the prior facilities sally ports were retrofitted which led to complications. Isa added that the new facilities designs will be improved.
2. Traffic: Resident Baniaga asked and Isa responded that traffic has been taken into account in the EIS. WCC Chancellor Dykstra noted that he believes the initial EIS covered the Goddard Project and the Avalon Bishop

Building Project. Chancellor Dykstra noted he won't feel comfortable unless both project put forth separate EIS. Brian Isa noted that the Avalon facility will have a separate EIS. Isa noted he has no details pertaining to the Bishop Building EIS as they are still in the development stage. Chancellor Dykstra noted the need for the renewal of a certificate of need for the Avalon Facility and Isa responded that he cannot speak to the Avalon project details.

Victims' Rights: Sager stated that he desired the board to take a position on victims' rights and circulated the resolution which is in support of victims' rights.

Sager moved and Ditch seconded a motion to support victims' rights legislation. Chair Radke called for a vote. The No. 30 Kaneohe Neighborhood Board has approved a resolution in support of victims' rights, **10-0-2** (**AYE**: Carlile, Collins, Dawson, Davlantes, Ditch Jr., San Nicolas, Hanks, Radke, Sager, and Zakahi; **NAY**: None; **ABSTAIN**: Sevier and Gavigan).

APPROVAL OF MINUTES

APPROVAL OF THE August 18, 2016, REGULAR MEETING MINUTES – San Nicolas moved and Sevier seconded the July 21, 2016 regular meeting minutes be APPROVED as written, 12-0-0 (Aye: Carlile, Collins, Dawson, Davlantes, Ditch Jr., San Nicolas, Hanks, Radke, Sager, Zakahi, Sevier and Gavigan **Nay:** None**; Abstain:** None**).**

APPROVAL OF THE September 6, 2016, Agenda Planning MINUTES – Hanks moved and Sevier seconded that the August 2, 2016 regular meeting minutes be APPROVED as written, 12-0-0 (Aye: Carlile, Collins, Dawson, Davlantes, Ditch Jr., San Nicolas, Hanks, Radke, Sager, Zakahi, Sevier and Gavigan **Nay:** None**; Abstain:** None**).**

COMMITTEE REPORTS

Hearing no objections, Chair Radke added "State Legislative Monitoring Committee" to the agenda under subsection "Committee Reports".

City and County Ordinance: Davlantes reported that she has spoken with the charter commission who is working on a brochure outlining the proposed charter amendments that will be sent to all households. However, testimony regarding each proposal could not be found. Davlantes added that she is working with the charter commission to figure out how to find the corresponding proposed charter amendment testimony.

Sager moved and Ditch Jr. seconded a motion to add decision making to the agenda regarding the resolution to urge the Neighborhood Commission Office to emphasize to the City and County of Honolulu Charter Commission the necessity and importance of providing sufficient information to Oahu voters on the proposed chart amendments before they vote. The motion was passed, 12-0-0 (Aye: Carlile, Collins, Dawson, Davlantes, Ditch Jr., San Nicolas, Hanks, Radke, Sager, Zakahi, Sevier and Gavigan Nay: None; Abstain: None).

Sager moved and Ditch Jr. seconded a motion to support a resolution to urge the Neighborhood Commission Office to emphasize to the City and County of Honolulu Charter Commission the necessity and importance of providing sufficient information to Oahu voters on the proposed chart amendments before they vote. The motion was passed, 12-0-0 (Aye: Carlile, Collins, Dawson, Davlantes, Ditch Jr., San Nicolas, Hanks, Radke, Sager, Zakahi, Sevier and Gavigan Nay: None; Abstain: None).

Emergency Management Committee: Sager announced on Monday, September 26, 2016, a hazardous awareness and response program will be held at Kaneohe District Park beginning at 6:30 p.m. Sager also announced he will be proposing a resolution next month regarding mosquito control and the impacts of mosquitos in relation to the Zika virus and Dengue Fever.

Treasurers Report: San Nicolas reported that $32.88 in August 2016 and the remaining balance is $311.42.

ANNOUCMENTS: Chair Radke thanked Skizewski and San Nicolas for their efforts in producing the board banners which will be set up along the fence on the perimeter of the school on meeting days. Chair Radke also thanked Dixon and Collins for updating the boards Facebook page that keeps the community involved.

ADJOURNMENT: The meeting adjourned at 8:22 p.m.

Submitted by: James Skizewski, Neighborhood Assistant I
Reviewed by: Neil Baarde, Neighborhood Assistant Supervisor
Reviewed by: Jon Hanks, Board Secretary
Approved and Finalized by: Mo Radke, Chair

Appendix H: Floral Evaluation

June 2016

Botanical Resources Assessment for the

Hawaii State Hospital Patient Facility

Kāne‘ohe, O‘ahu, Hawaii

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BOTANICAL RESOURCES ASSESSMENT FOR THE HAWAII STATE HOSPITAL PATIENT FACILITY KANEOHE, OAHU, HAWAII

Prepared by:

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Prepared for:

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June 2016

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INTRODUCTION

This report includes the findings of a plant inventory conducted for the Hawaii State Hospital located in Kaneohe, Oahu. LeGrande Biological Surveys Inc. carried out a botanical field survey of the above location on May 5 and 11, 2016. The primary objectives of the field studies were to:

1) inventory the flora;
2) provide a general description of the vegetation on the project site;
3) search for threatened and endangered species as well as species of concern (Federal and State of Hawaii listed Threatened or Endangered species status follows those set by the U.S. Fish and Wildlife Service (USFWS, 2015), and
4) provide recommendations regarding potential impacts to the plant resources of the area in regards to the survey area.

SITE DESCRIPTION

The survey area is located on the east shore of Oahu in Kaneohe. The project area includes three separate Tax Map Keys (TMKs): (1)4-5-023:002 (87 acres–main parcel with existing campus and buildings), (1)4-5-230:17 (3 acres), and (1)4-5-023:016 (7 acres). The survey area has been utilized for various agricultural uses, hospital buildings, and road development over time. As with most urban areas in the Hawaiian Islands, the natural habitat has been altered and is dominated by introduced plant species. The majority of the survey area is characterized by landscaped ornamental trees and grassy lawns with naturalized forest and shrubs at the periphery of the main campus.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps were examined to determine terrain characteristics, access, boundaries, and reference points.

A pedestrian survey was carried out where the investigator walked transects and boundaries of all three survey areas. Notes were made on plant associations and distribution, disturbances, topography, substrate types, exposure, drainage, etc. Plant identifications were made in the field; plants that could not be positively identified were photo documented for comparison with the recent taxonomic literature.

DESCRIPTION OF VEGETATION

The survey areas are typified by wet alien forest. There are a total of 123 plant species observed within the survey sites. 116 are alien (introduced) and 5 are indigenous (native to the Hawaiian Islands and elsewhere) and two are endemic (native only to the Hawaiian Islands). Therefore, 94% of the plant species observed are alien and 6% are native. An inventory of all the plants observed within the survey area (excluding ornamental plantings) is presented in the species list (Appendix B) at the end of the report.

The entire survey area, consisting of the three TMK parcels in close proximity to each other, has been highly altered from the native biological ecosystem over time. Non-native plant species dominate the entire survey area. No Threatened and or Endangered species were observed during the survey. The following are descriptions of the dominant vegetation divided into five main areas within the proposed project area:

CAMPUS PLANTINGS

The main Hawaii State Hospital Campus that is currently occupied by building facilities, housing, and parking lots is characterized by manicured grassy lawns with scattered ornamental tree and shrub plantings (See Figure 1). Cultivated tree species observed included ulu (*Artocarpus altilis*), kukui (*Aleurites moluccana*), coconut (*Cocos nucifera*), hala (*Pandanus tectorius*), monkeypod (*Samanea saman*), mango (*Mangifera indica*), shower trees (*Cassia* sps.), milo (*Thespesia populnea*), and paperbark (*Melaleuca quinquenervia*). Cultivated shrubs included hibiscus cultivars, ti (*Cordyline fruticosa*), wedelia (*Sphagneticola trilobata*), and ginger species. None of the ornamental/cultivated species were included in the overall species list unless observed growing wild in the overgrown or periphery of the survey areas.

NURSERY PLANTINGS

The nursery as shown on Figures 2 and 3 is actively being operated by staff and patients of the hospital. It includes agricultural plants such as lettuce, tomatoes, bananas, papayas, and citrus. The area is also interspersed with planted Hawaiian cultural plants such as ti (*Cordyline fruticosa*), noni (*Morinda citrifolia*), and kalo (*Alocasia esculenta*) in and around the wetland lo‘i. Fruit trees such as papaya (*Carica papaya*), noni (*Morinda citrifolia*), and avocado (*Persea americana*) are cultivated in the garden area. Naturalized plant species observed in or at the boundaries of the garden include molasses grass (*Melinis minutiflora*), hau (*Hibiscus tiliaceus*), java plum (*Syzygium cuminii*), African tulip (*Spathodea campanulata*), mango (*Mangifera indica*), little bell (*Ipomoea triloba*), gunpowder tree (*Trema orientalis*), and albizia (*Falcataria moluccana*).

KAPUNAHALA STREAM

Kapunahala Stream borders the southeast side of the property near the plant nursery. It flows into a low-lying area at the southeast corner of the property along Pookela Road. Both the plants along the stream bank areas as well as the low-lying area (see Figure 4) are indicative of wet forest and marshy species. Dominant species include African tulip (*Spathodea campanulata*), hau (*Hibiscus tiliaceus*), Octopus tree (*Schefflera actinophylla*), bingabing (*Macaranga mappa*). Understory plants include Guinea grass (*Panicum maximum*), honohono (*Commelina diffusa*), wedelia (*Sphagneticola trilobata*), Job’s tears (*Coix lachrymajobi*), and moonflower (*Ipomoea alba*).

The lower elevation area where water appears to collect at the corner of Po‘okela Road and a private drive is dominated by Job’s tears (*Coix lachrymajobi*) (see Figure 5), Guinea grass (*Panicum maximum*), molasses grass (*Melinis minutiflora*), moonflower (*Ipomoea alba*), napier grass (*Pennisetum purpureum*), umbrella sedge (*Cyperus involucratus*), and the native bracken fern kilau (*Pteridium aquilinium* var. *decompositum*).

MAUKA VEGETATION

This vegetation type is characterized by a thickly forested area of invasive tree species with an overgrown weedy understory. This type of vegetation was observed in sections of the upper

campus as well as the western boundary of campus and the TMK parcel that is located directly under the H-3 highway structure above campus (See Figures 8, 9, and 10). Tree species include a Java plum (*Syzygium cuminii*) and Octopus tree (*Schefflera actinophylla*) forest with other scattered tree species such as Chinese banyan (*Ficus microcarpa*), African tulip (*Spathodea campanulata*), Christmas berry (*Schinus terebinthifolius*), albizia (*Falcataria moluccana*), and koa haole (*Leucaena leucocephala*). Understory included several liana species such as maile pilau (*Paederia foetida*), mysore thorn (*Caesalpinia decapetala*) (See Figure 11), and pothos vine (*Epipremnum pinnatum*). Koster's curse (*Cidemia hirta*), Hilo holly (*Ardisia crenata*), and basket grass (*Oplismenus hirtellus* subsp. *hirtellus*), along with fern species such as uluhe (*Dicranopteris linearis* f. *emarginata*) and laua'e (*Phymatosorus grossus*), dominated the understory.

PO'OKELA ROAD TMK

The 7-acre parcel to the east of Po'okela Road consists of the west facing slope of a ridgeline that is relatively steep and dominated by introduced tree species and weedy understory (See Figure 6). Several old homeless encampments were observed scattered throughout the survey area. Trash and various camping debris were scattered in sections. Dominant tree species include swamp mahogany (*Eucalyptus robusta*), fern tree (*Felicium decipiens*), Java plum (*Syzygium cuminii*), gunpowder tree (*Trema orientalis*), albizia (*Falcataria moluccana*), and koa haole (*Leucaena leucocephala*). Understory consists of Guinea grass (*Panicum maximum*), castor bean (*Ricinus communis*), spiny amaranthus (*Amaranthus spinosus*), owi (*Stachytarpheta australis*), slender mimosa (*Desmanthus pernambucanus*), sourbush (*Pluchea carolinensis*), and Indian fleabane (*pluchea indica*).

DISCUSSION & RECOMMENDATIONS

The fieldwork results represent a one-time snapshot of the plants inhabiting the survey area. However, when considered together with the results of historical surveys, they represent a reasonably accurate description of the environment and vegetation of the project area. Native plant habitat within the proposed project area has been highly modified by human activities, such as agricultural activities, road building, residential construction, and the intentional and accidental introduction of alien species. The overwhelming abundance of non-native plant species throughout the project area is in direct correlation to disturbance over the last several hundred years. A concerted effort was made to locate native plants within the survey area.

The nature of the land and its present and historical disturbances limit the natural botanical resources anticipated to occur here. The results of our survey substantiate this prediction. The rare frequency of native plant species is an indication that because of constant disturbances (geological, vehicular, invasive plant species, feral ungulates), only species adapted to such conditions can survive, with few exceptions. Seven widespread native plant species were observed during the survey, five of which are indigenous (native to the Hawaiian Islands and elsewhere): popolo (*Solanum americanum*), milo (*Thespesia populnea*), hau (*Hibiscus tiliaceus*), hala (*Pandanus tectorius*), and pala`a (*Sphenomeris chinensis*). Two endemic (native only to the Hawaiian Islands) ferns species were found. Uluhe (*Dicranopteris linearis* f. *emarginata*) was restricted to the upper mauka elevations and kilau (*Pteridium aquilinium* var. *decompositum*) was restricted to the low-lying areas. None of the plant species observed are listed as Threatened or Endangered.

It is recommended that the low-lying area in the south east corner of the main parcel not be significantly modified unless proper engineering is put in place for the water flow from the

mauka or higher elevation areas. The low lying area serves as a water catchment before flowing under Po'okela Road.

Critical Habitat

There is no federally delineated Critical Habitat for any plant species present on or adjacent to the project area.

LITERATURE CITED

Evehuis, N.L. and L.G. Eldredge, editors. 1999-2002. Records of the Hawaii Biological Survey. Bishop Museum Occasional Papers Nos. 58-70.

Staples G. W. and D. R. Herbst. 2005. A Tropical Garden Flora: Plants cultivated in the Hawaiian Islands and other tropical places. Bishop Museum Press.

U.S. Fish and Wildlife Service. 2015. Hawaiian Islands Plants: Updated February 13, 2015 Listed and Candidate Species, as Designated under the U.S. Endangered Species Act. 21pp.

Wagner, W.L. and D.R. Herbst. 1999. Supplement to the Manual of the flowering plants of Hawaii, pp. 1855-1918. In: Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawaii. Revised Edition. 2 vols. University of Hawaii Press and Bishop Museum Press, Honolulu.

APPENDIX A
SITE PHOTOGRAPHS

Figure 1. Campus plants include large ornamental trees and maintained lawns.

Figure 2. A section of the plant nursery/garden.

Figure 3. Lo‘i in cultivation at the hospitals plant nursery and garden.

Figure 4. Low-lying area at the southeast corner of the property.

Figure 5. Thick overgrown forest and Job's tears understory near Kapunahala Stream.

Figure 6. Separate TMK along Po‘okela Road characterized by forested area with grasses in open areas.

Figure 7. Thick forest of invasive species dominate along the campus edges to the east, west, and south.

Figure 8. Maintained grassy area around water tank above HSH campus with large trees surrounding area. H-3 freeway is in background.

Figure 9. Thick overgrown forest along the H-3 freeway access road.

Figure 10. Section of open understory mauka of HSH campus towards H-3 freeway.

Figure 11. Thicket of mysore thorn under the H-3 freeway.

APPENDIX B
PLANT SPECIES LIST

The following checklist is an inventory of naturalized plant species observed within the survey areas of the Hawaii State Hospital subject properties. Ornamental planting and species observed only at the plant nursery or in the main campus area were not included in this species list. The plant names are arranged alphabetically by family and then by species into each of three groups: Pteridophytes, Monocots and Dicots. The taxonomy and nomenclature of the Ferns and Fern Allies follow Palmer (2002), flowering plants (Monocots and Dicots) are in accordance with Wagner *et al*. (1990), Wagner and Herbst (1999) and Staples and Herbst (2005). Recent name changes are those recorded in the Hawaii Biological Survey series (Evehuis and Eldredge, eds., 1999-2002).

For each species, the following name is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:

A = Alien species introduced to the Hawaiian Islands by humans, intentionally or accidentally.
I = Indigenous species native to the Hawaiian Islands and also found elsewhere in the world.
E = Endemic species found only in the Hawaiian Islands.

SCIENTIFIC NAME	**COMMON NAME**	**STATUS**
PTERIDOPHYTES		
BLECHNACEAE		
Blechnum appendiculatum Willd.		A
DENNSTAEDTIACEAE		
Pteridium aquilinum var. decompositum (Gaudich.) R.M.Tryon	kilau	E
GLEICHENIACEAE		
Dicranopteris linearis f. emarginata (Brack.) W.H.Wagner	uluhe	E
LINDSAEACEAE		
Sphenomeris chinensis (L.) Maxon	pala`a	I
NEPHROLEPIDACEAE		
Nephrolepis brownii (Desv.) Hovemkamp & Miyam.		A

SCIENTIFIC NAME	COMMON NAME	STATUS
THELYPTERIDACEAE		
Christella dentata (Forssk.) Brownsey & Jermy		A
POLYPODIACEAE		
Phymatosorus grossus (Langsd.& Fisch.) Brownlie	laua`e, maile-scented fern	A
PTERIDACEAE		
Adiantum hispidulum Sw.	rough maidenhair fern	A
MONOCOTS		
AGAVACEAE		
Cordyline fruticosa (L.) A.Chev.	ti, ki	A
ARACEAE		
Alocasia macrorrhizos (L.) G.Don	`ape, elephant's ear	A
Coloasia esculenta (L.) Schott.	kalo	A
Epipremnum pinnatum (L.) Engl.	taro vine, pothos	A
ARECACEAE		
Cocos nucifera L.	coconut	A
Livistonia chinensis (Jacq.)	Chinese fan palm	A
Phoenix hybrid	date palm	A
Roystonea regia	royal palm	A
CYPERACEAE		
Cyperus involucratus Rottb.	umbrella sedge	A
MUSACEAE		
Musa xparadisica L.	banana, mai`a	A
PANDANACEAE		
Pandanus tectorius Parkinson ex Z	hala	I
ZINGIBERACEAE		
Zingiber zerumbet (L.) Sm.	awapuhi	A

SCIENTIFIC NAME	COMMON NAME	STATUS
POACEAE		
Andropogon virginicus L. var. *virginicus*	broomsedge	A
Axonopus fissifolius (Raddi) Kuhlm.	narrow-leaved carpetgrass	A
Bambusa sp.	bamboo	A
Cenchrus ciliaris L.	buffelgrass	A
Cenchrus echinatus L.	common sandbur	A
Coix lachrymajobi L.	Job's tears	A
Cynodon dactylon (L.) Pers	manienie	A
Digitaria insularis (L.) Mez ex Ekman	sourgrass	A
Eragrostis amabilis (L.) Wight&Arn. Ex Nees	lovegrass	A
Melinis minutiflora P.Beauv.	molasses grass	A
Oplismenus hirtellus (L.) P.Beauv. subsp. *hirtellus* U.Scholz	basketgrass, honohono	A
Panicum maximum L.	Guinea grass	A
Paspalum fimbriatum Kunth	fimbriate paspalum	A
Pennisetum purpureum Schumach	napier grass	A
Sacciolepis indica (L.) Chase	glenwood grass	A
Setaria palmifera	palmgrass	A
DICOTS		
ACANTHACEAE		
Asystasia gangetica (L.) T. Anderson	Chinese violet	A
Justicia betonica L.	white shrimp plant	A
AMARANTHACEAE		
Achyranthes aspera L.		A
Alternanthera pungens Kunth	khaki weed	A
Amaranthus spinosus L.	spiny amaranth	A
ANACARDIACEAE		
Mangifera indica L.	mango	A
Schinus terebinthifolius Raddi	Christmas berry	A
ARALIACEAE		
Schefflera actinophylla (Endl.) Harms	octopus tree, umbrella tree	A

SCIENTIFIC NAME	COMMON NAME	STATUS
ASTERACEAE		
Bidens alba (L.) DC. var. *radiata* (Sch. Bip.) Ballard ex Melchert	beggar tick	A
Bidens pilosa L.	Spanish needle	A
Conyza bonariensis (L.) Cronq.	hairy horseweed	A
Eclipta prostrate (L.) L.	false daisy	A
Emilia sonchifolia (L.) DC.	Flora's paintbrush	A
Pluchea carolinensis (Jacq.) G. Don	sourbush	A
Pluchea indica (L.) Less.	Indian fleabane	A
Sphagneticola trilobata (L.) Pruski	wedelia	A
Synedrella nodiflora (L.) Gaertn.	nodeweed	A
Tridax procumbens L.	coat buttons	A
Youngia japonica (L.) DC.	oriental hawksbeard	A
BEGONIACEAE		
Begonia hirtella Link		A
BIGNONIACEAE		
Spathodea campanulata P.Beauv.	African tulip tree	A
BRASSICACEAE		
Lepidium virginicum L.	pepperwort	A
CARICACEAE		
Carica papaya L.	papaya	A
CARYOPHYLLACEAE		
Arenaria serpylifolia L.	thyme-leaved sandwort	A
Drymaria cordata var. *pacifica* M.Mizush.	pipili	A
CLUSIACEAE		
Clusia rosea Jacq.	autograph tree	A
COMMELINACEAE		
Commelina benghalensis L.	hairy honohono	A
Commelina diffusa Burm.f.	honohono	A

SCIENTIFIC NAME	COMMON NAME	STATUS
CONVOLVULACEAE		
Iomoea alba L.	moonflower	A
Ipomoea obscura (L.) Ker Gawl.		A
Ipomoea triloba L.	little bell	A
CUCURBITACEAE		
Coccinea grandis (L.) Voigt	ivy gourd	A
Momordica charantia L.	balsam pear	A
EUPHORBIACEAE		
Aleurites moluccana (L.) Willd.	kukui, candlenut	A
Chamaesyce hirta (L.) Millsp.	hairy spurge, garden spurge	A
Chamaesyce prostrata (Aiton) Small		A
Macaranga mappa (L.) Mull.Arg.	bingabing	A
Ricinus communis L.	castor bean	A
FABACEAE		
Bauhinia x blakeana	Hong Kong orchid tree	A
Caesalpinia decapetala (Roth) Aiston	mysore thorn	A
Canavalia cathartica Thouars	maunaloa	A
Crotalaria incana L.	fuzzy rattlepod	A
Crotalaria pallida Aiton	smooth rattlepod	A
Falcataria moluccana (Miq.) Barneby J.W. Grimes	albizia	A
Indigofera hendecaphylla Jacq.	creeping indigo	A
Leucaena leucocephala (Lam.) de Wit	koa haole	A
Macroptilium lathyroides (L.) Urb.	wild bean	A
Melilotus indica (L.) All.	sweet clover	A
Mimosa pudica L. var. *unijuga* (Duchass. & Walp.) Griseb.	sleeping grass, sensitive plant	A
Prosopis pallida Kunth	kiawe, mesquite	A
Samanea saman L.	monkeypod	A
MALVACEAE		
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	A
Hibiscus tiliaceus L.	hau	I?
Sida ciliaris L.		A

SCIENTIFIC NAME	COMMON NAME	STATUS
Sida cordifolia L.		A
Sidastrum micranthum Fryxell		A
Thespesia populnea L.	milo	I?
MELASTOMATACEAE		
Arthrostema ciliatum Pav. Ex D.Don	arthrostema	A
Clidemia hirta (L.) D.Don var. *hirta*	Koster's curse	A
MORACEAE		
Ficus microcarpa L.f.	Chinese banyan	A
MYRSINACEAE		
Ardisia crenata Sims	Hilo holly	A
Ardisia elliptica Thunb.	shoebutton ardisia	A
MYRTACEAE		
Eucalyptus robusta Sm.	swamp mahogany	A
Psidium cattleianum Sabine	strawberry guava	A
Psidium guajava L.	common guava	A
Syzygium cuminii (L.) Skeels	Java plum	A
Syzygium jambos (L.) Alston	rose apple	A
NYCTAGINACEAE		
Boerhavia coccinea Mill.		A
Bougainvillea sp.	bougainvillea	A
ONAGRACEAE		
Ludwigia octovalvis (Jacq.) P.H.Raven	primrose willow	A
OXALIDACEAE		
Oxalis corniculata L.	yellow wood sorrel	A
PASSIFLORACEAE		
Passiflora suberosa L.	huehue haole	A

SCIENTIFIC NAME	COMMON NAME	STATUS
PLANTAGINACEAE		
Plantago lanceolata L.	narrow-leaved plantain	A
Plantago major L.	broad-leaved plantain	A
POLYGALACEAE		
Polygala paniculata L.	milkwort	A
PROTEACEAE		
Grevillea robusta A.Cunn. ex R.Br.	silk oak, silver oak	A
ROSACEAE		
Rubus rosifolius Sm.	thimbleberry	A
RUBIACEAE		
Morinda citrifolia L.	noni	A
Paederia foetida L.	maile pilau	A
SAPINDACEAE		
Felicium decipiens (Wight&Am.) Thwaites	fern leaf tree	A
SOLANACEAE		
Solanum americanum Mill.	popolo	I?
Solanum lycopersicum var. *cerasiforme* Dunal	cherry tomato	A
Solanum torvum Sw.	turkeyberry	A
RUTACEAE		
Murraya paniculata (L.) Jack	mock orange	A
ULMACEAE		
Trema orientalis (L.) Blume	gunpowder tree	A
VERBENACEAE		
Citharexylum caudatum L.	fiddlewood	A
Stachytarpheta australis Moldenke	owi	A

Appendix I: Faunal Evaluation

May 18, 2016

Avifaunal and Feral Mammal Survey for an 87 Acre Property Located at the Hawaii State Hospital Patient Facility, Kāne‘ohe, O‘ahu

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AVIFAUNAL AND FERAL MAMMAL SURVEY FOR AN 87 ACRE PROPERTY LOCATED AT THE HAWAII STATE HOSPITAL PATIENT FACILITY, KANEOHE, OAHU

Report prepared for:

Brown and Caldwell
Pacific Guardian Center – Mauka Tower
Honolulu, Hawaii 96813 – 3214

Survey and Report by:

Phillip L. Bruner
Environmental Consultant
Faunal (Bird & Mammal) Surveys
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18 May 2016

INTRODUCTION

The purpose of this report is to provide the findings of a two day (5, 11 May 2016) field survey of an 87 acre property located at the Hawaii State Hospital Patient Facility, Kaneohe, Oahu. In addition to the data obtained from the field survey, relevant published and unpublished sources are also noted in the report. These sources can add a broader perspective of the potential birds and animals in this region of the island. The goals of the survey were:

1-Document the species of birds and mammals observed on the property.

2-Devote special attention to document the presence and/or possible use of this area by native and migratory species particularly those that are listed as threatened or endangered.

SITE DESCRIPTION

This 87 acre property contains a mix of second growth forest comprised primarily of non-native species and open landscaped lawns and gardens. A small plant nursery located on the southeast corner of the property contains a few small ponds used for growing taro.

SURVEY PROTOCOL

The fields survey was conducted on 5, 11 May 2016. Data were collected in the morning when birds and mammals are most active and more easily detected. Visual and auditory observations form the basis of the data. Weather during the survey was generally clear with little or no wind. Scientific and common vernacular names used in this report follow Honacki et al. (1982) and Pyle (2002).

RESULTS AND DISCUSSION

Native Land Birds:

No native land birds were observed on the survey. The only species that might on rare occasions occur in this area is the Hawaiian Short-eared Owl or Pueo (*Asio flammeus sandwichensis*) Pratt et al. 1987, Hawaii Audubon Society 2005). The Pueo is listed by the State of Hawaii as endangered on Oahu. They forage over an array of habitats including forests, grasslands, agricultural fields and nest on the ground in high, dense grass (Pratt et al.1987, Hawaii Audubon Society 2005)

Native Waterbirds:

One adult Black-crowned Night Heron was observed flying over the plant nursery ponds on the morning of 11 May. This species is indigenous to Hawaii. It is not listed as endangered or threatened. They forage on a wide variety of prey in wetland habitats. Three Koloa or Hawaiian Duck (*Anas wyvilliana*) were also seen in one of the small ponds at the plant nursery on May 11. Koloa are an endangered species (Hawaii Audubon Society 2005). On the same morning, a Common Moorhen or

Alae Ula was briefly seen along the edges of one small taro pond at the plant nursery. This waterbird is also an endangered species. The endangered Hawaiian Black-necked Stilt or Ae'o (*Himantopus mexicanus knudseni)* may also on occasion forage in these small ponds but was not seen on the survey.

Migratory Shorebirds:

At this time of year migratory shorebirds are on their breeding grounds in the arctic and subarctic. They winter in Hawaii between August and April. The species that would be expected on this site are the Pacific Golden-Plover or Kolea (*Pluvialis fulva*) and Ruddy Turnstone or Akekeke (*Arenaria interpres*). They forage for insects on lawns and other open habitats in Hawaii (Pratt et al. 1987, Hawaii Audubon Society 2005). They are not threatened or endangered species.

Seabirds:

No seabirds were observed on this survey. During the nesting season (September – December) they can be disoriented by artificially lighted areas and can strike powerlines. Once on the ground they can fall prey to cats or be struck by vehicles. The US Fish Wildlife Service can provide advice on how to minimize this danger.

Alien (Introduced) Birds:

This property contains the usual array of introduced birds seen on similar property elsewhere on Oahu. Table One notes the species recorded on this survey. None of these species are endangered or threatened.

Mammals:

The only feral mammals observed on the survey were the Small Indian Mongoose (*Herpestes javanicus*), feral pigs (*Sus scrofa*) and feral cats (*Felis catus*. Rats *Ratus spp.*) and Mice (*Mus muscullus*) also likely occur on the site. I know of no recent published records for the endangered Hawaiian Hoary

Bat (*Lasiurus cinereus semotus*) in the area of this proposed project. They root solitarily in trees and forage for flying insects in a wide variety of habitats including forests, agricultural lands and urban areas (Tomich 1986, Kepler and Scott 1990, Jacobs 1993, Reynolds et al. 1998 and Bonaccorso 2008 pers. comm.). They leave their young in "nursery" trees. The US Fish Wildlife Service recommends that trees taller than 15 feet should not be disturbed, removed or trimmed during the reproductive season (June – September) if bats are known to be using the property.

EXECUTIVE SUMMARY AND RECOMMENDATIONS

The occurrence of the endangered Hawaiian Duck (Koloa) and the endangered Common Moorhen Alae Ula on the taro ponds at the plant nursery site was not unexpected. Likewise the visual sighting of the non-endangered Black-crowned Night Heron flying over the ponds was not unusual. No Pacific Golden-Plover or Ruddy Turnstone were observed due to the time of year. They forage for insects on lawns and other open habitats in August –April and return to the arctic to nest in May –July. The typical array of alien (non-native) birds and mammals found in this region of Oahu and in the habitats available at this site were observed on this survey. Likewise the occurrence of non-native mammals (cats, pigs) was also to be expected given the proximity of housing areas and second growth forest and wet drainage areas. The information provided by the USFWS regarding the concern over issues related to seabirds being attracted to lights (September –December) and "nursery" trees utilized by the endangered Hawaiian Hoary Bat (June –September) are important considerations so as to be in compliance with the Endangered Species Acts.

Table One

Alien (Introduced birds) found on a 5, 11 May 2016 field survey of Hawaii State Hospital, Patient Facility Property, Oahu

Common Name	Scientific Name
Red Jungle Fowl	*Gallus gallus*
Cattle Egret	*Bubulcus ibis*
Spotted Dove	*Streptopelia chinensis*
Zebra Dove	*Geopelia striata*
Japanese White-eye	*Zosterops japonicus*
Common Myna	*Acrodotheres tristis*
Northern Cardinal	*Cardinalis cardinalis*
Red-crested Cardinal	*Paroaria capitata*
Red-vented Bulbul	*Pycnonotus cafer*
Red-whiskered Bulbul	*Pycnonotus jocosus*
White-rumped Shama	*Copsychus malabaricus*
Japanese Bush-warbler	*Cetia diphone*
Red-billed Leiothrix	*Leiothrix lutea*
House Sparrow	*Passer domesticus*
House Finch	*Carpodacus mexicanus*
Common Waxbill	*Estrilda astrild*
Chestnut Munia	*Lonchura atricapilla*
Nutmeg Mannikin	*Lonchura punctulata*

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Appendix J: Archaeological Evaluation

October 2016

Archaeological Assessment for the Department of Health Hawai‘i State Hospital Project

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

ARCHAEOLOGICAL ASSESSMENT FOR THE DEPARTMENT OF HEALTH HAWAIʻI STATE HOSPITAL PROJECT KĀNEʻOHE AHUPUAʻA, KOʻOLAUPOKO DISTRICT, OʻAHU ISLAND [TMK (1) 4-5-023:002, 4-5-023:016 (por.), 4-5-023:017 (por.)]

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INTRODUCTION

At the request Michael S. Nishimura, P.E., Brown and Caldwell, Scientific Consultant Services, Inc. (SCS) has prepared this archaeological assessment in advance of the complete build-out improvements to the Department of Health Hawaiʻi State Hospital (the Hospital). The proposed project area will encompass the entire 87-acre property, which is located at 45-691 Keaahala Road, Kāneʻohe, Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK (1) 4-5-023:002, 4-5-023:016 (por.), 4-5-023:017 (por.)] (Figures 1 through 3). The land owner of the project area is the State of Hawaiʻi.

This assessment document was prepared in support of the Hospital's 2015 Master Plan Update (updating the 2005 Master Plan) to guide design phases of the future Hospital facilities. Specific facilities need's identified in the 2015 update include: creation of an independently-operated Skilled Nursing Facility; a Behavioral Stability Facility; improvements to the Aloha Garden; and a landscape buffer between the Hospital and the immediately adjacent Windward Community College campus. The Hospital was established at this location as the Territorial Hospital in 1930. The Hospital campus is fully developed with underground utilities, roads, parking lots, historic buildings, and a large garden area which was constructed in the last 20 years.

GEOGRAPHIC SETTING

The island of Oʻahu ranks third in size of the eight main islands in the Hawaiian Archipelago. The Waiʻanae and Koʻolau mountain ranges were formed by two volcanoes. Through the millennia, the constant force of water carved fertile amphitheater-headed valleys and rugged passes eroded at lower elevations providing access from one side of the island to another (Macdonald and Abbott 1970). According to Stearns (1966:86-87), numerous volcanic eruptions created a number of today's well-known landmarks.

PROJECT AREA DESCRIPTION

The project area is situated on the eastern (windward) section of the island of Oʻahu located immediately adjacent and southwest of the Windward Community College Campus in Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK (1) 4-5-023:002]. The *ahupuaʻa* of Kāneʻohe received high rainfall, and along with its perennial streams, supplied a constant source of water for agriculture, which would have been extremely favorable to pre-contact

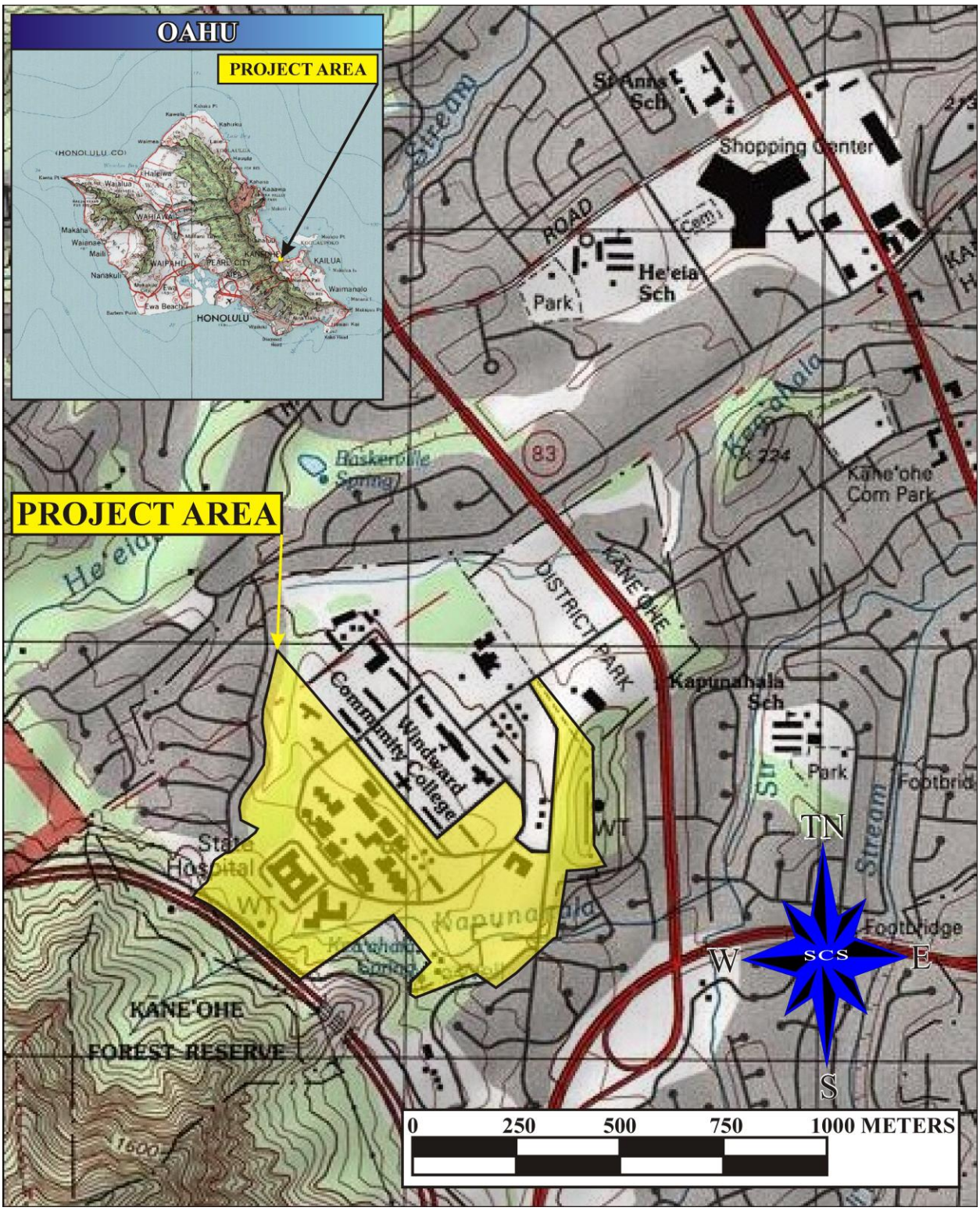

Figure 1: USGS Quadrangle (Kaneohe 1998: 1:24,000) Map Showing Project Area.

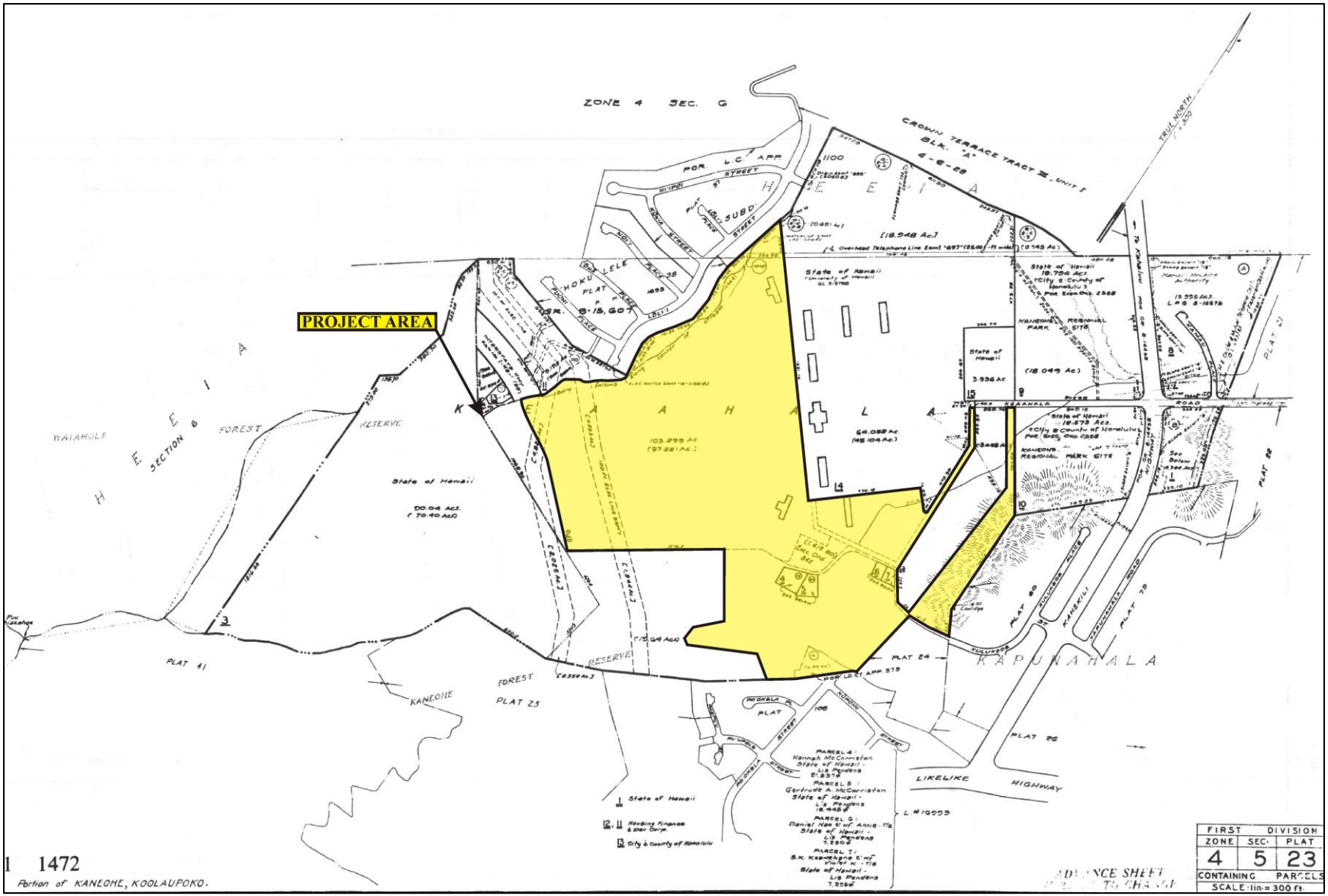

Figure 2: Tax Map Key [TMK: (1) 4-5-023] Showing Project Area.

Figure 3: Google Earth Image (Google 2015) Showing Project Area.

populations for the development of large scale cultivation of taro and the implementation of aquaculture in the form of large fish ponds.

The current project area is situated approximately two miles northeast of Kāneʻohe Bay, and is 630 m (0.4 miles) northwest of Kapunahala Stream in Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island. The project area is bounded on the east by Windward Community College, on the west by the H3 Highway, by agricultural fields to the south, and residential subdivision to the north/northwest. Elevation of the project area is 200 to 260 ft Average Mean Sea Level (AMSL).

CLIMATE

The average minimum annual temperature within the project area is 65˚degrees and the average maximum annual temperature is 85˚degrees (Armstrong 1983). The project area receives an average rainfall of 60 to 80 in. (1500 to 2000 mm) of annual rainfall (Giambelluca et al. 1986).

SOILS

According to Foote et al. (1972: Sheet Map 60) the project area is primarily located within soils classified as being of the Lolekaa Series, and specifically within Lolekaa silty clay, 3 to 8 percent slopes (LoB) deposits. Soils of the Lolekaa Series consist of "well drained soils on fans and terraces on the windward side of Oahu… [which] develop in old, gravelly colluvium and alluvium" (Foote et al. 1972:83). The LoB soils exhibit moderately rapid permeability, slow runoff, and a slight erosion hazard. The LoB soils are most often utilized as ranchlands, for the cultivation of fruits and vegetables, and for residences (ibid: 83-84).

VEGETATION

The project area lies within an area which has seen modern landscape modifications (*i.e.*, built environment), which has removed naturally occurring vegetation.

METHODS

Archival research focused on a historical documentary study involving both published and unpublished sources. These included legendary accounts, early historical journals and

narratives; historic maps, land records, such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts, and previous archaeological reports.

HISTORIC AND CULTURAL BACKGROUND

PAST POLITICAL BOUNDARIES

Traditionally, the division of O‘ahu’s land into districts (*moku*) and sub-districts was said to be performed by *Mā‘ilikukahi* who was chosen by the chiefs to be the *mō‘īho‘oponopono o ke aupuni* (administrator of the government; Kamakau 1991:53–55). Ross Cordy (2002) places Mā‘ilikukahi at the beginning of the 16th century. Mā‘ilikukahi created six districts and six district chiefs (*ali‘i ‘ai moku*). Land was considered the property of the king or *ali‘i ‘ai moku* (the *ali‘i* who eats the island/district), which he held in trust for the gods. The title of *ali‘i ‘ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted; his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka‘āinana* (commoners) worked the individual plots of land. It is said that Mā‘ilikukahi gave land to *maka‘āinana* all over the island of O‘ahu (*ibid*.).

In general, several terms, such as *moku*, *ahupua‘a*, *‘ili* or *‘ili‘* ā*ina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua‘a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua‘a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua‘a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *‘ili ‘āina* or *‘ili* were smaller land divisions next to importance to the *ahupua‘a* and were administered by the chief who controlled the *ahupua‘a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo‘o‘āina* were narrow strips of land within an *‘ili*. The land holding of a tenant or *hoa ‘āina* residing in an *ahupua‘a* was called a *kuleana* (Lucas 1995:61).

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua‘a*. During the pre-Contact Period (pre-1778), there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*)

agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinaruma*) and *maiʻa* (banana, *Musa* sp.), were also grown, and where appropriate, such crops as ʻ*uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern traditionally used on all the Hawaiian Islands (Kirch 1985; Kirch and Sahlins Vol. 1,1992:5, 119). Agricultural development on the windward side of Oʻahu was likely to have begun early (A.D. 1100–1300) during what is known as the Expansion Period (Kirch 1985). Traditionally Kāneʻohe Ahupuaʻa was viewed as valuable because of its productive agriculture and marine resources (Kamakau 1961:303).

Early settlement and agricultural development was probably first established on the windward side of the Hawaiian Islands and may have begun as early as A.D. 900-1000 on Oʻahu during what is known as the Colonization Period (Kirch 2011:22). Most likely arriving from east Polynesia, these early inhabitants brought with them tools, fishing gear, and other artifacts, as well as useful plants and animals. Settling in favorable localities offering both fishing and agricultural opportunities and having near access to inland resources was a priority (Kirch 1985). Although receiving the majority of their protein from fish, Handy and Handy (1972: vi) have stated: "…for every fisherman's house along the coasts there were hundreds of homesteads of planters in the valley and on the slopes and plains between the shore and forest." The *ahupuaʻa* of Kāneʻohe received high rainfall, and along with its perennial streams, supplied a constant source of water for agriculture (Cordy 2002). There was also easy access to marine resources, evidenced by the numerous fishponds lining the coast.

WAHI PANA (LEGENDARY PLACES)

According to the Reverend Kamau (in Sterling and Summers 1978:205), the name 'Kāneʻohe' may refer to a conversation between two women. One woman asked the other if her husband was a good husband. The second woman responded, "He is a kaneohe" (i.e., "[h]e is like a bamboo knife, this is cruel and heartless)."

Scattered amongst the agricultural and habitation sites were other places of cultural significance to the *kamaʻāina* of the district. The gods and goddess of traditional Hawaiʻi were a constant in everyday life. Place names, springs, forests, agriculture, and fishing all reflected the pervading influence of the mysterious. Hiʻiaka i-ka-poli-o-Pele, the younger sister of Pele, is associated with many places in Koʻolaupoko, as is Hina-i-ka-mālama who lives on the moon (Pukui 1926). Kane and Kanaloa, known for producing springs with their staffs, first dug in

Waikāne. Each spot associated with the gods and demigods have an auspicious names and *moʻolelo* attached and are too numerous to mention, but many can be found in more detail in Sterling and Summers (1978).

At least 14 *heiau* were recorded by McAllister in Kāneʻohe Ahupuaʻa (McAllister 1933). Two of these are said to have been built by the chief Olopana in the 12th century (Thrum 1907:48). Kawaʻewaʻe Heiau, reportedly build by *menehune*, was said to be where the 15th century chief, Olopana, had the demi-god Kamapuaʻa brought for sacrifice. A *holua* slide was enjoyed by the *aliʻi* but was subsequently destroyed during the early 1900s to make way for pineapple cultivation (McAllister 1933). The *ʻili* of Kekele (now the general area of Kaeleuli) was extolled in song as "the sweet land of fragrance and perfume" due to the *hala* blossoms from the grove of pandanus trees covering the plains of Kāneʻohe and known as the forest of Moelana (Sterling and Summers 1978:221). Fornander (1919 Vol. IV, 3:532) recounted:

> …when Kaulu took unto himself a wife, Kekele by name. Kekele was a very handsome woman whose breath and skin were as sweet as the *inamona*. She was a very quiet woman. Her favorite flowers and vines were the hala, maile, ieie and all the fragrant leaves. When she retired at night she used to sleep with her hala wreaths and would wear them until they were dried up; therefore he hala at Kekele was planted for her and it grows to this day.

The fruit from the *hala* was used for *lei*. Kekele was known as a rich land. However, by 1866, much of Moelana was gone as a result of grazing animals. According to Bates (1845:104):

> …From the precipice [Pali], the plains below present the features of a fine landscape. They are marked by heavy undulations, and rent in many places by shallow ravines. Hundreds of cattle may be seen feeding on the rich pasture with which these plains are covered….

A famous spring just below the old *pali* trail was named Waiaka, which means *shadowy water* (Sterling and Simmers 1978: 223). Although the trail was difficult and steep, people would hold on with hands and feet to reach the water. Further along the trail was a supernatural stone called Puu-o-Hauloawas located in a cave. It was said that the cave, where the spirit of the deity Pumaia flew and stayed there ablaze, is located on the highest peak to the east of the pass. It can be seen from Hoʻowahapōhaku on the trail in Kāneʻohe (Fornander 1919, Vol. IV:474).

The land below the forest was covered with taro plantations that were still present into the 20th century.

> Some of these [taro] plantations vary in size from a forty-feet square to two or three acres. Like many of the fish-ponds, the size indicates the wealth and rank of the owner. Forty square feet of land planted with kalo will afford subsistence for one person during a whole year. A square mile of land planted with the same vegetable will feed fifty-one persons for the same length of time [Bates 1845:122].

At the coast, fishponds were included within the *ahupuaʻa*:

> The ahupuaʻa of Kane-ohe and its sources of foods such as the pond of Kalopulolia, the nehu fish of Waihaukalua, the pods of Palawai and Nuʻupia, and the bird islands of Mokulua, these belonged to Maui-waena [Kamakau in Sterling and Summers 1978:206]

> Trails extended from the ocean to the mountains, as well as around the coast, linking various *ahupuaʻa* for both economic and social reasons. A *pali* trail crossed the Koʻolau Mountains and was a link to lands on the leeward side, although it was easier to go by canoe, the most popular mode of travel (Figure 4). In his 1825 description of the Pali Trail, Lord Byron recorded: The descent to this plain [Kāneʻohe], which, like that of Honoruru, extends to the sea, is the most fearful imaginable. In many places the path consists of little more than holes cut in the rock for the hands and feet; and, where most commodious, It lies along narrow ledges, where a false step would be inevitable destruction…At the bottom of the Parre there are two large stones, on which, even now, offerings of flowers and fruits are laid to propitiate the Akua Wahini, of goddesses, who are supposed to have the power of granting a safe passage [cited in Sterling and Summers 1978:225].

Names were given to the milestones along the old *pali* trail:

> At Kah-hoʻo-waha-pohaku they started climbing, to ascend from Koolau to Kona, then going perpendicularly up the edge of the cliff, and coming to a spring called Ka-wa-kilo-kanaka, a spring of olden times, well-known amongst the Hawaiians now. The beginning of that name, Ka-wa-kilo-kanaka, was because of the clearness of the reflection of a person in that water.

> From this place, climbing up the cliff, to the large rock called Ka-ipu-o-Lono, a noted rock, famous from olden times; at this rock there was a certain difficulty in the travel of olden times because if a person slipped while leaning his chest o this rock, he would fall and die I the divide. From thee to the joining place, that is, the pass of Nuuanu, was called Ka-pili, because of the joining of the cliff. From the 'nuku' on is Ka-holo-a-ke-ahole; that completes the divisions of the pali [Kaaia 1874 cited in Sterling and Summers 1978:224].

Below the *hala* groves at Kekele lies another famous stone called Ka-laau-Hoeu. Above this is another stone named Kaho-a-pohaku at resting place at the fork of the road to Kailua and Kāneʻohe. It was said that two more famous stones, Hapuu and Kalanaihauola, are at the top of the trail (Makanikeoe 1908 cited in Sterling and Summers 1978:224).

According to Kamakau, after the death of Olopana (mid-1400s, Cordy 2002), Laʻamaikahiki from Tahiti became the *aliʻi nui* of Kāneʻohe. Years later (1737) at the spot where he had arrived (Naonealaʻa), the chiefs of Maui and Oahu met to end a period of fighting:

> So it was that Peleioholani and Alapai met at Naonealaa in Kaneohe. The canoes were lined up from Kiʻi at Mokapu to Naonealaa and there on the shore line they remained. The chiefs of Oahu and Kauai and the fighting men and the country people remained inland…Alapai declared an end of war with all things as they were before, the chiefs of Maui and Molokai to be at peace with those of Oahu and Kauai; so also those of Hawaii [Kamakau in Sterling and Summers 1978:210].

In 1783, Kahahana, the nephew of Kalekili who had been put in charge of Oʻahu, was killed by his uncle. While on Oʻahu, Kahekili chose to live in the *ahupuaʻa* of Kailua, Kāneʻohe and Heʻeia (Kamakau 1961).

TRADITIONAL SETTING

Early settlement (A.D. 300–600) of Koʻolaupoko, which included habitation, as well as agriculture, has been established in several *ahupuaʻa*: the sandy beaches and dunes of Waimānalo; Kailua, especially the upper valleys of Maunawili, Kahanaiki, and Kapaʻa and the Kawainui Marsh area; and Kāneʻohe, with the possibly irrigated terraces, its dryland terraces and their associated habitation sites identified in Luluku (Cordy 2002). According to Cordy (2002), the early dates from these sites suggest an expanding population by A.D. 500s to A.D.1000s.

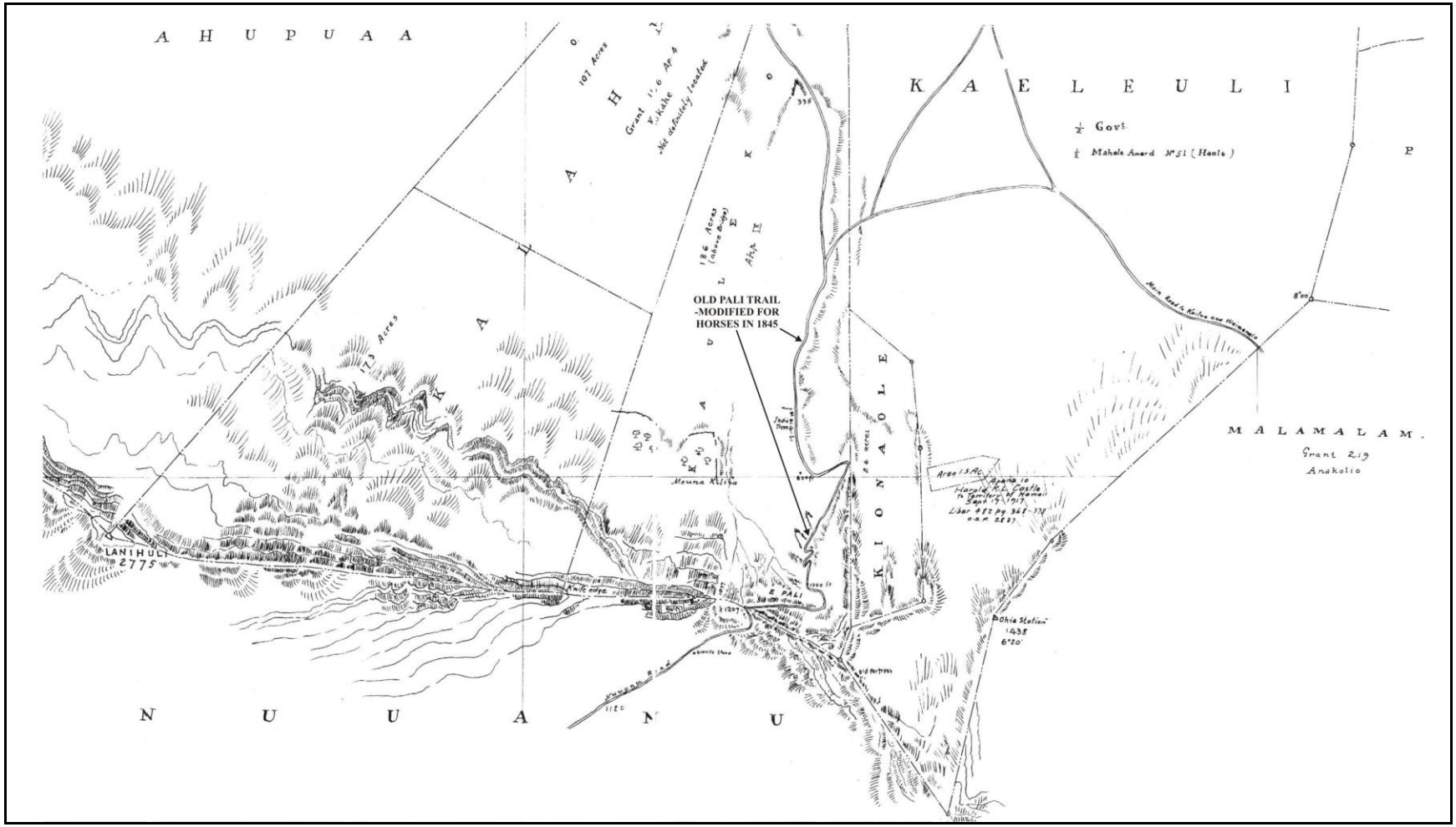

Figure 4: Map of Kāneʻohe, Oʻahu with West Kailua as Surveyed in 1874 by C.J. Lyons (State Survey Office Registered Map Number 585).

During the A.D. 1000s to 1300s, the windward population continued to expand and grow. At this time, there was cultivation along Kawainui Marsh as well as *lo‘i kalo* (wetland taro) extending from the Maunawili Stream out into the marsh (Cordy 2002). The inland terracing at Kāne‘ohe became complex and extensive, and included inland permanent habitation and field shelters. This was also the period that island-wide political changes occurred with the formation of district-based polities, which suggested a complex-rank political organization (Cordy 2002). By the 1700s, individual households were tenants of the land under a hierarchy of chiefs. The *ahupua‘a* of Kāne‘ohe and Kailua were the economic and demographic centers of Ko‘olaupoko District. Kāne‘ohe Bay area and in the drier areas along the lower valleys were dense with habitation, during the pre-Contact Period. The floors of narrow and wide valleys were used to produce taro, as were the lower valley marshes. Terracing in the uplands was located in almost all tributary streams extending to the base of the *pali* (cliff). There were at least 23 stone-walled fishponds established in the shallow waters of Kāne‘ohe Bay (Cordy 2002).

Handy (1940:97) provides the following description of the extensive cultivation observed in Kāne‘ohe:

> Kāne‘ohe is one of the most complicated terrace areas in the islands. It can be comprehended only in light of its stream system. It is one of the most active communities in planting commercial taro, and a goodly portion of its lowland terraces, tucked away in pockets flanked an often hidden by low hills or by the town itself, are still planted in taro (for milling) by Hawaiians who own the land and by Orientals who lease the land or are hired.
>
> This ahupua‘a was described in glowing terms a century and a half ago by Portlock. “…The bay all around has a very bountiful appearances, the low land and valleys being in a high state of cultivation, and crowded with plantation of taro, sweet potatoes, sugar, cane, etc., interspersed with a great number of coconut trees, which renders the prospect truly delightful.

The project area is situated in an area that was known for its extensive agricultural use. Handy (1940:97) notes that “some of the best terraces” were located in the vicinity of the project area:

> On the north side of the ahupua‘a near the boundary of He‘eia, Keaahala Stream flows into Kalimukele. Some of the best terraces now in use are inland of the highway and are irrigated by Keaahala; a large old terrace system extends

downstream below the highway. An elaborate system of water rights prevailed in ancient times throughout these sections irrigated by Keaahala.

HISTORICAL SETTING

In 1783, Kahahana, the nephew of Kalekili who had been put in charge of Oʻahu, was killed by his uncle. While staying on Oʻahu, Kahekili chose to live in the *ahupuaʻa* of Kailua, Kāneʻohe, and Heʻeia (Kamakau 1961).

Kamehameha's campaign to bring the islands under one rule started on Hawaiʻi Island. Moving to Maui, he fought the famous battle of Ka Pani Wai in ʻĪao Valley against the ruling chief, Kalanikupule. Escaping over the mountains to Olowalu, Kalanikupule quickly sailed to Oʻahu to seek protection from his father, Kahekili. Kamehameha eventually sailed with his *peleleu* (fleet) of warriors to Oʻahu where the Battle of Nuʻuanu was fought and where he became the ruler of the all the islands except Kauaʻi.

After Kamehameha's conquest of Oʻahu in 1795, he dispersed its lands to his loyal chiefs and counselors as rewards for their support. However, Kamehameha retained control over Kāneʻohe (ʻĪʻī 1959). Much of Kāneʻohe and all of Kahaluu and Kualoa were inherited as personal lands by Kamehameha's sons Liholiho and Kauikeaouli, Kamehameha II and III (Indices 1929:27-28). After Kamehameha's conquest of Oʻahu in 1895, he dispersed its lands to his loyal chiefs and counselors as rewards for their support.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kameʻeleihiwa 1992:169–70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *makaʻāinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *ʻokipū* (on Oʻahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983;

Kameʻeleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16). Kāneʻohe had passed from Kamehameha I to his son, Liholiho (Kamehameha II), and then to Kauikeaouli (Kamehameha III). Eventually, the *ahupuaʻa* was inherited by Kauikeaouli's widow, Queen Kalama.

In 1876, Judge C.C. Harris bought 20,000 acres from Queen Kalama consisting of lands from Kailua and Kāneʻohe (Devany *et al.* 1975). His daughter, Nannie R. Rice inherited the land, which she leased, to J.P. Mendonca in 1890 for raising Angus cattle. James B. Castle bought stock in the ranch, and ten years later, his son, Harold K. Castle purchased the land from Mrs. Rice (which included the present project area). Castle's Kaneohe Ranch Company consisted of some 12, 000 acres with 2,000 head of cattle.

Handy continued his description noting that the *kula* lands between the streams were planted in *hala*, *wauke*, bananas, and sweet potato. Dry-land taro plantations consisting of oriental taro, were cultivated along the upper portion of the stream, west of the highway.

Through the years, improvements were made to the original *pali* trail. In 1845, King Kamehameha III widened the pathway to six feet and most of it was paved with stone. However, the constant heavy rains caused rock-slides and maintenance was an on-going project. A few brave souls attempted the descent in small carts with some success, but the majority went on foot or slowly on horses taking three hours for the trip (Baker 1877).

Finally, in 1897, a road was designed by John Wilson and Frank Whitehouse with a grade of 8 percent and a width of 20 feet to allow loaded wagons (and eventually automobiles) to ascend and descend without difficulty. It is interesting to note that during construction of the road, approximately 800 skulls and bones were recovered from the base of the *pali*. These were thought to be the bones of the warriors who fought with Kalanikupule and Kamehameha I in 1895. The old Pali Road served well for 55 years with only occasional adjustment being made to widen the roadbed on curves. During this time, the project area was on the *makai* side of the branch road that became a part of Kalanianaʻole Highway.

The population steadily grew on the windward side of the island and it became evident in the 1950s that a new highway was needed. Construction began in 1952 on a section to eliminate a hairpin turn and continued until the new highway was completed in 1960. The new Pali

Highway provided easy access and ensured a steady commercial and residential growth on the windward side of the island that continues to this day.

Kamehameha III (Kauikeaouli) retained control over Kāneʻohe (ʻĪʻī 1959). He proceeded through the years to give portions of Kāneʻohe to deserving individuals. The *ʻili* of Keana was given to John Harbottle (Keaka), who left it to his son William Harbottle, (LCA2937). Alapai, Hueu, Ke, Kamakahonu, Kapu, Kawana, Kealoha, Kuaana,I. Piikoi, K. Piikoi, and Puupuu also received sections (Waihona ʻAina 2016). After his death, his wife Queen Kalama (Hakaleleponi), retained their portion of Kāneʻohe (Barreré 1994, Kameʻeleihiwa 1992). A total of 150 LCAs were awarded within the *ahupuaʻa* of Kāneʻohe (WaihonaʻAina 2016). However no LCA's were claimed on the project area. Six LCA's are located in the vicinity of the project area (LCA 387, 3430B, 3571, 3574, 5820, and 7173). LCA documentation indicates lands in the vicinity of the project area were utilized for traditional Hawaiian habitation and agriculture, such as house lots, *loʻi* (wetland taro fields), sweet potato, and bitter melon fields (WaihonaʻAina 2016).

MID-1800S TO 1900S

In the 1860s commercial sugar cane and rice cultivation began in Kāneʻohe. The Kāneʻohe Sugar Plantation, which started around 1865 was on Queen Kalama's land with Charles Coffin Harris (C.C. Harris) as a partner and manager. In 1871, C.C. Harris bought Queen Kalama's Koʻolaupoko properties from her heir, Charles Kanaina, as well as some land in Honolulu for $22,448. The sale included "…livestock, tool, fishpond, and fishing rights" (Bureau of Conveyances, Book 34:53; cited in Devaney et al. 1982:29).

Rice cultivation was to eventually succeed taro and dominated the lowlands of Kāneʻohe. Rice was cultivated mainly by Chinese, who rented or leased *loʻi* lands from Hawaiian land owners. By the late 1880's much of the floodplain areas of Kāneʻohe were under rice cultivation and remained so until early in the 20th century. In 1890-92, the Kāneʻohe Rice Mill was erected and put into production on property adjoining Kāneʻohe Stream. The mill had a long flume coming to it from further up Kāneʻohe Stream. It also had a short railway leading to a small landing in Kāneʻohe Bay, north of Kāneʻohe Stream. By the 1920, rice production gradually declined when it could no longer compete with the price of California grown rice (Dorrance 1998:94).

Ranching and pineapple also became major business endeavors during the mid-19th to early 20th centuries. Cattle had been left on Oʻahu by Vancouver in 1793, which multiplied on to a large herd by the 1840's (Devaney 1982:70). Kāneʻohe Ranch was formed in 1876, on lands which originally belonged to Queen Kalama. At its peak, the ranch included 12,000 acres and 2,000 head of cattle. Heavy cattle grazing resulted in much of the land modification in the upland and hill portions of Kāneʻohe.

Commercial cultivation of pineapple began in the 1890's into the first decade of the 1900's in Kāneʻohe. From 1910 to 1925, pineapple cultivation was a major industry in Kāneʻohe. In 1910, after assessing the demand for pineapple on the mainland United States, Libby, McNeill and Libby of Honolulu (a subsidiary of the mainland firm) began purchasing several of the windward pineapple companies. In 1911, Libby, McNeill and Libby built a pineapple cannery in Kahaluʻu. At its peak, 2,500 acres were under pineapple cultivation on the windward side of Oʻahu (Harper 1972), stretching from Kāneʻohe to Kahaluʻu. A large percentage of this acreage was in the Kāneʻohe Bay region, including Heʻeia.

The pineapple industry created havoc with traditional Hawaiian sites. During the 15-year period that pineapple was produced in the Kāneʻohe Bay region, at least five ancient Hawaiian sites were either badly damaged or completely destroyed. McAllister (1933) claims Haluakaiamoana, Kaualauki, Keikipuipui, Kukuiokāne, and perhaps Kalaeulaula to be among these, and possibly many other smaller sites as well. The failure of pineapple in Koʻolaupoko was attributed to the destruction of these sacred sites (McAllister 1933:170, 177). According to older Hawaiians of the area, the destruction of Kukuiokāne Heiau, brought on a disease that wiped out a large amount of Libby pineapple (McAllister 1933:177). According to Richard Miller, the loss was attributed to too much rainfall, saturated soils, aphids, mealybugs, and chlorosis, a disease that results from a deficiency of available iron in the soil (Miller interview 1988, in Allen et al. 1987).

The pineapple fields were abandoned when Molokaʻi and Lānaʻi pineapple cultivation began to boom, and Libby pulled out of the Koʻolaupoko enterprise (Kelly 1976:47). The cannery closed in 1923 (Dorrance 1998:95).

KEAʻAHALA

On November 9, 1914, the Territory of Hawaii set aside 216 acres of homestead land for the purpose of creating the Keaʻahala Military Reservation. Keaʻahala Military Reservation was

the property of the U.S. Armed Forces until the federal government returned all but 74 acres to the Territory on June 26, 1924, which was used for the Territorial Mental Hospital, the site of the present Hawaii State Hospital. In 1925 additional land was returned to the Territory so that a road leading to the hospital could be built (Dockall *et al.* 2003).

According to the correspondence between the Secretary of the Interior and Governor Wallace R. Farrington in May 1923, the Keaʻahala Military Reservation was originally established for no other reason than that the Federal Government was afraid that the land would be cut up into homestead lots under laws existing at the time, and that the Federal Government would be forced to buy it back again under condemnation proceedings if it were needed either for military or territorial purposes (Takemoto 1991).

A large portion of the Keaʻahala Military Reservation is now under the land jurisdiction of the State of Hawaiʻi and is currently being unitized as site locations for the Kāneʻohe District Park, the Hawaii State Hospital, and Windward Community College.

PREVIOUS ARCHAEOLOGY

Numerous previous archaeological projects have been completed within Kāneʻohe Ahupuaʻa, including within the project area. Please note that the following discussion of these works is based upon the availability of reports at the State Historic Preservation Division, Kapolei. The locations of previously conducted archaeological projects located within 0.5 mile of the current project area are located on Figure 5.

In the 1930's, J. Gilbert McAllister (1933) conducted the earliest archaeological work in the Koʻolaupoko District. McAllister identified six sites in the vicinity of the project area: (Kāne a me Kanaloa Heiau (McAllister Site 333), Kapuna Spring McAllister Site 334), old taro terraces McAllister Site 335), pigpen of Kāne (McAllister Site 338), Kukuiokāne Heiau (McAllister Site 340, and Kumukumu Spring (McAllister Site 341).

McAllister Site 333 (McAllister 1933:176) consists of a now destroyed Kāneame Kanaloa Heiau. McAllister described what was left of the *heiau*, as said by W. Kalani, to be at the end of the pine trees beneath the ti. There is nothing to indicate the old temple site now except an old stone wall which may have been built subsequently from the rocks of the *heiau*.

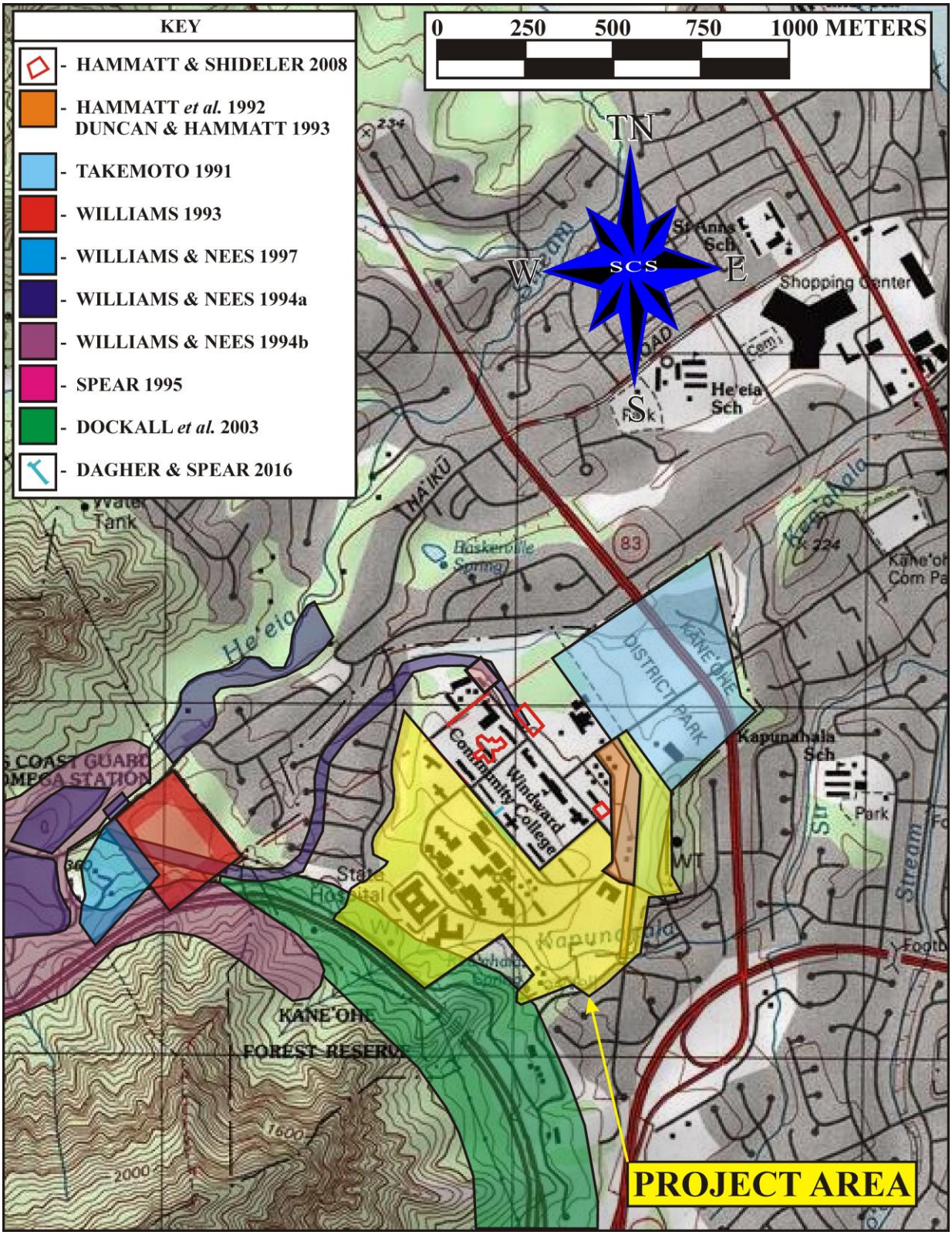

Figure 5: USGS Quadrangle (Kaneohe 1998; 1:24,000) Map Showing Previous Archaeology.

McAllister Site 334 consists of a Kapuna Spring, described by McAllister (1933) as "a spring at which Kane and Kanaloa are said to have obtained their drinking water" (McAllister 1933:176).

McAllister Site 335 consists of old taro terraces. McAllister (1933) describes the area in which the terraces are located as a valley which "broadens out with many acres of level rich lowlands protected by ridges which surround them almost completely. The land is now swampy and full of weeds, but the rectangular terraces can still be seen" (McAllister 1933:176).

McAllister Site 338 consists of Pupuaa a Kane (pigpen of Kāne), described by McAllister (1933) to be "just beneath Puu Keahiakahoe on the side of the pali" (McAllister 1933:177). McAllister (ibid) provides the following additional description of the site:

> A small flat area where it is said that Kane kept his best pigs. Certainly they were safe, for owning to the contours of the land, only one with supernatural powers could carry off a pig from such a height.
>
> At the foot of the pali is a small swale, now covered with a heavy growth of kukui, where Kane and his wife, Mamalohoa, grew awa. It is said that exceptionally good awa can still be gathered there (McAllister 1933:177).

McAllister Site 340 consists of the now largely destroyed Kukuiokāne Heiau, which was described by McAllister (1933:177) as being located inland from He'eia at the foot of the ridge above the banana fields. McAllister (1933:177) provides the following additional description of the site:

> Because of the destruction of this heiau, which was the largest and most important one in the region, by Libby, McNeill and Libby Co., a disease attacked their pineapples and the undertaking was a failure, according to the old Hawaiians of the district. The present deserted fields are adequate proof. The structure was said to be very large and if the many stones, some several feet in thickness, scattered throughout the area are any indication of the extent and importance of the former heiau, the native conception is quite justified. The ploughed-up remains indicate heavy walls and several terraces. It is impossible to obtain dimensions.

McAllister Site 341 consists of Kumukumu Spring described by McAllister (1933:177) to have been connected with Kukuiokāne Heiau. McAllister (1933:177) provides the following additional description of the site:

> On the night of Kane the drums of the hula can be heard at this spring. There was once a man, Konomokai, who said that he could dry up this spring by putting his cane into it. When he did this, the cane turned into salt, for the water was more powerful than man.

Paul H. Rosendahl (1976) conducted a reconnaissance survey for the Kailua- Kāneʻohe Flood Control Project along the banks of Kāneʻohe Stream. No sites were recorded during the reconnaissance survey.

Jane Allen (1987) conducted an inventory survey of five upland ʻili located in the Kāneʻohe Interchange of the Interstate H-3 Highway. The focus of this work was an upland agricultural system located in Luluku ʻIli.

Bishop Museum conducted a reconnaissance survey for the proposed Hope Chapel Foursquare Church Project *(Lutfy and Williams 1990)*. Five archaeological features were encountered during the survey including an *ʻili* boundary wall, a wooden outhouse, a small rock concentration, a small earthen and rock mound and alignment, and a loose alignment of stones.

Cultural Surveys Hawaiʻi Inc. conducted an Archaeological Inventory Survey of Castle Hills Access Road (Poʻokela Street and Keaʻahala Road connection) at the Kāneʻohe State Hospital and a Department of Transportation base yard (Hammatt et al. 1992). The survey involved a complete pedestrian inspection of the study area, as well as the excavation of two 1 m square test units at the southern portion of the project area in locations of anticipated ground disturbance. Besides a few fragments of 20th century glass and pottery sherds scattered in the surface zone, no archaeological cultural materials were identified. It was determined that the northern portion of the study area suffered extensive disturbance associated with the construction of the Hawaiʻi State Hospital (Territorial Hospital).

Cultural Surveys Hawaiʻi Inc. conducted archaeological monitoring of the Castle Hills Access Road (Poʻokela Street and Keaʻahala Road connection), which was built to provide access to the Castle Hills Subdivision (Duncan and Hammatt 1993). A single site, consisting of a Historic trash pit (Feature A) and a cement box (Feature B) dated to around 1900 A.D. was identified. Duncan and Hammatt (1993) state in the same report, "Clearly, the drainage pattern for the area has been severely altered by the development of residential subdivision *makai* of the project area. This modern modification of terrain may have backed up the drainage behind subdivisions to create the present marsh area. Judging from the local geomorphic features and

the pre-development topography, this wet area appears to be a recent phenomenon" (Duncan and Hammatt 1993:6).

Ogden Environmental and Energy Services Co., Inc. (Williams 1993) conducted Archaeological Reconnaissance and limited subsurface testing for the proposed family housing construction within the U.S. Coast Guard Omega Transmitter Station Site. One historic property was identified (State Site 50-80-10-4495), a pre- and post-contact habitation consisting of two heavily disturbed terraces. Subsurface testing at State Site -4595 yielded both pre-Contact artifacts (basalt flakes) and post-Contact artifacts (historic glass and ceramic fragments). Additionally, radiocarbon analysis of charcoal collected from a hearth feature provided a date range of 1260-1450 AD.

Ogden Environmental and Energy Services Co., Inc. (Williams and Nees 1994a) conducted Archaeological Reconnaissance and limited subsurface testing at five locations within the U.S. Coast Guard Omega Transmitter Station site. Five Historic properties were identified: two are associated with the WWII Naval Radio Station (State Sites 50-80-10-4787 and -4788), and three are the remains of pre-contact stone faced pond field terraces (State Sites 50-80-10-4789, -4790, and -4791).

Ogden Environmental and Energy Services Co., Inc. (Williams & Nees 1994b) conducted Archaeological and Historical Investigation for the Interstate Highway H-3 and within a portion of the U.S. Coast Guard Omega Transmitter Station site. Eleven Historic properties were identified: five consisting of pre-contact habitation features including a house complex with numerous terraces (State Site 50-80-10-2078) and four subsurface fire pit features (*imu*) (State Sites 50-80-10-2081, -2082, -2323, and -2324); the remaining six are pre-contact sites utilized into the post-Contact period, consisting of two agricultural terrace areas (State Sites 50-80-10-2042 and -2083), a habitation complex with terraces, alignments, and an enclosure (State Site 50-80-10-2041), a religious complex containing walls and modified outcrops (State Site 50-80-10-2080), a boundary wall (State Site 50-80-10-1904), and a platform of undetermined function (State Site 50-80-10-2079).

Scientific Consultant Services, Inc. (Spear 1995) conducted an Archaeological Inventory Survey for a proposed Hope Chapel driveway corridor. Fieldwork consisted of a pedestrian survey and collection and analysis of a single sediment core. Pedestrian survey yielded three surface features: a narrow dirt road cut approximately 3 m (9.8 feet) wide, a concentration of modern debris, and an outhouse described by Lutfy and Williams (1990). The original

assessment of this outhouse concluded that it was relatively recent (Lutfy and Williams 1990:3). None of the extant surface features are considered to be archaeologically significant (Spear 1995). Pollen and charcoal collected from the single sediment core indicated pre-Contact land use within the Kapunahala watershed by 692 years B.P. (about A.D. 1250).

Ogden Environmental and Energy Services Co., Inc. (Williams and Nees 1997) conducted archaeological reconnaissance and limited subsurface testing within a portion of the U.S. Coast Guard Omega Transmitter Station site. Two historic properties were identified: a single depression and unusually weathered boulders (State Site 50-80-10-4635) and a grouping of unusual stones (State Site 50-80-10-4637). Subsurface testing at State Site 50-80-10-4635 yielded eight traditional Hawaiian artifacts, which included seven basalt flakes and a volcanic glass core.

The Bishop Museum's Department of Anthropology (Dockall et al. 2003) conducted an Archaeological Inventory Survey, Data Recovery, and Monitoring for Interstate Route H-3. 49 Historic properties were identified, 14 of which are located in the vicinity of the current project area. The following is a brief description of the 14 Historic properties. State Site 50-80-10-1893 consists of a post-Contact series of either planting or clearing mounds, State Site 50-80-10-1894 was interpreted as an ʻ*ili* boundary wall, State Site 50-80-10-1901 consists of two features: a circular depression with an opening or ditch lined with basalt cobbles and course concrete (Feature 1) and a linear slope modification (trail) (Feature 2), State Site 50-80-10-1903 consists of a complex of 19 surface features, mostly small rock mounds, a platform, a boulder alignment, and a cut embankment, State Site 50-80-10-2039 consists of circular charcoal kiln depression, State Site 50-80-10-2040 consists of a large depression, linear arrangement of rock-faced terraces, and several rock mounds, State Site 50-80-10-2260 consists of charcoal filled *imu* (subterranean earth oven), State Site 50-80-10-2077 consists of a charcoal concentration, State Site 50-80-10-2084 consists of a post-Contact linear rock mound and terraces, State Site 50-80-10-2085 consists of charcoal-filled *imu*, State Site 50-80-10-2086 consists of a charcoal filled *imu*, State Site 50-80-10-2087 consists of a single cobble and boulder concentration with no evidence of a terrace, State Site 50-80-10-2251 consists of a three ridgetop terraces, and State Site 50-80-10-2156 consists of charcoal filled *imu.*

Scientific Consultant Services, Inc. (McGerty and Spear 2005) conducted an Archaeological Inventory Survey for a parcel of land in Kaeleuli ʻIli. Fieldwork consisted of a pedestrian survey. No archaeological sites or archaeological features were identified. Archival research indicated that the project area was only ever used as pastureland.

Garcia and Associates (McElroy 2006) conducted an Archaeological Inventory Survey on ten parcels where State and Country drainage improvements where conducted. Fieldwork consisted of a pedestrian survey. Pedestrian survey failed to result in the identification of any archaeological features within the ten parcels in the project area. According to McElroy (2006), these parcels have been severely disturbed by modern land use, "if surface archaeological features were present in these areas at one time, they have been destroyed by modern development".

Cultural Surveys Hawaiʻi, Inc. (Hammatt and Shideler 2008) conducted an archaeological-inventory survey level study of the proposed Windward Community College Library and Learning Resources Center Project, located in Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK: (1) 4-5-023: 014, por.]. No historic properties were identified.

FIELD INSPECTION

The field inspection was conducted on Friday, June 17, 2016 by SCS Senior Archaeologist Morgan E. Davis, M.A. under the overall guidance of Robert L. Spear, Ph.D., Principal Investigator. Digital photographs were taken of the Haloa, Bishop, Goddard and Guensberg Buildings (see map of Hospital campus, Figure 6). Interviews were formally conducted with three staff members regarding use of the buildings: Candace Sullivan, Mack Kalahiki, and Clyde Tanabe, and informal discussions were had during the site visit for photographs with security officer Henry Lee and State of Hawaii DAGS supervisor Arnold Hagihara. While the purpose of the staff interviews was for incorporation with another document, the Cultural Impact Assessment (in prep), information obtained about the structures from these sources has been included below as background information available to the authors for our recommendations.

HALOA BUILDING

The Haloa Building, at the right of the Central Campus in Figure 6, is located in the Master Plan's Central Campus area. It is currently vacant. Windows and doors are closed off. The front entrance faces the rear loading dock of Building Q, which is currently in use. No information was provided regarding the proposed use of the Haloa Building, which is over 50 years old and qualifies as a historic property. Images of the exterior (Figures 7 through 9) show the current state of the building's exterior.

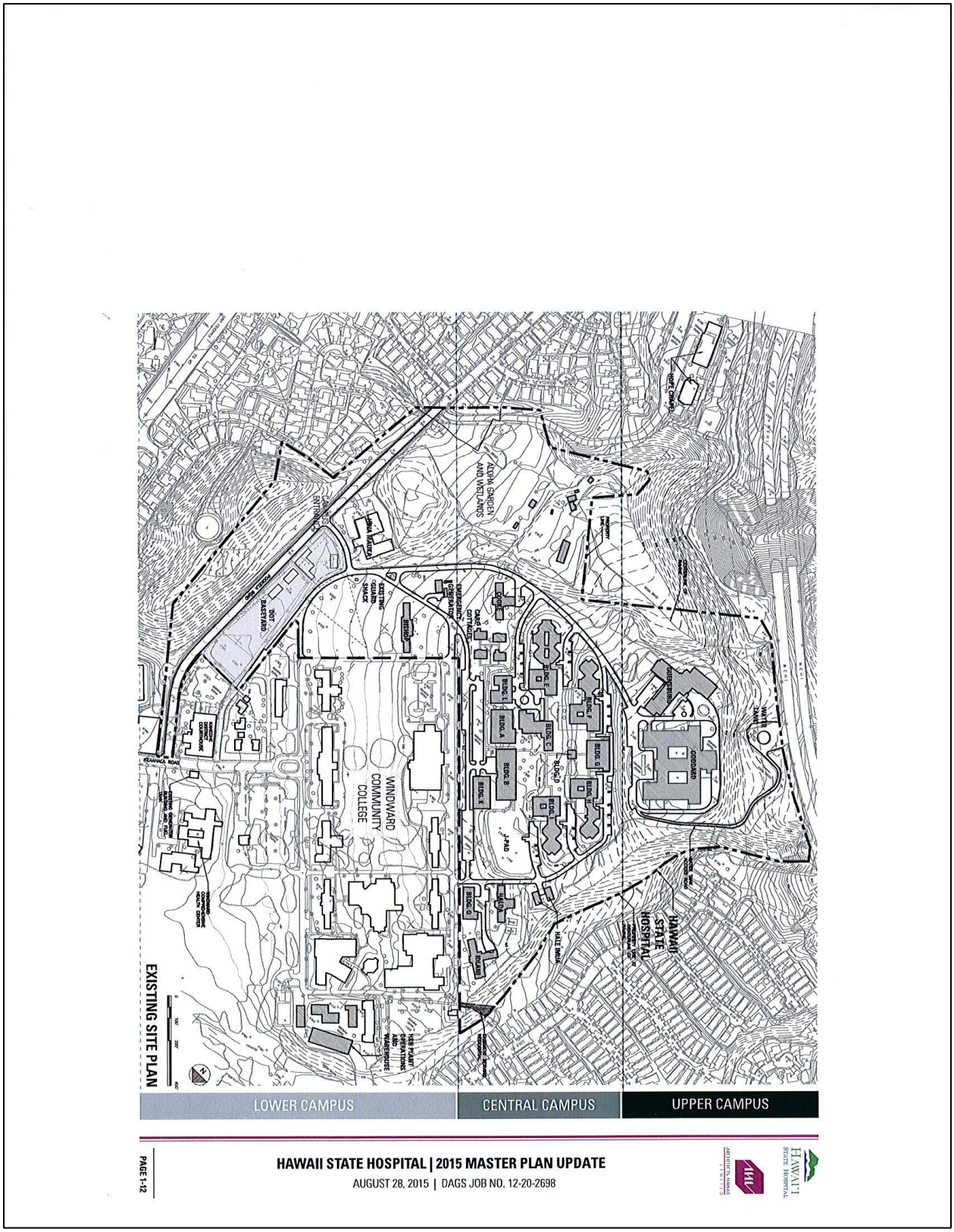

Figure 6: Site Plan Map, Hawaii State Hospital 2015 Master Plan Update (August 28, 2015).

Figure 7: Haloa Building, View of the South Side Exterior.

Figure 8: Haloa Building, View of the East Entrance – Left of Stairway.

Figure 9: Haloa Building, View of the East Entrance.

BISHOP BUILDING

The Bishop Building (Figures 10 through 12), to the left of Windward Community College at the center of the Lower Campus in Figure 6, is currently vacant. This location is identified as the future new independently-operated Skilled Nursing Facility building. This structure's windows and doors are closed off. Bishop was previously utilized as a TB (tuberculosis) ward. Bishop is over 50 years old and qualifies as a historic property. This Bishop Building is planned to be demolished prior to the construction of an indepently-operated Skilled Nursing Facility; this is a change from the 2005 version of the Master Plan and demolition of the structure has not yet been approved by the Department of Land and Natural Resources, State Historic Preservation Division (SHPD).

GODDARD BUILDING

The Goddard Building (Figures 13 through 20), seen at the center of the Upper Campus in Figure 6, has been vacant for decades although it was utilized briefly in the early 1990s when the roof of the adjacent Guensberg Building was being replaced. Demolition was scheduled for the week following the field inspection.

At the time of the site visit the building was undergoing asbestos removal and lead abatement; permission was obtained from DAGS to enter the active construction site and obtain photos. Computers, wall portions, and other office-type detritus were piled against the inside of a black construction fencing encircling the area, and construction equipment was parked around (and sometimes inside) the structure, with areas open to the outside where the wall portions had been removed.

Goddard Building's interior was described by staff as an H-shape, with the left-hand wing including the morgue and autopsy/observatory and the right-hand wing housing occupational therapy; both wings housed patients, originally including 24-hour admittance prior to the establishment of state law Chapter 175 after which admissions by police required an official charge. The center of the H was used for administrative purposes. The Goddard Building is planned for demolition in order to construct the initial new 144-Bed Goddard Patient Care

Figure 10: Bishop Building view of Rear.

Figure 11: Bishop Building, View West.

Figure 12: Bishop Building, view West and *Mauka.*

Figure 13: Goddard Building, View of Entrance Showing Mosaics and Construction Equipment, Northwest End.

Figure 14: Goddard Building, View of Entrance Showing Mosaics and Construction Equipment, Northeast End.

Figure 15: Goddard Building, Pali Wing Front.

Figure 16: Goddard Building, West Wing Front.

Figure 17: Goddard Building, West Wing with Debris.

Figure 18: Goddard Building, Rear during Asbestos Removal.

Figure 19: Goddard Building, view of "Pali" Terrace (Term Used by Hospital Staff).

Figure 20: Close-up of Front Entrance "Mosaic" (Term Used by Hospital Staff).

Facility. The Department of Land and Natural Resources, State Historic Preservation Division (SHPD) has already approved the demolition of Goddard.

GUENSBERG BUILDING

The Guensberg Building (Figures 21 through 24), seen at the center of the Upper Campus in Figure 6, was the only building in use at the time of the field inspection. This building was identified as containing three (3) units, Units S, T and U; a chapel; classrooms; and offices. There were also visible two outdoor areas enclosed by chain-link fencing. One on the *mauka* side of the building contained exercise equipment and a volleyball court; the other on the *makai* side was covered in grass and contained a number of picnic bench sets.

The Guensberg Building is planned to be demolished in order to construct a future, second 144-Bed Patient Care Facility for high-risk patients.

RECOMMENDATIONS

The current Archaeological Assessment and Field Inspection identified the lack of prior archaeological survey for the majority of the project area, and identified the presence of historic buildings located across the property. Though modern construction activities have occurred throughout the parcel the surface architecture is primarily historic, and underground excavations will be required during building replacement (demolition) and work on the sewers and parking lots. Based on archaeological survey conducted in association with the construction of the H-3 roadway within a portion of the parcel, a pre-Contact component is known to have been present in this area.

Based on the findings of the current archaeological field inspection, archaeological inventory survey, with subsurface testing is recommended in consultation with the State Historic Preservation Division, prior to any ground disturbing activities. It is also recommended that architectural documentation of any historic buildings that are slated for renovations or demolitions associated with the campus redesign be conducted in consultation with the State Historic Preservation Division, prior to demolition or renovation.

Figure 21: Guensberg Building, View of Entrance.

Figure 22: Guensberg Building, View of Rear.

Figure 23: Guensberg Building, Mauka Exercise Courts.

Figure 24: Guensberg Building, Makai Enclosed Yard.

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Appendix K: Cultural Impact Assessment (Draft)

October 2016

A Cultural Impact Assessment for the Department of Health Hawai‘i State Hospital Project

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

SCS Project Number 1809 CIA-1

A CULTURAL IMPACT ASSESSMENT FOR THE DEPARTMENT OF HEALTH HAWAIʻI STATE HOSPITAL PROJECT

KĀNEʻOHE AHUPUAʻA, KOʻOLAUPOKO DISTRICT, OʻAHU ISLAND

TMK (1) 4-5-023:002, 4-5-023:016 (por.), 4-5-023:017 (por.)

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October 2016
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INTRODUCTION

At the request Michael S. Nishimura, P.E., Brown and Caldwell, Scientific Consultant Services, Inc. (SCS), has prepared a Cultural Impact Assessment (CIA) for the proposed complete build-out improvements to the Department of Health Hawaiʻi State Hospital (the Hospital). The proposed project area will encompass the entire 92-acre property, which is located at 45-691/710 Keaahala Road, Kāneʻohe, Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK (1) 4-5-023:002, 4-5-023:016 (por.), 4-5-023:017 (por.)] (Figures 1 through 3). The land owner of the project area is the State of Hawaiʻi.

The Constitution of the State of Hawai'i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of Native Hawaiians. Article XII, Section 7 (2000) requires the State to "protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by *ahupua'a* tenants who are descendants of Native Hawaiians who inhabited the Hawaiian Islands prior to 1778." In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to Native Hawaiian *ahupua'*a tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaii Revised Statutes (HRS) 7-1. In 1992, the State of Hawai'i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, "native Hawaiian rights…may extend beyond the *ahupua'a* in which a Native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner" (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

Act 50, enacted by the Legislature of the State of Hawai'i (2000) with House Bill (HB) 2895, relating to Environmental Impact Statements, proposes that:

> …there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights… [H.B. NO. 2895].

Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs and practices, and resources of Native Hawaiians as well as other ethnic groups. Act 50 also requires state agencies and other developers to assess the effects of proposed land use or shoreline developments on the

“cultural practices of the community and State” as part of the HRS Chapter 343 (2001) environmental review process.

It also re-defined the definition of “significant effect” to include “the sum of effects on the quality of the environment including actions impacting a natural resource, limit the range of beneficial uses of the environment, that are contrary to the State’s environmental policies . . . or adversely affect the economic welfare, social welfare or cultural practices of the community and State” (H.B. 2895, Act 50, 2000). Cultural resources can include a broad range of often overlapping categories, including places, behaviors, values, beliefs, objects, records, stories, etc. (H.B. 2895, Act 50, 2000).

Thus, Act 50 requires that an assessment of cultural practices and the possible impacts of a proposed action be included in Environmental Assessments and Environmental Impact Statements, and to be taken into consideration during the planning process. As defined by the Hawaii State Office of Environmental Quality Control (OEQC), the concept of geographical expansion is recognized by using, as an example, “the broad geographical area, e.g. district or *ahupua'a*” (OEQC 2012:12). It was decided that the process should identify ‘anthropological’ cultural practices, rather than ‘social’ cultural practices. For example, *limu* (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

Therefore, the purpose of a Cultural Impact Assessment is to identify the possibility of on-going cultural activities and resources within a project area, or its vicinity, and then assessing the potential for impacts on these cultural resources. The CIA is not intended to be a document of in depth archival-historical land research, or a record of oral family histories, unless these records contain information about specific cultural resources that might be impacted by a proposed project.

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 2012:12):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, which support such cultural beliefs.

The meaning of "traditional" was explained in *National Register Bulletin*:

> Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations', usually orally or through practice. The traditional cultural significance of a historic property then is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. . . . [Parker and King 1998:1]

METHODOLOGY

This Cultural Impact Assessment was prepared as much as possible in accordance with the suggested methodology and content protocol in the Guidelines for Assessing Cultural Impacts (OEQC 2012:11-13). In outlining the "Cultural Impact Assessment Methodology", the OEQC (2012:11) states that:

> "…information may be obtained through scoping, community meetings, ethnographic interviews and oral histories…"

This report contains archival and documentary research, as well as communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. An example of the letters of invitation is presented in Appendix A, an example of the follow-up letters is presented in Appendix B; copies of the posted newspaper notices and Affidavit are presented in Appendix C, responses to the inquiries are presented in Appendix D, and the signed information release forms are presented in Appendix E. This Cultural Impact Assessment was prepared in accordance with the suggested methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 2012:13), whenever possible. The assessment concerning cultural impacts may include, but not be limited to:

A. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.

B. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

C. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

D. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

E. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.

F. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

G. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area affected directly or indirectly by the proposed project.

H. An explanation of confidential information that has been withheld from public disclosure in the assessment.

I. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

J. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

K. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

If on-going cultural activities and/or resources are identified within the project area, assessments of the potential effects on the cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps, land records, such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts, and previous archaeological reports.

INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws, and guidelines, when knowledgeable individuals are able to identify cultural practices in, or in close proximity to, the project area. If they have knowledge of traditional stories, practices and beliefs associated with a project area or if they know of historical properties within the project area, they are sought out for additional consultation and interviews. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share their relevant information concerning particular cultural resources. Often people are recommended for their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch ofOHA, historical societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input, and suggest further avenues of inquiry, as well as specific individuals to interview. It should be stressed again that this process does not include formal or in-depth ethnographic interviews or oral histories as described in the OEQC's *Guidelines for Assessing Cultural Impacts* (2012). The assessments are intended to identify potential impacts to on-going cultural practices, or resources, within a project area or in its close vicinity.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the interview available for this study. When telephone interviews occur, a summary of the information is usually sent for correction and approval, or dictated by the informant and then incorporated into the document. If no cultural resource information is forthcoming and no knowledgeable informants are suggested for further inquiry, interviews are not conducted.

GEOGRAPHIC SETTING

The island of O‘ahu ranks third in size of the eight main islands in the Hawaiian Archipelago. The Wai‘anae and Ko‘olau mountain ranges were formed by two volcanoes. Through the millennia, the constant force of water carved fertile amphitheater-headed valleys and rugged passes eroded at lower elevations providing access from one side of the island to another (Macdonald and Abbott 1970). According to Stearns (1966:86-87), numerous volcanic eruptions created a number of today's well-known landmarks.

PROJECT AREA DESCRIPTION

The project area is situated on the eastern (windward) section of the island of O‘ahu located immediately adjacent and southwest of the Windward Community College Campus in

Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK (1) 4-5-023:002, (1) 4-5-023:016 (por.), (1) 4-5-023:017 (por.)] (Figures 1 through 3). The *ahupuaʻa* of Kāneʻohe received high rainfall, and along with its perennial streams, supplied a constant source of water for agriculture, which would have been extremely favorable to pre-contact populations for the development of large scale cultivation of taro and the implementation of aquaculture in the form of large fish ponds.

The current project area is situated approximately two miles (3.2 km) northeast of Kāneʻohe Bay, and is 0.4 miles (630 m) northwest of Kapunahala Stream in Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island. The project area is bounded on the east by Windward Community College, on the west by the H3 Highway, by agricultural fields to the south, and residential subdivision to the north/northwest. Elevation of the project area is 200 to 260 ft. above mean sea level (AMSL).

CLIMATE

The average minimum annual temperature within the project area is 65 degrees Fahrenheit and the average maximum annual temperature is 85 degrees Fahrenheit (Armstrong 1983). The project area receives an average rainfall of 60 to 80 in. (1500 to 2000 mm) of annual rainfall (Giambelluca et al. 1986).

SOILS

According to Foote et al. (1972: Sheet Map 60) the project area is primarily located within soils classified as being of the Lolekaa Series, and specifically within Lolekaa silty clay, 3 to 8 percent slopes (LoB) deposits. Soils of the Lolekaa Series consist of "well drained soils on fans and terraces on the windward side of Oahu… [which] develop in old, gravelly colluvium and alluvium" (Foote et al. 1972:83). The LoB soils exhibit moderately rapid permeability, slow runoff, and a slight erosion hazard. The LoB soils are most often utilized as ranchlands, for the cultivation of fruits and vegetables, and for residences (Foote et al. (1972): 83-84).

VEGETATION

The project area lies within an area which has seen modern landscape modifications (*i.e.*, built environment), which has removed naturally occurring vegetation.

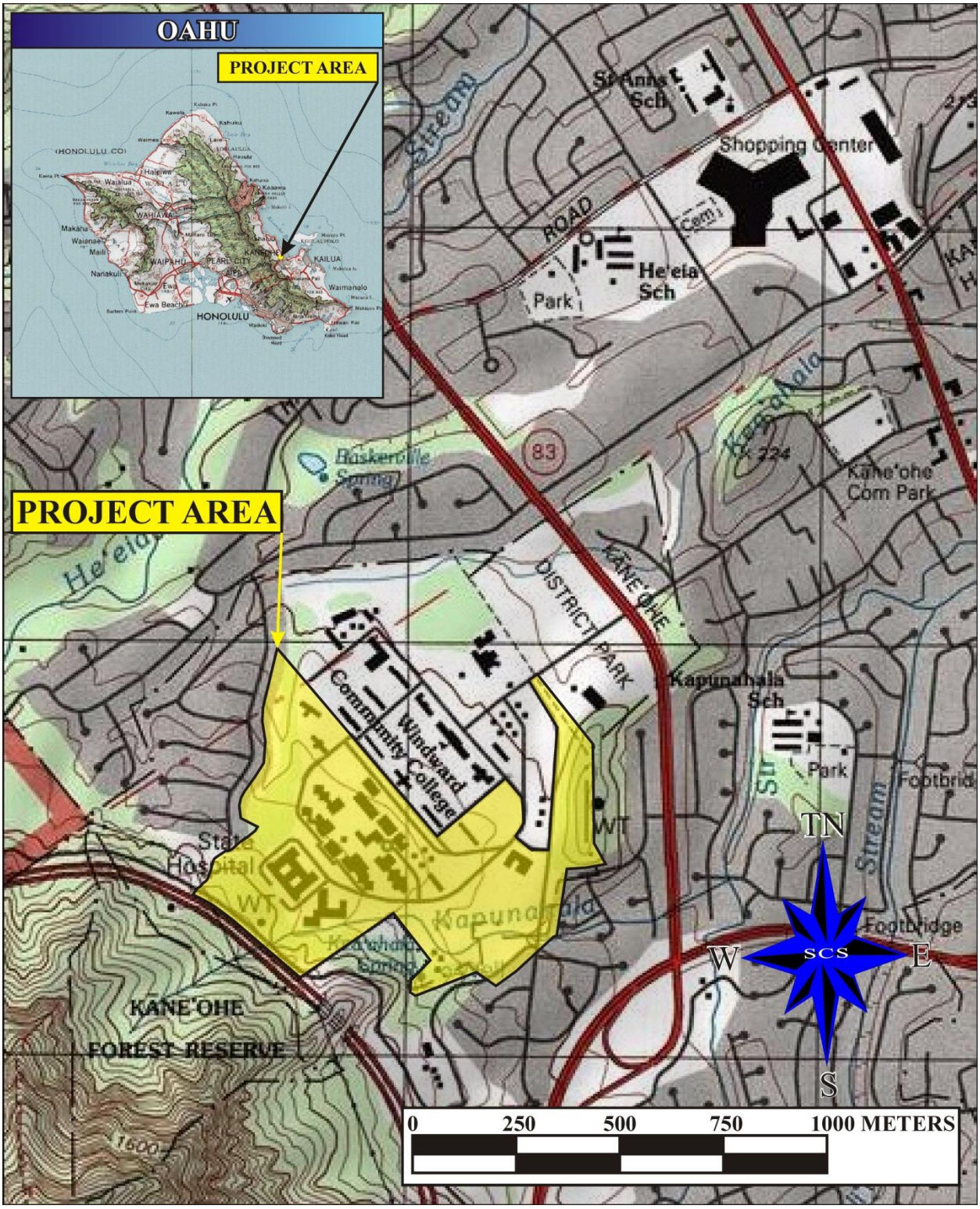

Figure 1: USGS Quadrangle (Kaneohe 1998: 1:24,000) Map Showing Project Area.

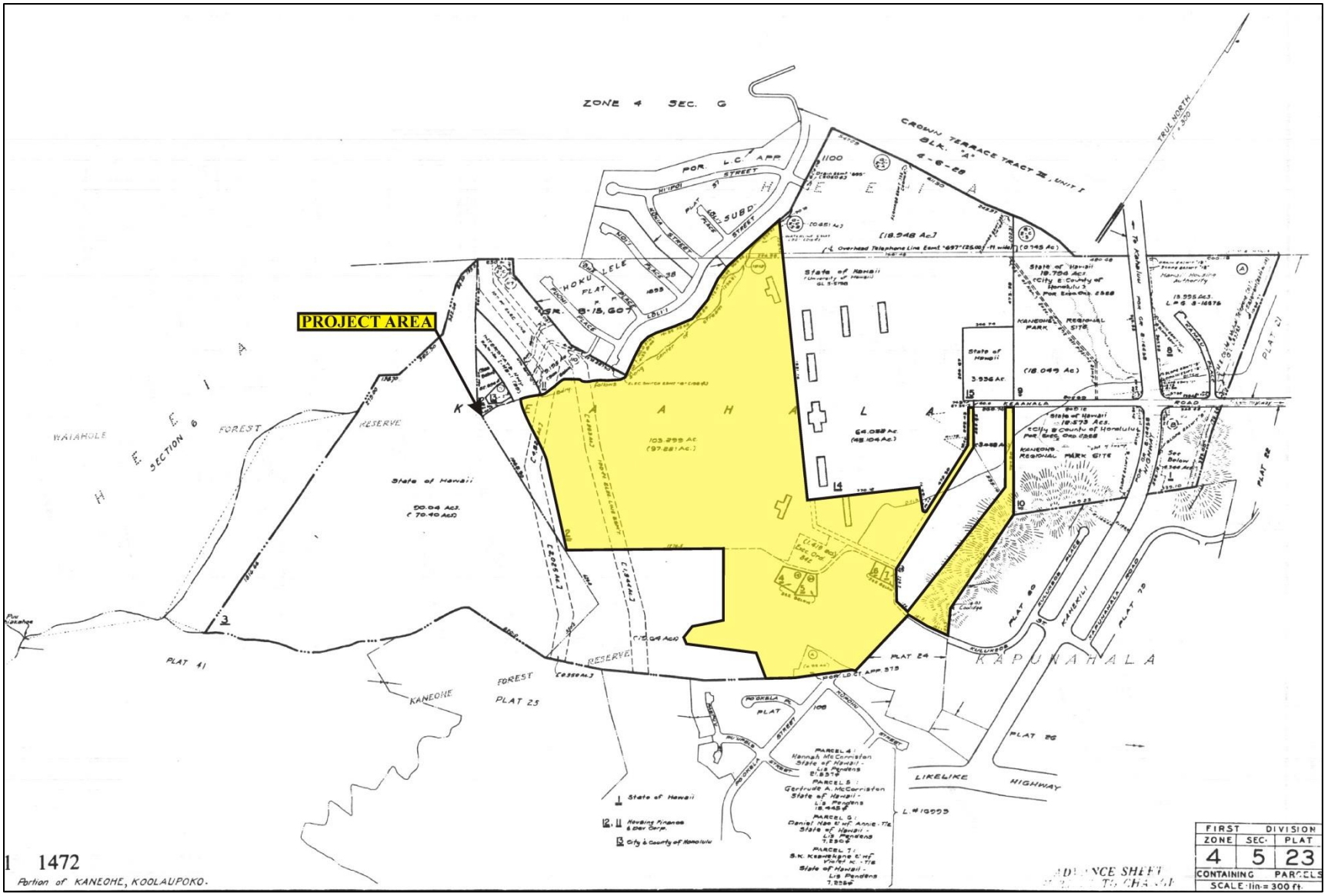

Figure 2: Tax Map Key [TMK: (1) 4-5-023] Showing Project Area.

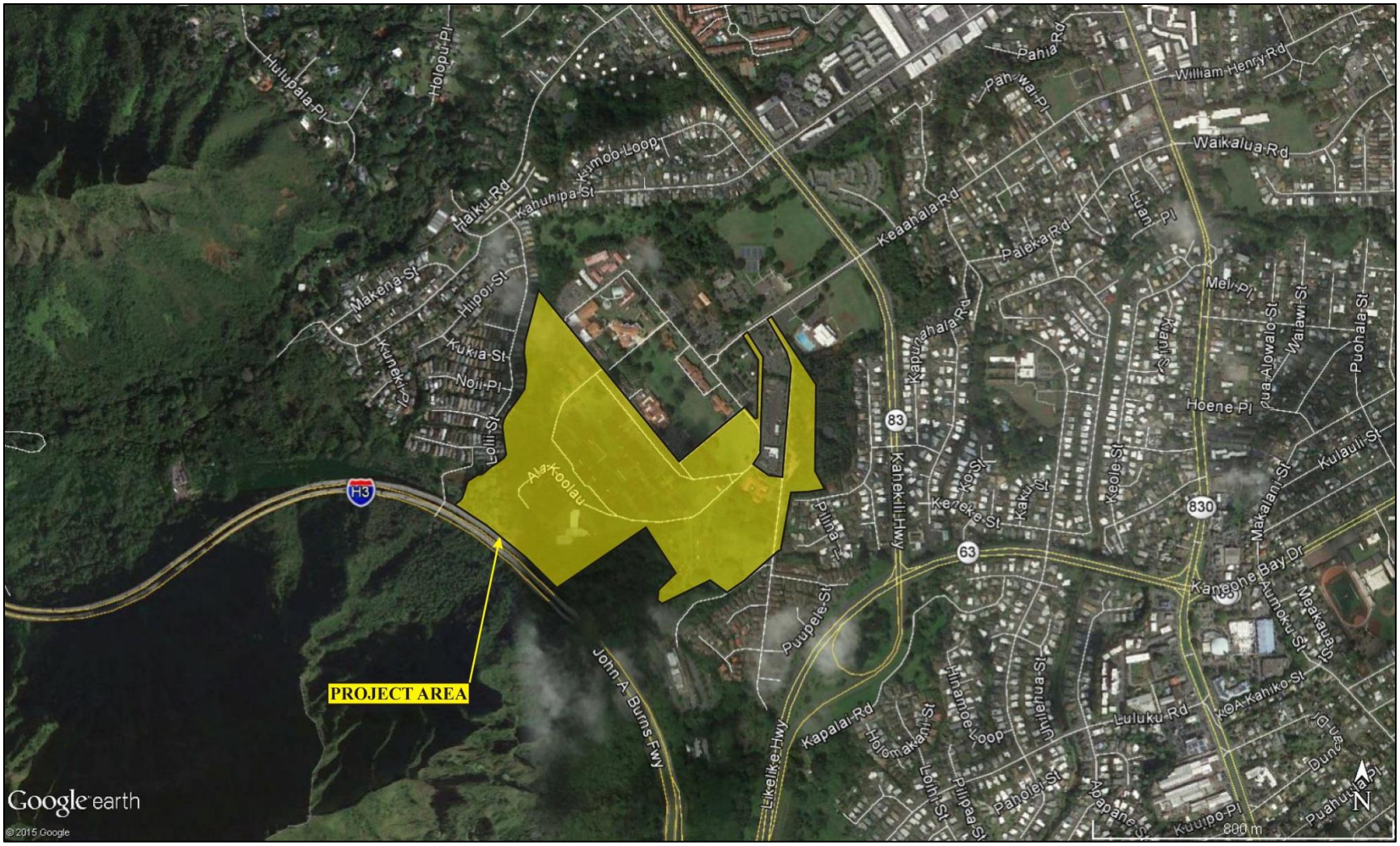

Figure 3: Google Earth Image (Google 2016; Google Image Dated 1/29/2013) Showing Project Area.

HISTORIC AND CULTURAL BACKGROUND

PAST POLITICAL BOUNDARIES

Traditionally, the division of O‘ahu’s land into districts (*moku*) and sub-districts was said to be performed by *Mā‘ilikukahi* who was chosen by the chiefs to be the *mō‘īho‘oponopono o ke aupuni* (administrator of the government; Kamakau 1991:53–55). Ross Cordy (2002) places Mā‘ilikukahi at the beginning of the 16th century. Mā‘ilikukahi created six districts and six district chiefs (*ali‘i ‘ai moku*). Land was considered the property of the king or *ali‘i ‘ai moku* (the *ali‘i* who eats the island/district), which he held in trust for the gods. The title of *ali‘i ‘ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted; his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka‘āinana* (commoners) worked the individual plots of land. It is said that Mā‘ilikukahi gave land to *maka‘āinana* all over the island of O‘ahu (*ibid*.).

In general, several terms, such as *moku*, *ahupua‘a*, *‘ili* or *‘ili‘* ā*ina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua‘a*) that customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua‘a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua‘a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *‘ili ‘āina* or *‘ili* were smaller land divisions next to importance to the *ahupua‘a* and were administered by the chief who controlled the *ahupua‘a* in which it was located (Lyons 1875:33; Lucas 1995:40). The *mo‘o‘āina* were narrow strips of land within an *‘ili*. The land holding of a tenant or *hoa ‘āina* residing in an *ahupua‘a* was called a *kuleana* (Lucas 1995:61).

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua‘a*. During the pre-Contact Period (pre-1778), there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinaruma*) and *mai‘a* (banana, *Musa* sp.), were also grown, and where appropriate, such crops as ‘*uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern traditionally used on all the Hawaiian Islands (Kirch 1985; Kirch and

Sahlins Vol. 1,1992:5, 119). Agricultural development on the windward side of Oʻahu was likely to have begun early (A.D. 1100–1300) during what is known as the Expansion Period (Kirch 1985). Traditionally Kāneʻohe Ahupuaʻa was viewed as valuable because of its productive agriculture and marine resources (Kamakau 1961:303).

Early settlement and agricultural development was probably first established on the windward side of the Hawaiian Islands and may have begun as early as A.D. 900-1000 on Oʻahu during what is known as the Colonization Period (Kirch 2011:22). Most likely arriving from east Polynesia, these early inhabitants brought with them tools, fishing gear, and other artifacts, as well as useful plants and animals. Settling in favorable localities offering both fishing and agricultural opportunities and having near access to inland resources was a priority (Kirch 1985). Although receiving the majority of their protein from fish, Handy and Handy (1972: vi) have stated: "…for every fisherman's house along the coasts there were hundreds of homesteads of planters in the valley and on the slopes and plains between the shore and forest." The *ahupuaʻa* of Kāneʻohe received high rainfall, and along with its perennial streams, supplied a constant source of water for agriculture (Cordy 2002). There was also easy access to marine resources, evidenced by the numerous fishponds lining the coast.

WAHI PANA (LEGENDARY PLACES)

According to Reverend Kamau (in Sterling and Summers 1978:205), the name 'Kāneʻohe' may refer to a conversation between two women. One woman asked the other if her husband was a good husband. The second woman responded, "He is a kaneohe" (i.e., "[h]e is like a bamboo knife, this is cruel and heartless)."

Scattered amongst the agricultural and habitation sites were other places of cultural significance to the *kamaʻāina* of the district. The gods and goddess of traditional Hawaiʻi were a constant in everyday life. Place names, springs, forests, agriculture, and fishing all reflected the pervading influence of the mysterious. Hiʻiaka i-ka-poli-o-Pele, the younger sister of Pele, is associated with many places in Koʻolaupoko, as is Hina-i-ka-mālama who lives on the moon (Pukui 1926). Kane and Kanaloa, known for producing springs with their staffs, first dug in Waikāne. Each spot associated with the gods and demigods have an auspicious names and *moʻolelo* attached and are too numerous to mention, but many can be found in more detail in Sterling and Summers (1978).

At least 14 *heiau* were recorded by McAllister in Kāneʻohe Ahupuaʻa (McAllister 1933). Two of these are said to have been built by the chief Olopana in the 12th century (Thrum

1907:48). Kawaʻewaʻe Heiau, reportedly build by *menehune*, was said to be where the 15th century chief, Olopana, had the demi-god Kamapuaʻa brought for sacrifice. A *holua* slide was enjoyed by the *aliʻi* but was subsequently destroyed during the early 1900s to make way for pineapple cultivation (McAllister 1933). The *ʻili* of Kekele (now the general area of Kaeleuli) was extolled in song as "the sweet land of fragrance and perfume" due to the *hala* blossoms from the grove of pandanus trees covering the plains of Kāneʻohe and known as the forest of Moelana (Sterling and Summers 1978:221). Fornander (1919 Vol. IV, 3:532) recounted:

> …when Kaulu took unto himself a wife, Kekele by name. Kekele was a very handsome woman whose breath and skin were as sweet as the *inamona*. She was a very quite woman. Her favorite flowers and vines were the hala, maile, ieie and all the fragrant leaves. When she retired at night she used to sleep with her hala wreaths and would wear them until they were dried up; therefore he hala at Kekele was planted for her and it grows to this day.

The fruit from the *hala* was used for *lei*. Kekele was known as a rich land. However, by 1866, much of Moelana was gone as a result of grazing animals. According to Bates (1845:104):

> …From the precipice [Pali], the plains below present the features of a fine landscape. They are marked by heavy undulations, and rent in many places by shallow ravines. Hundreds of cattle may be seen feeding on the rich pasture with which these plains are covered….

A famous spring just below the old *pali* trail was named Waiaka, which means *shadowy water* (Sterling and Simmers 1978: 223). Although the trail was difficult and steep, people would hold on with hands and feet to reach the water. Further along the trail was a supernatural stone called Puu-o-Hauloawas located in a cave. It was said that the cave, where the spirit of the deity Pumaia flew and stayed there ablaze, is located on the highest peak to the east of the pass. It can be seen from Hoʻowahapōhaku on the trail in Kāneʻohe (Fornander 1919, Vol. IV:474).

The land below the forest was covered with taro plantations that were still present into the 20th century.

> Some of these [taro] plantations vary in size from a forty-feet square to two or three acres. Like many of the fish-ponds, the size indicates the wealth and rank of the owner. Forty square feet of land planted with kalo will afford subsistence for one person during a whole year. A square mile of land planted with the same vegetable will feed fifty-one persons for the same length of time [Bates 1845:122].

At the coast, fishponds were included within the *ahupuaʻa*:

> The ahupuaʻa of Kane-ohe and its sources of foods such as the pond of Kalopulolia, the nehu fish of Waihaukalua, the pods of Palawai and Nuʻupia, and the bird islands of Mokulua, these belonged to Maui-waena [Kamakau in Sterling and Summers 1978:206]

> Trails extended from the ocean to the mountains, as well as around the coast, linking various *ahupuaʻa* for both economic and social reasons. A *pali* trail crossed the Koʻolau Mountains and was a link to lands on the leeward side, although it was easier to go by canoe, the most popular mode of travel (Figure 4). In his 1825 description of the Pali Trail, Lord Byron recorded: The descent to this plain [Kāneʻohe], which, like that of Honoruru, extends to the sea, is the most fearful imaginable. In many places the path consists of little more than holes cut in the rock for the hands and feet; and, where most commodious, It lies along narrow ledges, where a false step would be inevitable destruction…At the bottom of the Parre there are two large stones, on which, even now, offerings of flowers and fruits are laid to propitiate the Akua Wahini, of goddesses, who are supposed to have the power of granting a safe passage [cited in Sterling and Summers 1978:225].

Names were given to the milestones along the old *pali* trail:

> At Kah-hoʻo-waha-pohaku they started climbing, to ascend from Koolau to Kona, then going perpendicularly up the edge of the cliff, and coming to a spring called Ka-wa-kilo-kanaka, a spring of olden times, well-known amongst the Hawaiians now. The beginning of that name, Ka-wa-kilo-kanaka, was because of the clearness of the reflection of a person in that water.
>
> From this place, climbing up the cliff, to the large rock called Ka-ipu-o-Lono, a noted rock, famous from olden times; at this rock there was a certain difficulty in the travel of olden times because if a person slipped while leaning his chest o this rock, he would fall and die I the divide. From thee to the joining place, that is, the pass of Nuuanu, was called Ka-pili, because of the joining of the cliff. From the ʻnukuʼ on is Ka-holo-a-ke-ahole; that completes the divisions of the pali [Kaaia 1874 cited in Sterling and Summers 1978:224].

Below the *hala* groves at Kekele lies another famous stone called Ka-laau-Hoeu. Above this is another stone named Kaho-a-pohaku at resting place at the fork of the road to Kailua and Kāneʻohe. It was said that two more famous stones, Hapuu and Kalanaihauola, are at the top of the trail (Makanikeoe 1908 cited in Sterling and Summers 1978:224).

According to Kamakau, after the death of Olopana (mid-1400s, Cordy 2002), Laʻamaikahiki from Tahiti became the *aliʻi nui* of Kāneʻohe. Years later (1737) at the spot where he had arrived (Naonealaʻa), the chiefs of Maui and Oahu met to end a period of fighting:

> So it was that Peleioholani and Alapai met at Naonealaa in Kaneohe. The canoes were lined up from Kiʻi at Mokapu to Naonealaa and there on the shore line they remained. The chiefs of Oahu and Kauai and the fighting men and the country people remained inland…Alapai declared an end of war with all things as they were before, the chiefs of Maui and Molokai to be at peace with those of Oahu and Kauai; so also those of Hawaii [Kamakau in Sterling and Summers 1978:210].

In 1783, Kahahana, the nephew of Kalekili who had been put in charge of Oʻahu, was killed by his uncle. While on Oʻahu, Kahekili chose to live in the *ahupuaʻa* of Kailua, Kāneʻohe and Heʻeia (Kamakau 1961).

TRADITIONAL SETTING

Early settlement (A.D. 300–600) of Koʻolaupoko, which included habitation, as well as agriculture, has been established in several *ahupuaʻa*: the sandy beaches and dunes of Waimānalo; Kailua, especially the upper valleys of Maunawili, Kahanaiki, and Kapaʻa and the Kawainui Marsh area; and Kāneʻohe, with the possibly irrigated terraces, its dryland terraces and their associated habitation sites identified in Luluku (Cordy 2002). According to Cordy, the early dates from these sites suggest an expanding population by A.D. 500s to A.D.1000s (ibid).

During the A.D. 1000s to 1300s, the windward population continued to expand and grow. At this time, there was cultivation along Kawainui Marsh as well as *loʻi kalo* (wetland taro) extending from the Maunawili Stream out into the marsh (Cordy 2002). The inland terracing at Kāneʻohe became complex and extensive, and included inland permanent habitation and field shelters. This was also the period that island-wide political changes occurred with the formation of district-based polities, which suggested a complex-rank political organization (Cordy 2002). By the 1700s, individual households were tenants of the land under a hierarchy of chiefs. The *ahupuaʻa* of Kāneʻohe and Kailua were the economic and demographic centers of Koʻolaupoko District. Kāneʻohe Bay area and in the drier areas along the lower valleys were dense with habitation, during the pre-Contact Period. The floors of narrow and wide valleys were used to produce taro, as were the lower valley marshes. Terracing in the uplands was located in almost all tributary streams extending to the base of the *pali* (cliff). There were at least 23 stone-walled fishponds established in the shallow waters of Kāneʻohe Bay (Cordy 2002).

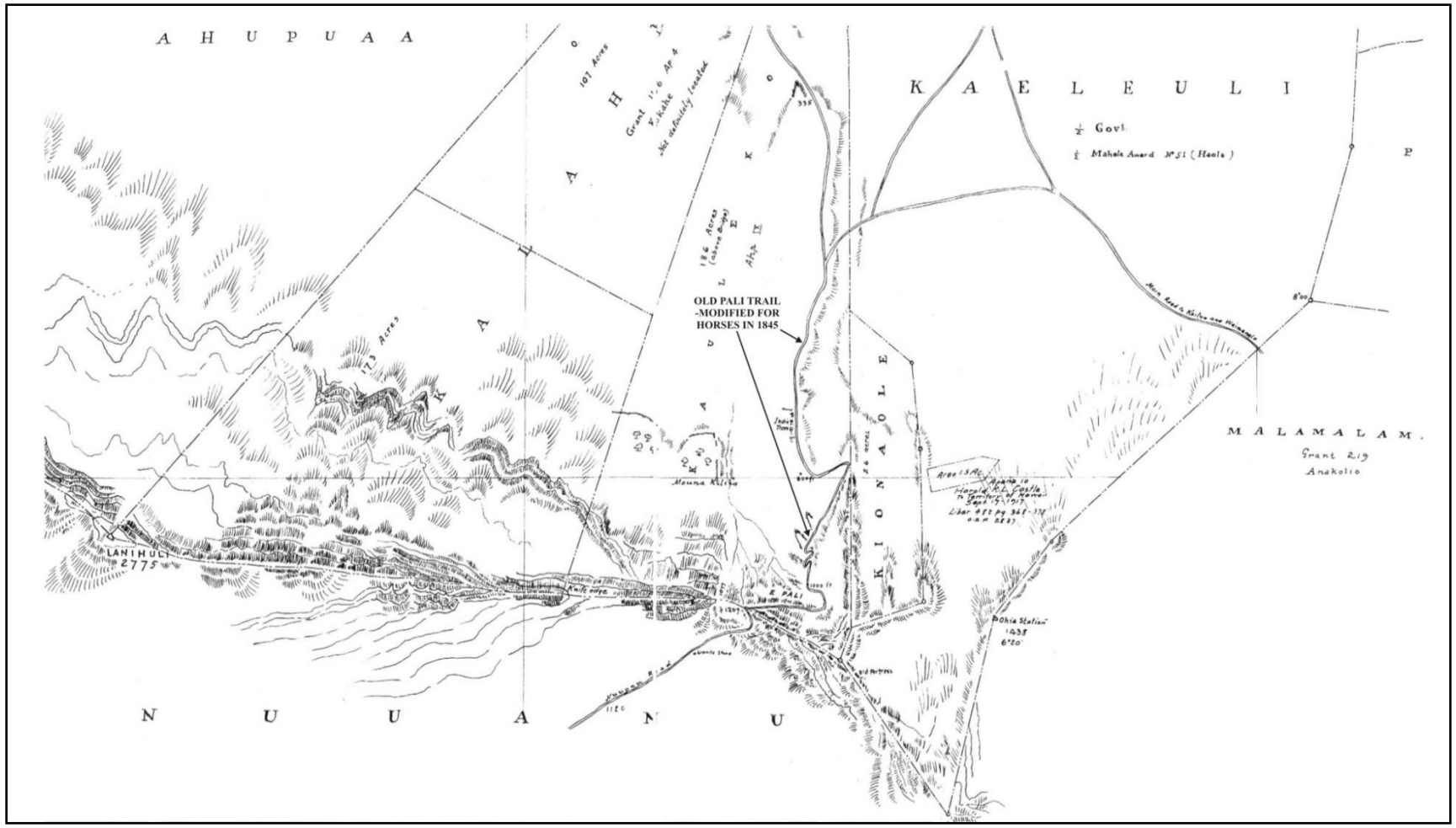

Figure 4: Map of Kāneʻohe, Oʻahu with West Kailua as Surveyed in 1874 by C.J. Lyons (State Survey Office Registered Map Number 585).

Handy (1940:97) provides the following description of the extensive cultivation observed in Kāneʻohe:

> Kāneʻohe is one of the most complicated terrace areas in the islands. It can be comprehended only in light of its stream system. It is one of the most active communities in planting commercial taro, and a goodly portion of its lowland terraces, tucked away in pockets flanked an often hidden by low hills or by the town itself, are still planted in taro (for milling) by Hawaiians who own the land and by Orientals who lease the land or are hired.
>
> This ahupuaʻa was described in glowing terms a century and a half ago by Portlock. "…The bay all around has a very bountiful appearances, the low land and valleys being in a high state of cultivation, and crowded with plantation of taro, sweet potatoes, sugar, cane, etc., interspersed with a great number of coconut trees, which renders the prospect truly delightful.

The project area is situated in an area that was known for its extensive agricultural use. Handy (1940:97) notes that "some of the best terraces" were located in the vicinity of the project area:

> On the north side of the ahupuaʻa near the boundary of Heʻeia, Keaahala Stream flows into Kalimukele. Some of the best terraces now in use are inland of the highway and are irrigated by Keaahala; a large old terrace system extends downstream below the highway. An elaborate system of water rights prevailed in ancient times throughout these sections irrigated by Keaahala.

HISTORICAL SETTING

In 1783, Kahahana, the nephew of Kalekili who had been put in charge of Oʻahu, was killed by his uncle. While staying on Oʻahu, Kahekili chose to live in the *ahupuaʻa* of Kailua, Kāneʻohe, and Heʻeia (Kamakau 1961).

Kamehameha's campaign to bring the islands under one rule started on Hawaiʻi Island. Moving to Maui, he fought the famous battle of Ka Pani Wai in ʻĪao Valley against the ruling chief, Kalanikupule. Escaping over the mountains to Olowalu, Kalanikupule quickly sailed to Oʻahu to seek protection from his father, Kahekili. Kamehameha eventually sailed with his *peleleu* (fleet) of warriors to Oʻahu where the Battle of Nuʻuanu was fought and where he became the ruler of the all the islands except Kauaʻi.

After Kamehameha's conquest of Oʻahu in 1795, he dispersed its lands to his loyal chiefs and counselors as rewards for their support. However, Kamehameha retained control over

Kāneʻohe (ʻĪʻī 1959). Much of Kāneʻohe and all of Kahaluu and Kualoa were inherited as personal lands by Kamehameha's sons Liholiho and Kauikeaouli, Kamehameha II and III (Indices 1929:27-28). After Kamehameha's conquest of Oʻahu in 1895, he dispersed its lands to his loyal chiefs and counselors as rewards for their support.

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kameʻeleihiwa 1992:169–70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *makaʻāinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *ʻokipū* (on Oʻahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kameʻeleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16). Kāneʻohe had passed from Kamehameha I to his son, Liholiho (Kamehameha II), and then to Kauikeaouli (Kamehameha III). Eventually, the *ahupuaʻa* was inherited by Kauikeaouli's widow, Queen Kalama.

In 1876, Judge C.C. Harris bought 20,000 acres from Queen Kalama consisting of lands from Kailua and Kāneʻohe (Devany *et al.* 1975). His daughter, Nannie R. Rice inherited the land, which she leased, to J.P. Mendonca in 1890 for raising Angus cattle. James B. Castle bought stock in the ranch, and ten years later, his son, Harold K. Castle purchased the land from Mrs. Rice (which included the present project area). Castle's Kaneohe Ranch Company consisted of some 12, 000 acres with 2,000 head of cattle.

Handy continued his description noting that the *kula* lands between the streams were planted in *hala*, *wauke*, bananas, and sweet potato. Dry-land taro plantations consisting of oriental taro, were cultivated along the upper portion of the stream, west of the highway.

Through the years, improvements were made to the original *pali* trail. In 1845, King Kamehameha III widened the pathway to six feet and most of it was paved with stone. However, the constant heavy rains caused rock-slides and maintenance was an on-going project. A few brave souls attempted the descent in small carts with some success, but the majority went on foot or slowly on horses taking three hours for the trip (Baker 1877).

Finally, in 1897, a road was designed by John Wilson and Frank Whitehouse with a grade of 8 percent and a width of 20 feet to allow loaded wagons (and eventually automobiles) to ascend and descend without difficulty. It is interesting to note that during construction of the road, approximately 800 skulls and bones were recovered from the base of the *pali*. These were thought to be the bones of the warriors who fought with Kalanikupule and Kamehameha I in 1895. The old Pali Road served well for 55 years with only occasional adjustment being made to widen the roadbed on curves. During this time, the project area was on the *makai* side of the branch road that became a part of Kalaniana‘ole Highway.

The population steadily grew on the windward side of the island and it became evident in the 1950s that a new highway was needed. Construction began in 1952 on a section to eliminate a hairpin turn and continued until the new highway was completed in 1960. The new Pali Highway provided easy access and ensured a steady commercial and residential growth on the windward side of the island that continues to this day.

Kamehameha III (Kauikeaouli) retained control over Kāne‘ohe (‘Ī‘ī 1959). He proceeded through the years to give portions of Kāne‘ohe to deserving individuals. The *‘ili* of Keana was given to John Harbottle (Keaka), who left it to his son William Harbottle, (LCA2937). Alapai, Hueu, Ke, Kamakahonu, Kapu, Kawana, Kealoha, Kuaana,I. Piikoi, K. Piikoi, and Puupuu also received sections (Waihona ‘Aina 2016). After his death, his wife Queen Kalama (Hakaleleponi), retained their portion of Kāne‘ohe (Barreré 1994, Kame‘eleihiwa 1992). A total of 150 LCAs were awarded within the *ahupua‘a* of Kāne‘ohe (Waihona‘Aina 2016). However no LCA’s were claimed on the project area. Six LCA’s are located in the vicinity of the project area (LCA 387, 3430B, 3571, 3574, 5820, and 7173). LCA documentation indicates lands in the vicinity of the project area were utilized for traditional Hawaiian habitation and agriculture, such as house lots, *lo‘i* (wetland taro fields), sweet potato, and bitter melon fields (Waihona‘Aina 2016).

MID-1800s TO 1900s

In the 1860s commercial sugar cane and rice cultivation began in Kāneʻohe. The Kāneʻohe Sugar Plantation, which started around 1865 was on Queen Kalama's land with Charles Coffin Harris (C.C. Harris) as a partner and manager. In 1871, C.C. Harris bought Queen Kalama's Koʻolaupoko properties from her heir, Charles Kanaina, as well as some land in Honolulu for $22,448. The sale included "…livestock, tool, fishpond, and fishing rights" (Bureau of Conveyances, Book 34:53; cited in Devaney et al. 1982:29).

Rice cultivation was to eventually succeed taro and dominated the lowlands of Kāneʻohe. Rice was cultivated mainly by Chinese, who rented or leased *loʻi* lands from Hawaiian land owners. By the late 1880's much of the floodplain areas of Kāneʻohe were under rice cultivation and remained so until early in the 20th century. In 1890-92, the Kāneʻohe Rice Mill was erected and put into production on property adjoining Kāneʻohe Stream. The mill had a long flume coming to it from further up Kāneʻohe Stream. It also had a short railway leading to a small landing in Kāneʻohe Bay, north of Kāneʻohe Stream. By the 1920, rice production gradually declined when it could no longer compete with the price of California grown rice (Dorrance 1998:94).

Ranching and pineapple also became major business endeavors during the mid-19th to early 20th centuries. Cattle had been left on Oʻahu by Vancouver in 1793, which multiplied on to a large herd by the 1840's (Devaney 1982:70). Kāneʻohe Ranch was formed in 1876, on lands which originally belonged to Queen Kalama. At its peak, the ranch included 12,000 acres and 2,000 head of cattle. Heavy cattle grazing resulted in much of the land modification in the upland and hill portions of Kāneʻohe.

Commercial cultivation of pineapple began in the 1890's into the first decade of the 1900's in Kāneʻohe. From 1910 to 1925, pineapple cultivation was a major industry in Kāneʻohe. In 1910, after assessing the demand for pineapple on the mainland United States, Libby, McNeill and Libby of Honolulu (a subsidiary of the mainland firm) began purchasing several of the windward pineapple companies. In 1911, Libby, McNeill and Libby built a pineapple cannery in Kahaluʻu. At its peak, 2,500 acres were under pineapple cultivation on the windward side of Oʻahu (Harper 1972), stretching from Kāneʻohe to Kahaluʻu. A large percentage of this acreage was in the Kāneʻohe Bay region, including Heʻeia.

The pineapple industry created havoc with traditional Hawaiian sites. During the 15-year period that pineapple was produced in the Kāneʻohe Bay region, at least five ancient Hawaiian

sites were either badly damaged or completely destroyed. McAllister (1933) claims Haluakaiamoana, Kaualauki, Keikipuipui, Kukuiokāne, and perhaps Kalaeulaula to be among these, and possibly many other smaller sites as well. The failure of pineapple in Koʻolaupoko was attributed to the destruction of these sacred sites (McAllister 1933:170, 177). According to older Hawaiians of the area, the destruction of Kukuiokāne Heiau, brought on a disease that wiped out a large amount of Libby pineapple (McAllister 1933:177). According to Richard Miller, the loss was attributed to too much rainfall, saturated soils, aphids, mealybugs, and chlorosis, a disease that results from a deficiency of available iron in the soil (Miller interview 1988, in Allen et al. 1987).

The pineapple fields were abandoned when Molokaʻi and Lānaʻi pineapple cultivation began to boom, and Libby pulled out of the Koʻolaupoko enterprise (Kelly 1976:47). The cannery closed in 1923 (Dorrance 1998:95).

KEAʻAHALA

On November 9, 1914, the Territory of Hawaii set aside 216 acres of homestead land for the purpose of creating the Keaʻahala Military Reservation. Keaʻahala Military Reservation was the property of the U.S. Armed Forces until the federal government returned all but 74 acres to the Territory on June 26, 1924, which was used for the Territorial Mental Hospital, the site of the present Hawaii State Hospital. In 1925 additional land was returned to the Territory so that a road leading to the hospital could be built (Dockall *et al.* 2003).

According to the correspondence between the Secretary of the Interior and Governor Wallace R. Farrington in May 1923, the Keaʻahala Military Reservation was originally established for no other reason than that the Federal Government was afraid that the land would be cut up into homestead lots under laws existing at the time, and that the Federal Government would be forced to buy it back again under condemnation proceedings if it were needed either for military or territorial purposes (Takemoto 1991).

A large portion of the Keaʻahala Military Reservation is now under the land jurisdiction of the State of Hawaiʻi and is currently being unitized as site locations for the Kāneʻohe District Park, the Hawaii State Hospital, and Windward Community College.

PREVIOUS ARCHAEOLOGY

Numerous previous archaeological projects have been completed within Kāneʻohe Ahupuaʻa, including within the project area. Please note that the following discussion of these works is based upon the availability of reports at the State Historic Preservation Division,

Kapolei. The locations of previously conducted archaeological projects located within 0.5 mile of the current project area are located on Figure 5.

In the 1930's, J. Gilbert McAllister (1933) conducted the earliest archaeological work in the Koʻolaupoko District. McAllister identified six sites in the vicinity of the project area: (Kāne a me Kanaloa Heiau (McAllister Site 333), Kapuna Spring McAllister Site 334), old taro terraces McAllister Site 335), pigpen of Kāne (McAllister Site 338), Kukuiokāne Heiau (McAllister Site 340, and Kumukumu Spring (McAllister Site 341).

McAllister Site 333 (McAllister 1933:176) consists of a now destroyed Kāneame Kanaloa Heiau. McAllister described what was left of the *heiau*, as said by W. Kalani, to be at the end of the pine trees beneath the ti. There is nothing to indicate the old temple site now except an old stone wall which may have been built subsequently from the rocks of the *heiau*.

McAllister Site 334 consists of a Kapuna Spring, described by McAllister (1933) as "a spring at which Kane and Kanaloa are said to have obtained their drinking water" (McAllister 1933:176).

McAllister Site 335 consists of old taro terraces. McAllister (1933) describes the area in which the terraces are located as a valley which "broadens out with many acres of level rich lowlands protected by ridges which surround them almost completely. The land is now swampy and full of weeds, but the rectangular terraces can still be seen" (McAllister 1933:176).

McAllister Site 338 consists of Pupuaa a Kane (pigpen of Kāne), described by McAllister (1933) to be "just beneath Puu Keahiakahoe on the side of the pali" (McAllister 1933:177). McAllister (ibid) provides the following additional description of the site:

> A small flat area where it is said that Kane kept his best pigs. Certainly they were safe, for owning to the contours of the land, only one with supernatural powers could carry off a pig from such a height.
>
> At the foot of the pali is a small swale, now covered with a heavy growth of kukui, where Kane and his wife, Mamalohoa, grew awa. It is said that exceptionally good awa can still be gathered there (McAllister 1933:177).

McAllister Site 340 consists of the now largely destroyed Kukuiokāne Heiau, which was described by McAllister (1933:177) as being located inland from Heʻeia at the foot of the ridge

above the banana fields. McAllister (1933:177) provides the following additional description of the site:

> Because of the destruction of this heiau, which was the largest and most important one in the region, by Libby, McNeill and Libby Co., a disease attacked their pineapples and the undertaking was a failure, according to the old Hawaiians of the district. The present deserted fields are adequate proof. The structure was said to be very large and if the many stones, some several feet in thickness, scattered throughout the area are any indication of the extent and importance of the former heiau, the native conception is quite justified. The ploughed-up remains indicate heavy walls and several terraces. It is impossible to obtain dimensions.

McAllister Site 341 consists of Kumukumu Spring described by McAllister (1933:177) to have been connected with Kukuiokāne Heiau. McAllister (1933:177) provides the following additional description of the site:

> On the night of Kane the drums of the hula can be heard at this spring. There was once a man, Konomokai, who said that he could dry up this spring by putting his cane into it. When he did this, the cane turned into salt, for the water was more powerful than man.

Paul H. Rosendahl (1976) conducted a reconnaissance survey for the Kailua- Kāneʻohe Flood Control Project along the banks of Kāneʻohe Stream. No sites were recorded during the reconnaissance survey.

Jane Allen (1987) conducted an inventory survey of five upland ʻili located in the Kāneʻohe Interchange of the Interstate H-3 Highway. The focus of this work was an upland agricultural system located in Luluku ʻIli.

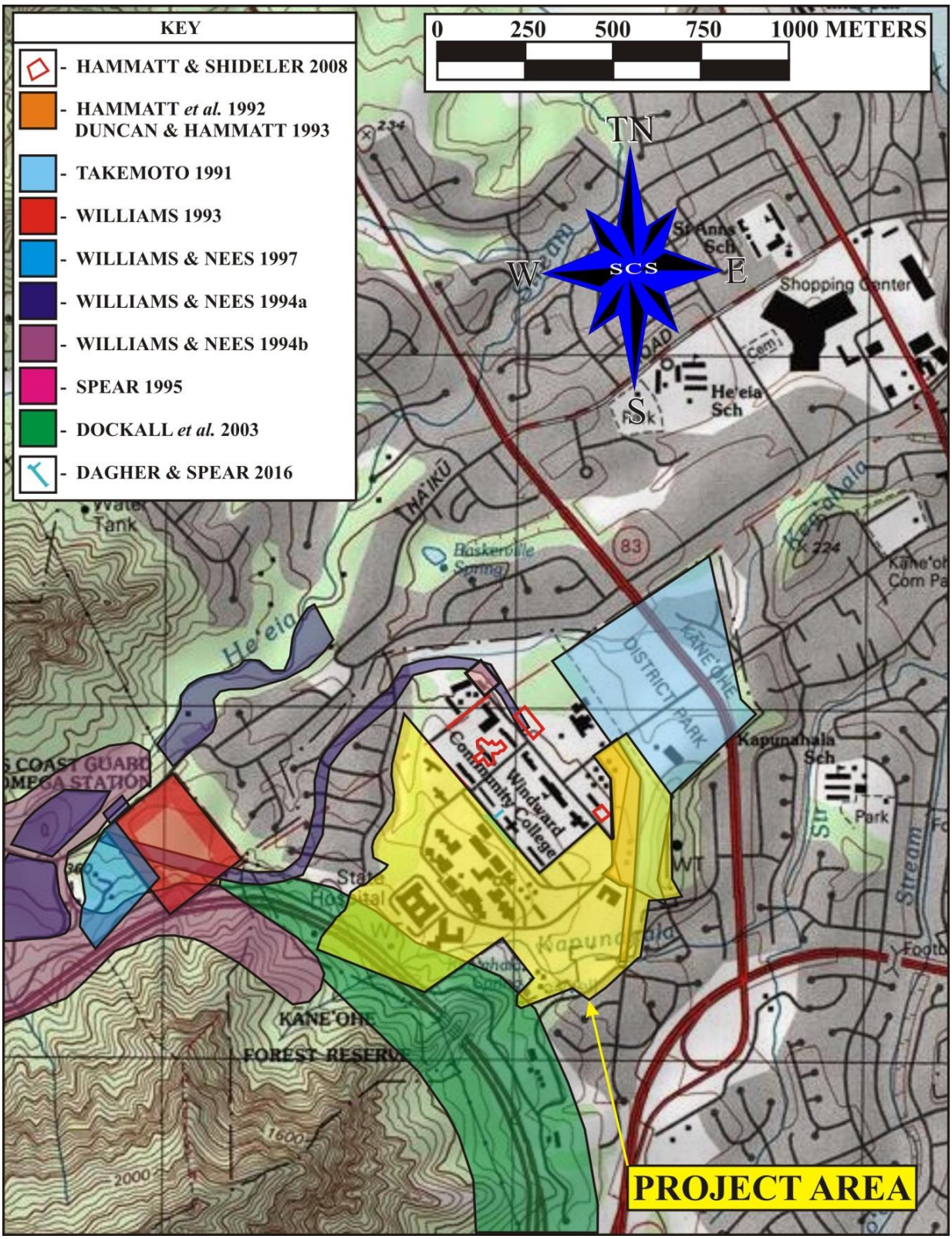

Figure 5: USGS Quadrangle (Kaneohe 1998; 1:24,000) Map Showing Previous Archaeology.

Bishop Museum conducted a reconnaissance survey for the proposed Hope Chapel Foursquare Church Project *(Lutfy and Williams 1990)*. Five archaeological features were encountered during the survey including an *ʻili* boundary wall, a wooden outhouse, a small rock concentration, a small earthen and rock mound and alignment, and a loose alignment of stones.

Cultural Surveys Hawaiʻi Inc. conducted an Archaeological Inventory Survey of Castle Hills Access Road (Poʻokela Street and Keaʻahala Road connection) at the Kāneʻohe State Hospital and a Department of Transportation base yard (Hammatt et al. 1992). The survey involved a complete pedestrian inspection of the study area, as well as the excavation of two 1 m square test units at the southern portion of the project area in locations of anticipated ground disturbance. Besides a few fragments of 20th century glass and pottery sherds scattered in the surface zone, no archaeological cultural materials were identified. It was determined that the northern portion of the study area suffered extensive disturbance associated with the construction of the Hawaiʻi State Hospital (Territorial Hospital).

Cultural Surveys Hawaiʻi Inc. conducted archaeological monitoring of the Castle Hills Access Road (Poʻokela Street and Keaʻahala Road connection), which was built to provide access to the Castle Hills Subdivision (Duncan and Hammatt 1993). A single site, consisting of a Historic trash pit (Feature A) and a cement box (Feature B) dated to around 1900 A.D. was identified. Duncan and Hammatt (1993) state in the same report, "Clearly, the drainage pattern for the area has been severely altered by the development of residential subdivision *makai* of the project area. This modern modification of terrain may have backed up the drainage behind subdivisions to create the present marsh area. Judging from the local geomorphic features and the pre-development topography, this wet area appears to be a recent phenomenon" (Duncan and Hammatt 1993:6).

Ogden Environmental and Energy Services Co., Inc. (Williams 1993) conducted Archaeological Reconnaissance and limited subsurface testing for the proposed family housing construction within the U.S. Coast Guard Omega Transmitter Station Site. One historic property was identified (State Site 50-80-10-4495), a pre- and post-contact habitation consisting of two heavily disturbed terraces. Subsurface testing at State Site -4595 yielded both pre-Contact artifacts (basalt flakes) and post-Contact artifacts (historic glass and ceramic fragments). Additionally, radiocarbon analysis of charcoal collected from a hearth feature provided a date range of 1260-1450 AD.

Ogden Environmental and Energy Services Co., Inc. (Williams and Nees 1994a) conducted Archaeological Reconnaissance and limited subsurface testing at five locations within the U.S. Coast Guard Omega Transmitter Station site. Five Historic properties were identified: two are associated with the WWII Naval Radio Station (State Sites 50-80-10-4787 and -4788), and three are the remains of pre-contact stone faced pond field terraces (State Sites 50-80-10-4789, -4790, and -4791).

Ogden Environmental and Energy Services Co., Inc. (Williams & Nees 1994b) conducted Archaeological and Historical Investigation for the Interstate Highway H-3 and within a portion of the U.S. Coast Guard Omega Transmitter Station site. Eleven Historic properties were identified: five consisting of pre-contact habitation features including a house complex with numerous terraces (State Site 50-80-10-2078) and four subsurface fire pit features (*imu*) (State Sites 50-80-10-2081, -2082, -2323, and -2324); the remaining six are pre-contact sites utilized into the post-Contact period, consisting of two agricultural terrace areas (State Sites 50-80-10-2042 and -2083), a habitation complex with terraces, alignments, and an enclosure (State Site 50-80-10-2041), a religious complex containing walls and modified outcrops (State Site 50-80-10-2080), a boundary wall (State Site 50-80-10-1904), and a platform of undetermined function (State Site 50-80-10-2079).

Scientific Consultant Services, Inc. (Spear 1995) conducted an Archaeological Inventory Survey for a proposed Hope Chapel driveway corridor. Fieldwork consisted of a pedestrian survey and collection and analysis of a single sediment core. Pedestrian survey yielded three surface features: a narrow dirt road cut approximately 3 m (9.8 feet) wide, a concentration of modern debris, and an outhouse described by Lutfy and Williams (1990). The original evaluation of this outhouse concluded that it was relatively recent (Lutfy and Williams 1990:3). None of the extant surface features are considered to be archaeologically significant (Spear 1995). Pollen and charcoal collected from the single sediment core indicated pre-Contact land use within the Kapunahala watershed by 692 years B.P. (about A.D. 1250).

Ogden Environmental and Energy Services Co., Inc. (Williams and Nees 1997) conducted archaeological reconnaissance and limited subsurface testing within a portion of the U.S. Coast Guard Omega Transmitter Station site. Two historic properties were identified: a single depression and unusually weathered boulders (State Site 50-80-10-4635) and a grouping of unusual stones (State Site 50-80-10-4637). Subsurface testing at State Site 50-80-10-4635 yielded eight traditional Hawaiian artifacts, which included seven basalt flakes and a volcanic glass core.

The Bishop Museum's Department of Anthropology (Dockall et al. 2003) conducted an Archaeological Inventory Survey, Data Recovery, and Monitoring for Interstate Route H-3. 49 Historic properties were identified, 14 of which are located in the vicinity of the current project area. The following is a brief description of the 14 Historic properties. State Site 50-80-10-1893 consists of a post-Contact series of either planting or clearing mounds, State Site 50-80-10-1894 was interpreted as an ʻ*ili* boundary wall, State Site 50-80-10-1901 consists of two features: a circular depression with an opening or ditch lined with basalt cobbles and course concrete (Feature 1) and a linear slope modification (trail) (Feature 2), State Site 50-80-10-1903 consists of a complex of 19 surface features, mostly small rock mounds, a platform, a boulder alignment, and a cut embankment, State Site 50-80-10-2039 consists of circular charcoal kiln depression, State Site 50-80-10-2040 consists of a large depression, linear arrangement of rock-faced terraces, and several rock mounds, State Site 50-80-10-2260 consists of charcoal filled *imu* (subterranean earth oven), State Site 50-80-10-2077 consists of a charcoal concentration, State Site 50-80-10-2084 consists of a post-Contact linear rock mound and terraces, State Site 50-80-10-2085 consists of charcoal-filled *imu*, State Site 50-80-10-2086 consists of a charcoal filled *imu*, State Site 50-80-10-2087 consists of a single cobble and boulder concentration with no evidence of a terrace, State Site 50-80-10-2251 consists of a three ridgetop terraces, and State Site 50-80-10-2156 consists of charcoal filled *imu.*

Scientific Consultant Services, Inc. (McGerty and Spear 2005) conducted an Archaeological Inventory Survey for a parcel of land in Kaeleuli ʻIli. Fieldwork consisted of a pedestrian survey. No archaeological sites or archaeological features were identified. Archival research indicated that the project area was only ever used as pastureland.

Garcia and Associates (McElroy 2006) conducted an Archaeological Inventory Survey on ten parcels where State and Country drainage improvements where conducted. Fieldwork consisted of a pedestrian survey. Pedestrian survey failed to result in the identification of any archaeological features within the ten parcels in the project area. According to McElroy (2006), these parcels have been severely disturbed by modern land use, "if surface archaeological features were present in these areas at one time, they have been destroyed by modern development".

Cultural Surveys Hawaiʻi, Inc. (Hammatt and Shideler 2008) conducted an archaeological-inventory survey level study of the proposed Windward Community College Library and Learning Resources Center Project, located in Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK: (1) 4-5-023: 014, por.]. No historic properties were identified.

An archeological evaluation and field inspection of the subject property was conducted on June 17, 2016, by SCS archaeologist Morgan Davis, M.A. (Dagher et al. 2016). The archaeological evaluation and field inspection identified the lack of prior archaeological survey for the majority of the project area, and identified the presence of historic buildings located across the property. Though modern construction activities have occurred throughout the parcel the surface architecture is primarily historic, and underground excavations will be required during building replacement (demolition) and work on the sewers and parking lots. Based on archaeological survey conducted in association with the construction of the H-3 roadway within a portion of the parcel, a pre-Contact component is known to have been present in this area. Based on the findings of the archeological evaluation and field inspection the following recommendations were made: an archaeological inventory survey with a subsurface component to be conducted; the State Historic Preservation Division be contacted regarding any requirements for Historic American Buildings Survey (HABS) and/or the Historic American Engineering Record (HAER) architectural documentation for the historic buildings prior to planned renovations or demolitions associated with the campus redesign.

CONSULTATION

Consultation was conducted via telephone, e-mail, personal interviews, and the U.S. Postal Service. Consultation was sought from Alice P. Hewett, President, Koʻolaupoko Hawaiian Civic Club; E. Tory Laitila, Registrar, Mayor's Office; Candace Sullivan, Department of Health, Hawaii State Hospital, Kāneʻohe; Mack Kalahiki, Department of Health, Hawaii State Hospital, Kāneʻohe; Clyde Tanabe, Department of Health, Hawaii State Hospital, Kāneʻohe; Frances (Rocky) Kaluhiwa, AHA Moku Advisory Committee, Oʻahu Poʻo; Jerry Kaluhiwa, Koʻolaupoko Moku Representative Moku Representative; Dr. Kamanaʻopono M. Crabbe, Office of Hawaiian Affairs; Leimana DaMate, Executive Director, Aha Moku Advisory Committee, State of Hawaii; S.C. Kaahiki Solis, Cultural Historian, State Historic Preservation Division; William Hoʻohuli, community member; Mapuana De Silva, kumu hula and cultural practpitioner; Kihei De Silva, cultural practitioner; Donna Kamehaʻiku Camvel, caretaker of the LeleaHina Heiau, cultural practitioner, and longtime resident;

In addition, a Cultural Impact Assessment Notice was published in the July 10, 13, and 14, 2016; editions of The Honolulu Star-Advertiser and the August 2016 issue of the OHA newspaper, Ka Wai Ola (see Appendix C). These notices requested information of cultural resources or activities in the area of the proposed project, stated the Tax Map Key (TMK) number, and where to respond with pertinent information. Based on the responses, an assessment

of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

CULTURAL IMPACT ASSESSMENT RESPONSES

Analysis of the potential effect of the project on cultural resources, practices or beliefs, the potential to isolate cultural resources, maintain practices or beliefs in their original setting, and the potential of the project to introduce elements that may alter the setting in which cultural practices take place is a requirement of the OEQC (2012:13). As stated earlier, this includes the cultural resources of the different groups comprising the multiethnic community of Hawai'i. Responses (see Appendix D) were received (via e-mail and USPS) from Leimana DaMate, Executive Director, Aha Moku Advisory Committee, State of Hawaii, and E. Tory Laitila, Registrar, Office of the Mayor; S.C. Kaahiki Solis, Cultural Historian, State Historic Preservation Division; Dr. Kamanaʻopono M. Crabbe, Office of Hawaiian Affairs

Leimana DaMate, Executive Director, Aha Moku Advisory Committee, State of Hawaii

Leimana DaMate Executive Director, Aha Moku Advisory Committee, State of Hawaii, responded via e-mail on August 11, 2016. In her e-mail, Ms. DaMate stated that she would be forwarding SCS's request for information pertaining to traditional cultural practices in the vicinity of the project area to Frances (Rocky) Kaluhiwa, AHA Moku Advisory Committee, Oʻahu Poʻo. Mr. Laitila mentioned that there is a Pipeline Right-of-Way and a Transmission Line Right-of-Way through the parcel. **Concerns**: None.

E. Tory Laitila, Office of the Mayor, Registrar

E. Tory Laitila, Registrar, Office of the Mayor responded, via a letter dated August 11, 2016. In his letter, Mr. Laitila stated that the City and County of Honolulu owns Kaneohe District Park (deeded Kaneohe Regional Park), which is located on a property that is adjacent to the current project area. The parcel, on which the park is located, was received by the City of Honolulu when the State of Hawaii Board of Land and Natural Resources issued, through State of Hawaii Governor John Burns, Executive Order Number 02528: Kaneohe Regional Park Site, Kaneohe, Koolaupoko, Oahu, in 1970. The parcel was originally a portion of the Government (Crown) Land of Keaahala.

Mr. Laitila, also, suggested contacting Roy Benham, former Commissioner with the City and County of Honolulu Commission on Culture and the Arts, Hawaiian cultural practitioner, and inaugural Office of Hawaiian Affairs Trustee. C**oncerns**: None.

S.C. Kaahiki Solis, Cultural Historian, State Historic Preservation Division

S.C. Kaahiki Solis, Cultural Historian, State Historic Preservation Division, responded electronically, via two e-mails dated August 24, 2016. In these e-mails, Ms. Solis suggested contacting Mapuana and Kihei De Silva and Donna Kamehaiku Camvel. On the behalf of SCS, Ms. Solis reached out to the Laimana *ʻohana*. **Concerns**: None.

Dr. Kamanaʻopono M. Crabbe, Office of Hawaiian Affairs

Dr. Kamanaʻopono M. Crabbe, Office of Hawaiian Affairs, responded via a letter dated August 15, 2016. In his letter, Dr. Crabbe acknowledged receipt of the letters SCS sent to OHA on July 20, 2016 and August 9, 2016, which requested comments on the cultural impact assessment (CIA) to complete the proposed build-out improvement of the Department of Health Hawaiʻi State Hospital and a brief summary of the specific facility's needs, as identified in the Hawai'i State Hospital 2015 Master Plan Update.

Dr. Crabbe stated that OHA appreciated the outreach efforts that the Scientific Consultant Services, Inc. had undertaken by consulting with OHA. In addition, Dr. Crabbe requested that, in the future, OHA be provided with a summary of the historical, customs, and practices information previously gathered for the area from present research and past CIA consultations, in order to determine whether additional information should be suggested. OHA does not want to burden practitioners and informants with repeated requests for the same information in similar projects in the same area.

As with all projects involving subsurface ground disturbances, OHA requested assurances that should iwi kupuna or Native Hawaiian cultural deposits be identified during any ground altering activities, all work will immediately cease and the appropriate agencies, including OHA, will be contacted pursuant to applicable law. Dr. Crabbe indicated that OHA would like the opportunity to review the completed draft environmental assessment.

SUMMARY

The "level of effort undertaken" to identify potential effect by a project to cultural resources, places or beliefs (OEQC 2012) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who may be affected by the project or who know its history, researching sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a "good faith effort." However,

when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the current undertaking, letters of inquiry were sent to individuals and organizations that may have knowledge or information pertaining to the collection of cultural resources and/or practices currently, or previously, conducted in close proximity to the proposed complete build-out improvements to the Department of Health Hawaii State Hospital, located at 45-691/710 Keaʻahala Road, Kāneʻohe, Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK (1) 4-5-023:002, (1) 4-5-023:016 (por.), (1) 4-5-023:017 (por.)]

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of this report. Such scholars as Samuel Kamakau, Martha Beckwith, Jon J. Chinen, Lilikalā Kame'eleihiwa, R. S. Kuykendall, Marion Kelly, E. S. C. Handy and E.G. Handy, and Mary Kawena Puku'i and Samuel H. Elbert continue to contribute to our knowledge and understanding of Hawai'i, past and present. The works of these and other authors were consulted and incorporated in this report where appropriate. Land use document research was supplied by the Waihona 'Aina Database (2016).

CULTURAL ASSESSMENT AND RECOMMENDATIONS

Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a suggested guideline of the OEQC (2012). As indicated by the responses received from the community, the broad area constituting the current project area within Kāneʻohe, Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK (1) 4-5-023:002, (1) 4-5-023:016 (por.), (1) 4-5-023:017 (por.)] is not currently being used for traditional cultural purposes.

The consultation process is on-going, with potentially 3 interviews to be conducted. Once these interviews have been conducted and summarized, the recommendation discussion will be completed.

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APPENDIX A: EXAMPLE LETTER OF INQUIRY

Aloha kāua,

At the request of Brown and Caldwell, Scientific Consultant Services, Inc. (SCS) is preparing a Cultural Impact Assessment (CIA) for the proposed complete build-out improvements to the Department of Health Hawaiʻi State Hospital, which is located at 45-691 Keaʻahala Road, Kāneʻohe, Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK: (1) 4-5-023:002, (1) 4-5-023:016 (por.), (1) 4-5-023:017 (por.)].

The proposed project area will encompass the entire 92-acre property, which is owned by the State of Hawaiʻi. Specific facilities needs identified in the Hawaiʻi State Hospital 2015 Master Plan Update include: creation of an independently-operated Skilled Nursing Facility, a forensic Patient Facility, additional Patient Facilities, additional parking, improvements to the Aloha Garden, and a landscape buffer between the Hospital and the immediately adjacent Windward Community College campus. The Hospital was established at this location as the Territorial Hospital in 1930. The Hospital campus is fully developed with underground utilities, roads, parking lots, historic buildings, and a large garden area which was constructed in the last 20 years.

The purpose of this CIA is to identify and understand the importance of any traditional Hawaiian and/or historic cultural resources or traditional cultural practices associated with the project area and the surrounding *ahupuaʻa.* In an effort to promote responsible decision making, the CIA will gather information about the project area and its surroundings through research and interviews with individuals that are knowledgeable about the area in order to assess potential impacts to the cultural resources, cultural practices, and beliefs identified as a result of the proposed project. We are seeking your *kōkua* and guidance regarding the following aspects of our study:

- General history as well as present and past land use of the project area
- Knowledge of cultural resources which may be impacted by future development of the project area (i.e. historic and archaeological sites, as well as burials)
- Knowledge of traditional gathering practices in the project area, both past and ongoing
- Cultural associations of the project area, such as legends, traditional uses and beliefs
- Referrals of *kūpuna* or elders and *kamaʻāina* who might be willing to share their cultural knowledge of the project area and the surrounding *ahupuaʻa*
- Due to the sensitive nature regarding *iwi kūpuna,* or ancestral remains discovered, *manaʻo* regarding *nā iwi kūpuna* will be greatly appreciated
- Any other cultural concerns the community has related to Hawaiian cultural practices within or in the vicinity of the project area.

The CIA is in compliance with the Hawaiʻi Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law and in accordance with the State of Hawaiʻi Department of Health's Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawaiʻi on November 19, 1997. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs…The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural which support such cultural beliefs…

Enclosed are maps showing the locations of the existing transmission and distribution lines, as well as substations subject to improvement as part of this project. Please contact me at the Scientific Consultant Services, Honolulu office, at (808) 597-1182 or via e-mail (cathy@scshawaii.com) with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Cathleen Dagher
Senior Archaeologist
Attachments (3)

APPENDIX B: NEWSPAPER NOTICE AND AFFADAVIT

1809

AFFIDAVIT OF PUBLICATION

IN THE MATTER OF
DOH Hawai`i State Hospital Project (SCS Proj 1809)

STATE OF HAWAII
City and County of Honolulu

Doc. Date: JUL 1 4 2016 **# Pages:** 1
Notary Name: Patricia K. Reese First Judicial **Circuit**
Doc. Description: Affidavit of Publication

Patricia K. Reese JUL 1 4 2016
Notary Signature Date

PATRICIA K. REESE NOTARY PUBLIC Comm. No. 86-467 STATE OF HAWAII

Scientific Consultant Services, Inc. (SCS) is seeking information on cultural resources and traditional, previous or on-going cultural activities within or near the proposed 92-acre DOH Hawai'i State Hospital Project, located at 45-691 Kea'ahala Road, Kane'ohe, Kane'ohe Ahupua'a, Ko'olaupoko District, O'ahu Island [TMK: (1) 4-5-023:002, (1) 4-5-023:016 (por.), (1) 4-5-023:017 (por.)]. Please respond within 30 days to Cathleen Dagher at (808) 597-1182.
(SA892485 7/10, 7/13, 7/14/16)

Barbara Suzuki being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of Oahu Publications, Inc. publisher of The Honolulu. Star-Advertiser, MidWeek, The Garden Island, West Hawaii Today, and Hawaii Tribune-Herald, that said newspapers are newspapers of general circulation in the State of Hawaii, and that the attached notice is true notice as was published in the aforementioned newspapers as follows:

Honolulu Star-Advertiser 3 times on:
07/10, 07/13, 07/14/2016

MidWeek 0 times on:

The Garden Island 0 times on:

Hawaii Tribune-Herald 0 times on:

West Hawaii Today 0 times on:

Other Publications: 0 times on:

And that affiant is not a party to or in any way interested in the above entitled matter.

Barbara Suzuki

Subscribed to and sworn before me this 14th day of July A.D. 2016

Patricia K. Reese, Notary Public of the First Judicial Circuit, State of Hawaii
My commission expires: Oct 07, 2018

PATRICIA K. REESE NOTARY PUBLIC Comm. No. 86-467 STATE OF HAWAII

Ad # 0000892485

SP.NO.: _____ L.N.

APPENDIX C: EXAMPLE FOLLOW-UP LETTER

Aloha kāua,

This is our follow-up letter to our July 20, 2016 letter which was in compliance with the statutory requirements of the State of Hawai`i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai`i Department of Health's Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai`i, on November 19, 1997.

At the request of Brown and Caldwell, Scientific Consultant Services, Inc. (SCS) is preparing a Cultural Impact Assessment (CIA) for the proposed complete build-out improvements to the Department of Health Hawaiʻi State Hospital, which is located at 45-691 Keaʻahala Road, Kāneʻohe, Kāneʻohe Ahupuaʻa, Koʻolaupoko District, Oʻahu Island [TMK: (1) 4-5-023:002, 4-5-023:016 (por.), 4-5-023:017 (por.)].

The proposed project area will encompass the entire 92-acre property, which is owned by the State of Hawaiʻi. Specific facilities needs identified in the Hawaiʻi State Hospital 2015 Master Plan Update include: creation of an independently-operated Skilled Nursing Facility, a forensic Patient Facility, additional Patient Facilities, additional parking, improvements to the Aloha Garden, and a landscape buffer between the Hospital and the immediately adjacent Windward Community College campus. The Hospital was established at this location as the Territorial Hospital in 1930. The Hospital campus is fully developed with underground utilities, roads, parking lots, historic buildings, and a large garden area which was constructed in the last 20 years.

The purpose of this CIA is to identify and understand the importance of any traditional Hawaiian and/or historic cultural resources or traditional cultural practices associated with the project area and the surrounding *ahupuaʻa.* In an effort to promote responsible decision making, the CIA will gather information about the project area and its surroundings through research and interviews with individuals that are knowledgeable about the area in order to assess potential impacts to the cultural resources, cultural practices, and beliefs identified as a result of the proposed project. We are seeking your *kōkua* and guidance regarding the following aspects of our study:

- General history as well as present and past land use of the project area
- Knowledge of cultural resources which may be impacted by future development of the project area (i.e. historic and archaeological sites, as well as burials)
- Knowledge of traditional gathering practices in the project area, both past and ongoing
- Cultural associations of the project area, such as legends, traditional uses and beliefs
- Referrals of *kūpuna* or elders and *kamaʻāina* who might be willing to share their cultural knowledge of the project area and the surrounding *ahupuaʻa*
- Due to the sensitive nature regarding *iwi kūpuna*, or ancestral remains discovered, *manaʻo* regarding *nā iwi kūpuna* will be greatly appreciated
- Any other cultural concerns the community has related to Hawaiian cultural practices within or in the vicinity of the project area.

The CIA is in compliance with the Hawai‘i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law and in accordance with the State of Hawai‘i Department of Health’s Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai‘i on November 19, 1997. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs…The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural which support such cultural beliefs…

Enclosed are maps showing the locations of the existing transmission and distribution lines, as well as substations subject to improvement as part of this project. Please contact me at the Scientific Consultant Services, Honolulu office, at (808) 597-1182 or via e-mail (cathy@scshawaii.com) with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Cathleen Dagher
Senior Archaeologist

Cc: E. Tory Laitila, Registar, Mayor’s Office; Candace Sullivan, Department of Health, Hawai`i State Hospital, Kāne`ohe; Mack Kalahiki, Department of Health, Hawai`i State Hospital, Kāne`ohe ; Clyde Tanabe, Department of Health, Hawai`i State Hospital, Kāne`ohe; Rocky Kaluhiwa, Ko`olaupoko AHA Moku Representative; Jerry Kaluhiwa, Ko`olaupoko Moku Representative Moku Representative; Dr. Kamana`opono M. Crabbe, Chief Executive Officer, Office of Hawaiian Affairs; Leimana DaMate, Executive Director, Aha Moku Advisory Committee, State of Hawai`i; S.C. Kaahiki Solis, Cultural Historian, State Historic Preservation Division; William Ho`ohuli, community member

Appendix L: Traffic Impact Analysis Report

October 20, 2016

Traffic Impact Analysis Report – Hawai‘i State Hospital, New Patient Facility and Campus Master Plan Development

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

TRAFFIC IMPACT ANALYSIS REPORT - HAWAII STATE HOSPITAL, NEW PATIENT FACILITY AND CAMPUS MASTER PLAN DEVELOPMENT

KANEOHE (KOOLAUPOKO), OAHU, HAWAII

October 20, 2016

Prepared for:

Brown and Caldwell
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Honolulu. Hawaii 93813

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TRAFFIC IMPACT ANALYSIS REPORT – HAWAII STATE HOSPITAL, NEW PATIENT FACILITY AND MASTER PLAN DEVELOPMENT

Kaneohe (Koolaupoko), Oahu, Hawaii

Prepared for

Brown and Caldwell

Prepared by

Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

October 20, 2016

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AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

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DRAFT FINAL

TRAFFIC IMPACT ANALYSIS REPORT

HAWAII STATE HOSPITAL, NEW PATIENT FACILITY AND CAMPUS MASTER PLAN DEVELOPMENT

Kaneohe (Koolaupoko), Oahu, Hawaii

1. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the traffic impacts for the first phase of the Hawaii State Hospital (HSH), New Patient Facility and Campus Master Plan Development in Kaneohe (Koolaupoko), Oahu, Hawaii (hereinafter referred to as the "Project").

1.1 Location

The Project is located in Kaneohe on the island of Oahu on parcels of land more specifically identified as TMKs: (1)4-5-023:002, (1)4-5-023:016 (remnant), and (1)4-5-023:017 (remnant). The project site is bordered by Windward Community College (WCC) to the east, Pookela Road and Paepuu Street to the south, residential units to the north, and the Interstate H-3 Freeway to the west. See Figure 1.1 for the Project location.

1.2 Project Description

The 2015 HSH Master Plan Update proposes to replace and construct primarily five (5) buildings, which includes a new 144-bed New Patient Facility at the existing Goddard Building site, additional 144-bed patient care facility in place of the existing Guensberg building, 72-bed patient care facility on the existing J-Pad site, 72-bed patient care facility in place of existing Building I, and Plant Operations building, over four (4) or more phases as the needs are justified and funding becomes available.

The improvements discussed in the Master Plan are divided into short-term and long-term master plans. The short-term master plan includes the addition of a 144-bed New Patient Facility and a rehabilitation mall. The proposed development for the short-term master plan is expected to be completed by the Year 2021. The short-term master plan constitutes the first phase of the HSH Master Plan Development and is the focus of this traffic study.

The long-term master plan examines the projected estimated increase in patient demand and how to best accommodate them on the existing site. General plans showing locations of each

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OFFICES IN:
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WAILUKU, MAUI, HAWAII
HILO, HAWAII

proposed facility is included in the 2015 HSH Master Plan Update dated August 28, 2015. However, timelines for these long-term master plan improvements are unknown and uncertain at this time. While the focus and main intent of this study is on the first phase of the HSH, New Patient Facility and Campus Master Plan Development, the Master Plan full buildout is briefly discussed to provide an understanding of a possible scenario for the complete development.

See Figure 1.2 for proposed Project site plan.

1.3 Study Methodology

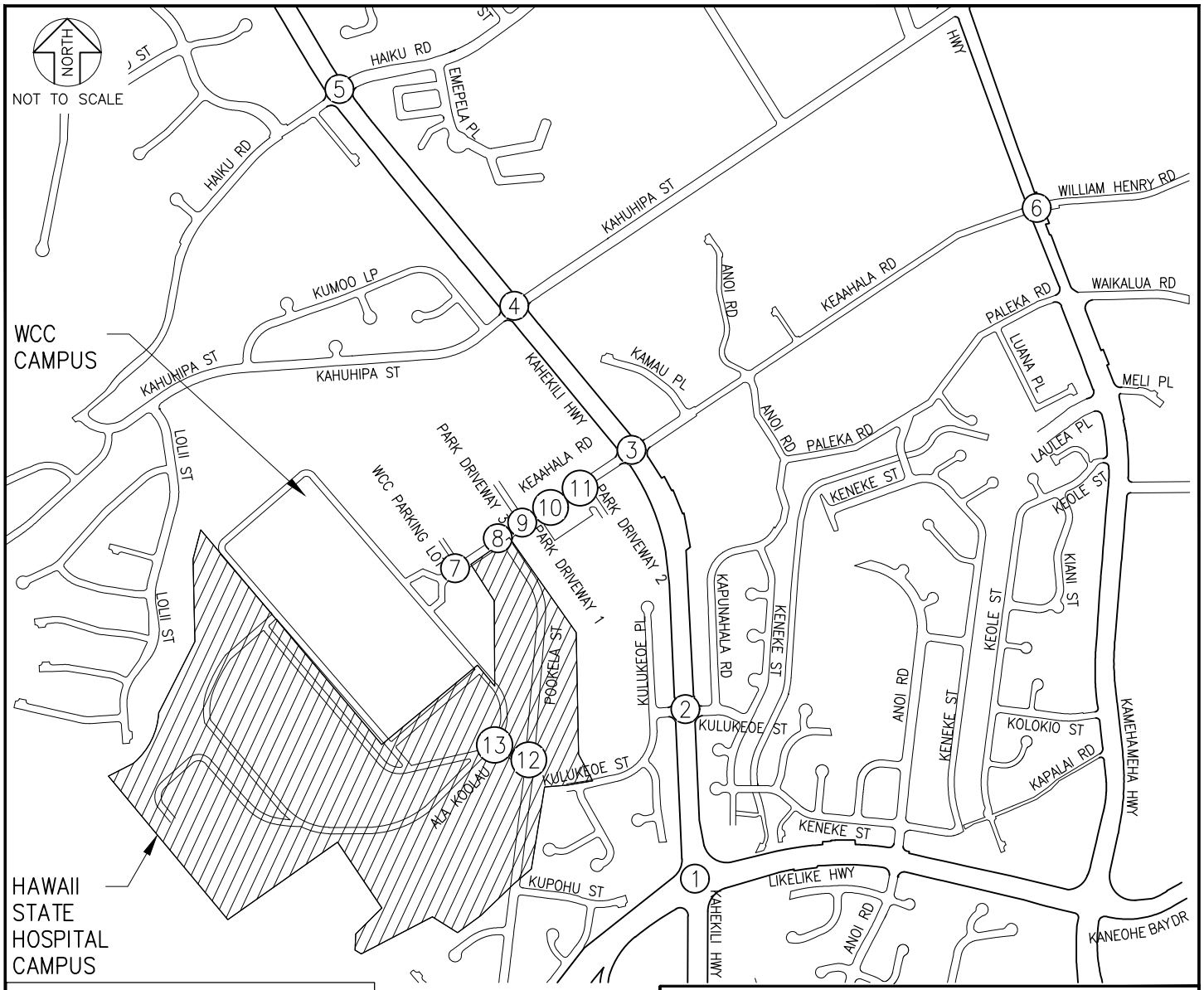
This study will address the following:

1. Assess existing traffic operating conditions during the weekday AM and PM peak hours of traffic within the study area.
2. Traffic projections for Base Year 2021 (without the Project).
3. Estimate the vehicular trips that will be generated by the Project.
4. Traffic projections for the Project for Future Year 2021 (with Project).
5. Recommendations for roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by the Project.

1.4 Analysis Methodology

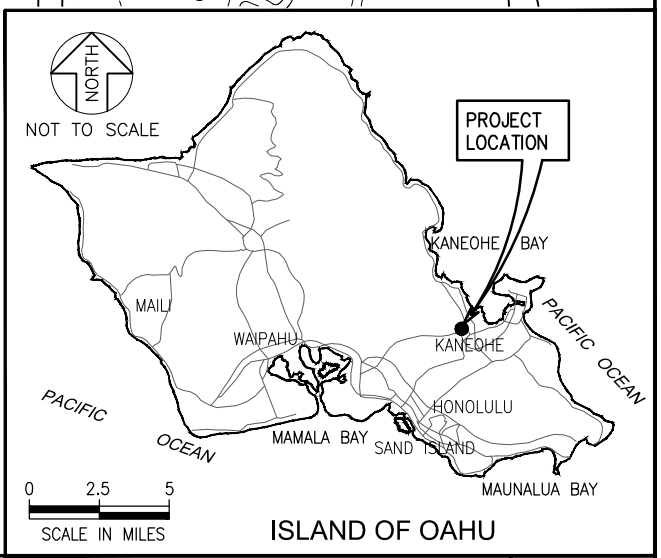
Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual (HCM), dated 2010, includes methods for calculating volume to capacity ratios, delays, and corresponding LOS that were utilized in this study. See Appendix B for Level of Service Criteria.

Analyses for the study intersections were performed using the traffic analysis software Synchro, which is able to prepare reports based on the methodologies described in the HCM. These reports contain control delay results as based on intersection lane geometry, signal timing, and hourly traffic volumes. Based on the vehicular delay at each intersection, a LOS is assigned to each approach and intersection movement as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in this report.



STUDY INTERSECTIONS

1. KAHEKILI HWY. & LIKELIKE HWY.
2. KAHEKILI HWY. & KULUKEOE ST.
3. KAHEKILI HWY. & KEAAHALA RD.
4. KAHEKILI HWY. & KAHUHIPA ST.
5. KAHEKILI HWY. & HAIKU DR.
6. KEAAHALA RD. & KAMEHAMEHA HWY.
7. KEAAHALA RD. & WCC PARKING LOT
8. KEAAHALA RD. & POOKELA STREET
9. KEAAHALA RD. & DISTRICT PARK 3
10. KEAAHALA RD. & DISTRICT PARK 1
11. KEAAHALA RD. & DISTRICT PARK 2
12. POOKELA ST. & HSH DRIVEWAY
13. ALA KOOLAU & HSH DRIVEWAY

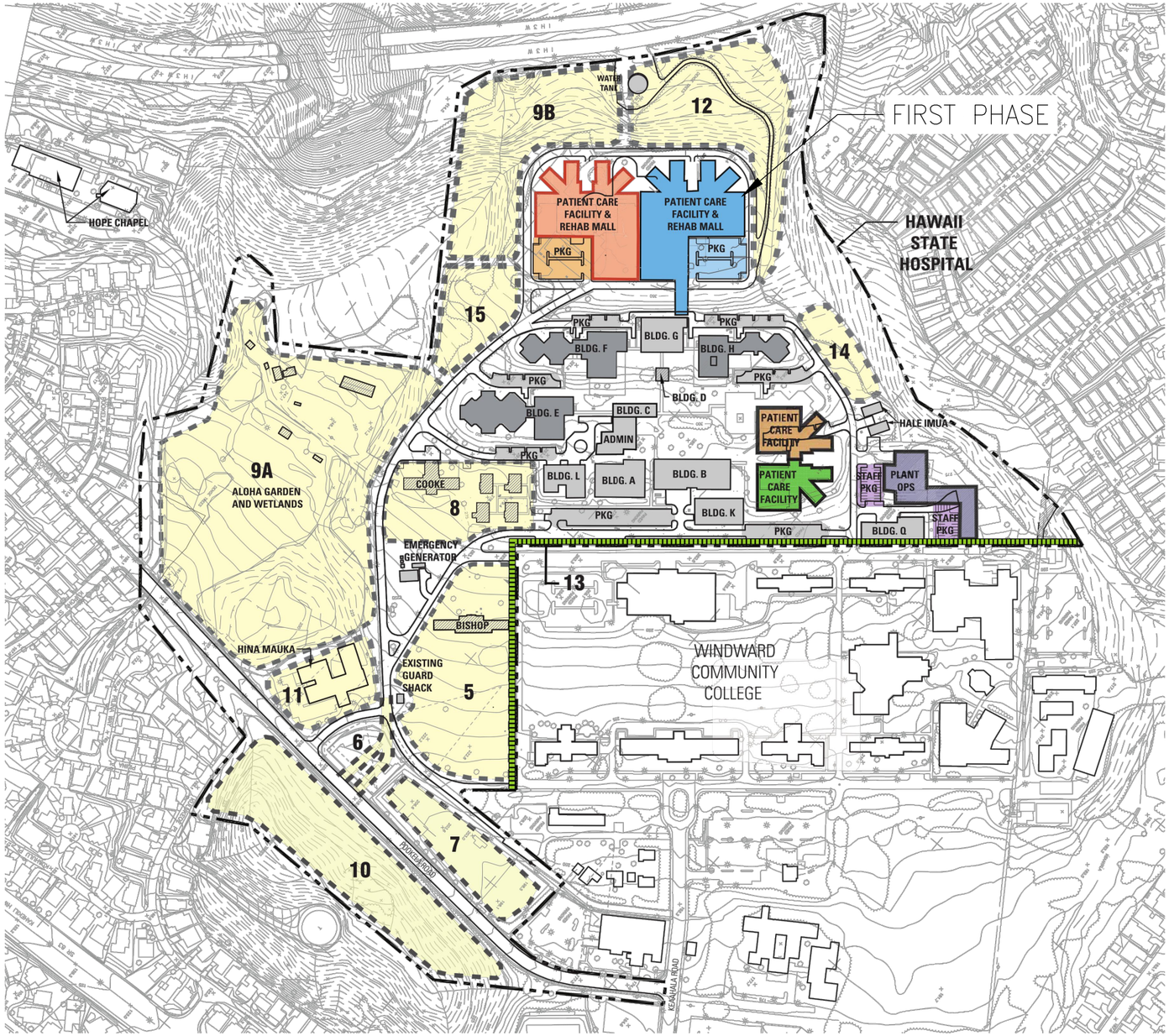


HAWAII STATE HOSPITAL,
NEW PATIENT FACILITY AND CAMPUS
MASTER PLAN DEVELOPMENT TIAR

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

LOCATION MAP

FIGURE
1.1



LEGEND

- PROPERTY LINE
- PLANNING ZONES (SEE KEYNOTES BELOW)
- NEW GODDARD PATIENT CARE FACILITY (144 BEDS), REHAB MALL, PEDESTRIAN BRIDGE TO LOWER CAMPUS, AND PARKING (42 SPACES)
- FUTURE PATIENT CARE FACILITY (144 BEDS), REHAB MALL, AND PARKING (42 SPACES)
- FUTURE PATIENT CARE FACILITY (24-72 BEDS)
- FUTURE PATIENT CARE FACILITY (24-72 BEDS)
- FUTURE PLANT OPERATIONS, WAREHOUSE, AND PARKING (25 SPACES)
- EXISTING ADMINISTRATION, FACILITY SUPPORT, PATIENT SUPPORT, REHAB MALL, THERAPY, DINING & KITCHEN, TRANSITIONAL CARE COTTAGES (22 BEDS), AND PARKING
- EXISTING PATIENT CARE UNITS (84 BEDS TOTAL)

KEYNOTES

5 Zone reserved for future development (by others) of an independently operated Skilled Nursing Facility. Demolition of Bishop will be by others. Existing Guard Shack to remain.

6 Zone reserved for future HSH main entrance improvements. This plan will require moving the SDOT Base Yard to another site (off HSH's campus).

7 Zone reserved for future development such as a Behavioral Stability Facility, relocation of Transitional Care Cottages (22 beds), or additional parking (320 spaces, surface or parking structure). This plan will require moving the SDOT Base Yard to another site (off HSH's campus).

8 Zone reserved for future expansion of HSH Administration or additional parking (220 spaces, surface or parking structure). This plan will require demolition of Cooke (currently used by Security and Grounds Maintenance) and relocation of Transitional Housing (22 beds in 4 cottages).

9A Zone reserved for Aloha Garden improvements.

9B Zone reserved for watershed.

10 Zone reserved for future development such as additional parking (200 spaces, surface).

11 Zone reserved for continued use by Hina Mauka (an independently operated drug treatment facility) on the HSH campus.

12 Zone reserved for water tanks, access road, emergency ingress to / egress from HSH site.

13 Zone reserved for future landscape buffer.

14 Zone reserved for future development such as additional parking (60 spaces, surface).

15 Zone reserved for future development such as additional parking (110 spaces, asurface).

0 100' 200' 400'

LONG-TERM MASTER PLAN

FIGURE RETRIEVED FROM HAWAII STATE HOSPITAL 2015 MASTER PLAN UPDATE DATED AUGUST 28, 2015 PAGE 2–17

HAWAII STATE HOSPITAL,
NEW PATIENT FACILITY AND CAMPUS
MASTER PLAN DEVELOPMENT TIAR

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS,SURVEYORS • HONOLULU,HAWAII

PROJECT SITE PLAN

FIGURE
1.2

2. EXISTING CONDITIONS

2.1 Roadway System

The following are brief descriptions of the roadways in the vicinity of the Project:

Kahekili Highway is a north-south, two-way arterial road in the vicinity of the study intersections and provides regional access. This roadway begins to the north at its intersection with Kamehameha Highway and terminates to the south at a T-intersection with Likelike Highway. South of Haiku Road, this roadway is a five or six-lane divided roadway. North of Haiku Road, the roadway narrows from four lanes to two lanes. The posted speed limit along this roadway in the vicinity of the Project is 35 miles per hour (mph).

Likelike Highway is an east-west, two-way, divided arterial roadway providing regional access. This roadway begins to the east at its intersection with Kamehameha Highway and terminates to the south at its intersection with Lunalilo Freeway. At the intersection of Likelike Highway and Nalanieha Street, this roadway widens from two-lanes to three-lanes heading southbound. East of Kahekili Highway, this roadway is a five or six-lane divided roadway. The posted speed limit along this roadway in the vicinity of the Project is 45 mph.

Haiku Road is generally an east-west, two-way, undivided collector roadway providing access to residential areas to the west of Kahekili Highway and to residential as well as commercial access to the east of Kahekili Highway. This roadway begins to the west at its intersection with Kahuhipa Street, and terminates to the east at its intersection with Kamehameha Highway. West of Kahekili Highway, this roadway is a two-lane roadway. East of Kahekili Highway, this roadway is a three or four-lane roadway. The posted speed limit in the vicinity of the Project is 25 mph.

Kahuhipa Street is an east-west, two-way, two-lane, collector roadway providing access to residential areas west of Kahekili Highway and residential and commercial/inudstrial areas to the east of Kahekili Highway. This roadway begins to the west as a T-intersection with Haiku road, and terminates to the east at its intersection with Kamehemeha Highway. The posted speed limit on Kahukipa Street is 25 mph in the Project vicinity.

Keaahala Road is an east-west, two-way, two-lane, collector roadway providing access to the Project, WCC, Kaneohe Courthouse, Hina Mauka, the Kaneohe District Park and some residences to the west of Kahekili Highway. To the east of Kahekili Highway, Keaahala Road provides access to residential areas, Kaneohe Community Park and some commercial areas. This roadway begins to the west as a T-intersection with Ala Koolau, and terminates to the east at its intersection with Kamehemeha Highway. The posted speed limit on Keaahala Road is 25 mph in the Project vicinity.

Kulukeoe Street is an east-west, two-way, collector road providing access to residential areas. Kulukeoe Street begins to the east as a T-intersection with Keneke Street, and terminates to the west as a dead end with Pilina Place. The posted speed limit on Kulukeoe Street is 25 mph.

Pookela Street is a north-south, two-way, two-lane, collector roadway providing access to residential areas, the HSH, Hina Mauka and the Kaneohe Courthouse. This roadway begins to the north as a T-intersection with Keaahala Road, and terminates to the west at a cul-de-sac.

The posted speed limit on Pookela Street is 25 mph from Keaahala Road and changes to 15 mph near Kupohu Street to the cul-de-sac.

Ala Koolau Street is a series of two-way, two-lane, local roadways that comprise the HSH and WCC campuses. Field observations revealed no posted speed limit signs along Ala Koolau Street.

2.2 Sustainable Transportation

2.2.1 Complete Streets

While transportation planning has traditionally focused on automobile travel, recent "Complete Streets" policies also recognize the numerous benefits of encouraging the use of alternative modes of transportation. "Complete Streets" policies encourage the provision of equitable, accessible, and safe transportation for all modes.

Hawaii State Senate Bill 718 (2009) required that the Hawaii Department of Transportation (HDOT) and the County transportation departments:

"…adopt a complete streets policy that seeks to reasonably accommodate convenient access and mobility for all users of the public highways within their respective jurisdictions…"

2.2.2 Pedestrian Accessibility

Within the Project vicinity, sidewalks are provided on both sides of the roadway on Kahekili Highway from Kulukeoe Street to Haiku Road and on Keaahala Road from Kahekili Highway to the WCC Campus. Sidewalks are also provided on both sides of Pookela Street and both sides of Ala Koolau along the frontage of WCC. See Figure 2.1 for the existing sidewalk facilities.

2.2.3 Bicycle Accessibility

Within the Project vicinity, bicycle lanes are provided on both sides of the roadway on Kahekili Highway from Kulukeoe Street to Haiku Road and on Keaahala Road from Kahekili Highway to the WCC Campus. See Figure 2.1 for the existing bicycle facilities.

The Oahu Bike Plan (2012), issued by the City and County of Honolulu Department of Transportation Services, provides a master guide for integrating bicycle facilities with Oahu's roadways throughout the island. See Figure 2.2 for the bicycle facilities recommended by the Oahu Bike Plan in the vicinity of the Project.

2.2.4 Public Transit

Oahu Transit Services (OTS) operates TheBus, which currently operates a fleet of 519 buses servicing most populated areas of the island. The cost of service is $2.50 for an adult for each 1-way ride (with one free transfer), $60 for a monthly pass, and $660 for an annual pass[1]. Discount rates are available for seniors, students, and military.

Near the Project, routes 56, 65, 77, and 88 currently provide regional and local access, with numerous stops between route start and end points. Route 56 and Route 77 service Keaahala

[1] Based on 2016 TheBus information.

Road nearest to the Project. Route 88 and Route 65 service regional movement along Kahekili Highway and Kamehameha Highway, respectively. See Figure 2.3 for existing TheBus routes within the vicinity of the Project.

2.3 Existing Traffic Volumes

Manual turning movement traffic counts and field observations were conducted at the following study intersections on Wednesday, April 27, 2016.

- Kahekili Highway/Likelike Highway (Signalized)
- Kahekili Highway/Kulukeoe Street (Signalized)
- Kahekili Highway/Keaahala Road (Signalized)
- Kahekili Highway/Kahuhipa Street (Signalized)
- Kahekili Highway/Haiku Road (Signalized)
- Keaahala Road/Pookela Street (Unsignalized)
- Keaahala Road /Kaneohe District Park Driveways (3) (Unsignalized)
- Keaahala Road /WCC Parking Lot Driveway (Unsignalized)
- Kamehemeha Highway/Keaahala Road (Signalized)
- Ala Koolau Street/HSH Driveway (Unsignalized)
- Pookela Street/HSH Driveway (Unsignalized)

Based on the traffic count data, the weekday AM and PM peak hour of traffic was determined to be from 7:30 AM to 8:30 AM and 3:15 PM to 4:15 PM, respectively. The traffic count data is provided in Appendix A.

2.4 Existing Observations and Analysis

2.4.1 Regional Analysis

The Project is located in the general Kaneohe region of Oahu. Kaneohe serves as the gateway to Oahu's north shore, while also housing residential, institutional, commercial, and industrial land uses. Likelike Highway, Kahekili Highway, Kaneohe Bay Drive, and Kamehameha Highway serve as the primary arterial roads through the area.

In the vicinity of the Project, Kahekili Highway and Kamehameha Highway combine to form the regional north-south corridor. During the AM peak hour of traffic, southbound traffic heading towards the primary urban center of Honolulu is heavier than northbound traffic, whereas during the PM peak hour of traffic, northbound traffic is heavier due to commuters returning home from work. The Project is located to the west of Kahekili Highway and is accessed via Keaahala Street, which also provides access to a residential area, the Kaneohe Courthouse, WCC and the Kaneohe District Park.

2.4.2 Hawaii State Hospital and Surrounding Land Uses

HSH currently provides recovery services for adults with varying degrees of mental illness. The HSH campus is located adjacent to WCC, and currently houses 178 patient beds and administrative support.

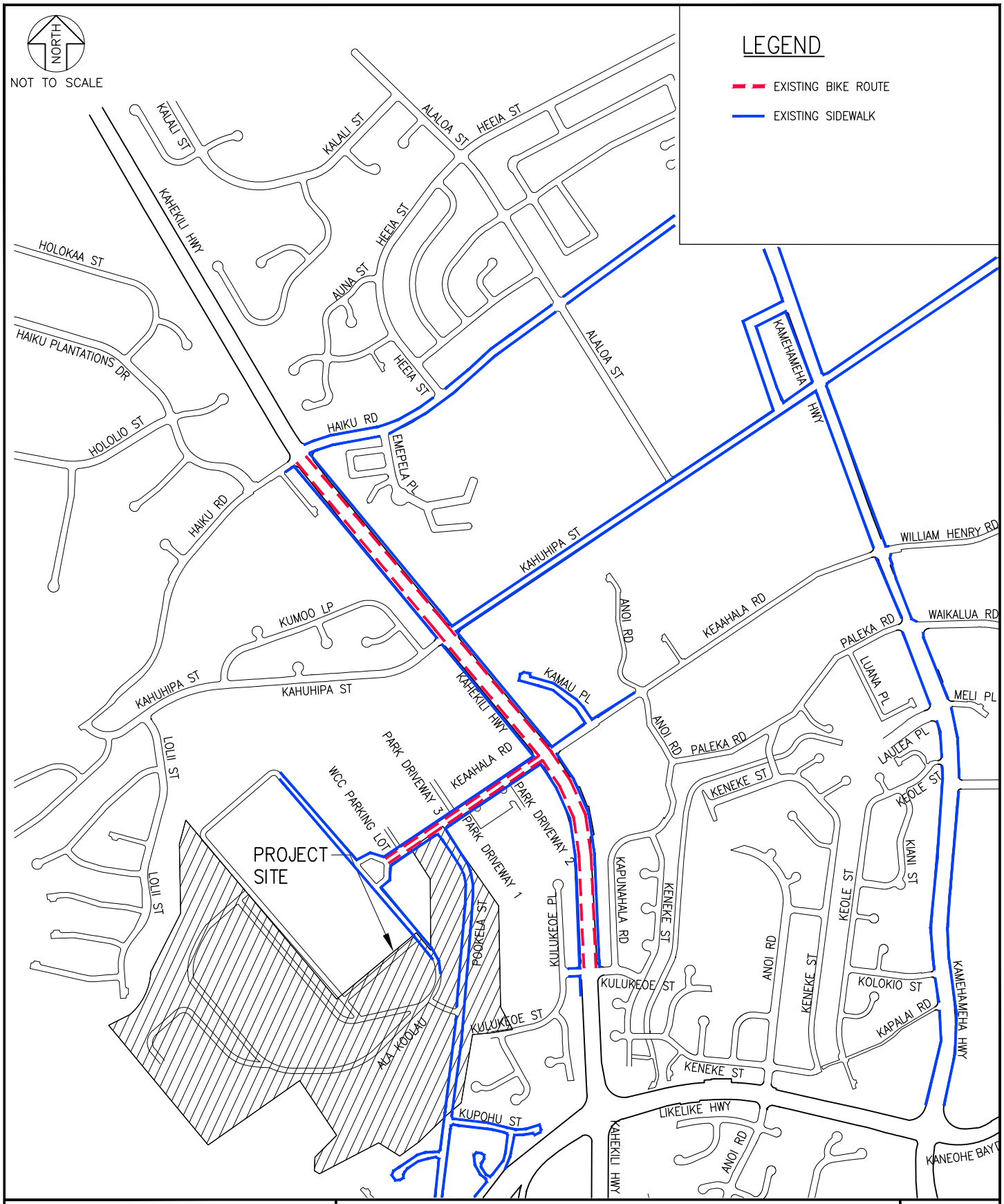
HSH currently operates 24 hours a day, 7 days a week with staffing around the clock and shift changes occurring at 7:00 AM, 3:00 PM, and 11:00 PM, which coincide with the HSH Campus' busiest traffic periods. However, it should be noted that existing shift changes mostly occur outside of the AM and PM peak hours of traffic where traffic is heaviest regionally. Therefore, Project-generated traffic is anticipated to have minimal impact on the regional traffic conditions.

Access to HSH is provided solely via Keaahala Street, which also provides sole access to:

- Windward Community College – Currently enrolls approximately 2,600 students which has generally remained stagnant between 2010 and 2015[2]
- Kaneohe District Courthouse – operational 7:45 AM to 4:30 PM, Monday through Friday, except State holidays.
- Hawaii Department of Transportation Kaneohe Baseyard – provides the Motorcycle Skill and Commercial Driver License test.
- Windward Comprehensive Health Center – provides education, support and promotion, and health care and social service referrals.
- Kaneohe District Park – includes a gymnasium, swimming pool, and baseball field.
- A residential neighborhood.

Figure 2.4 demonstrates that HSH generates between 17-29%(13-40%) of the traffic along Keaahala Street during the AM(PM) peak hours of traffic. The majority of traffic is generated by WCC.

[2] Source: http://www.hawaii.edu/cgi-bin/iro/maps?Epuhf16.pdf



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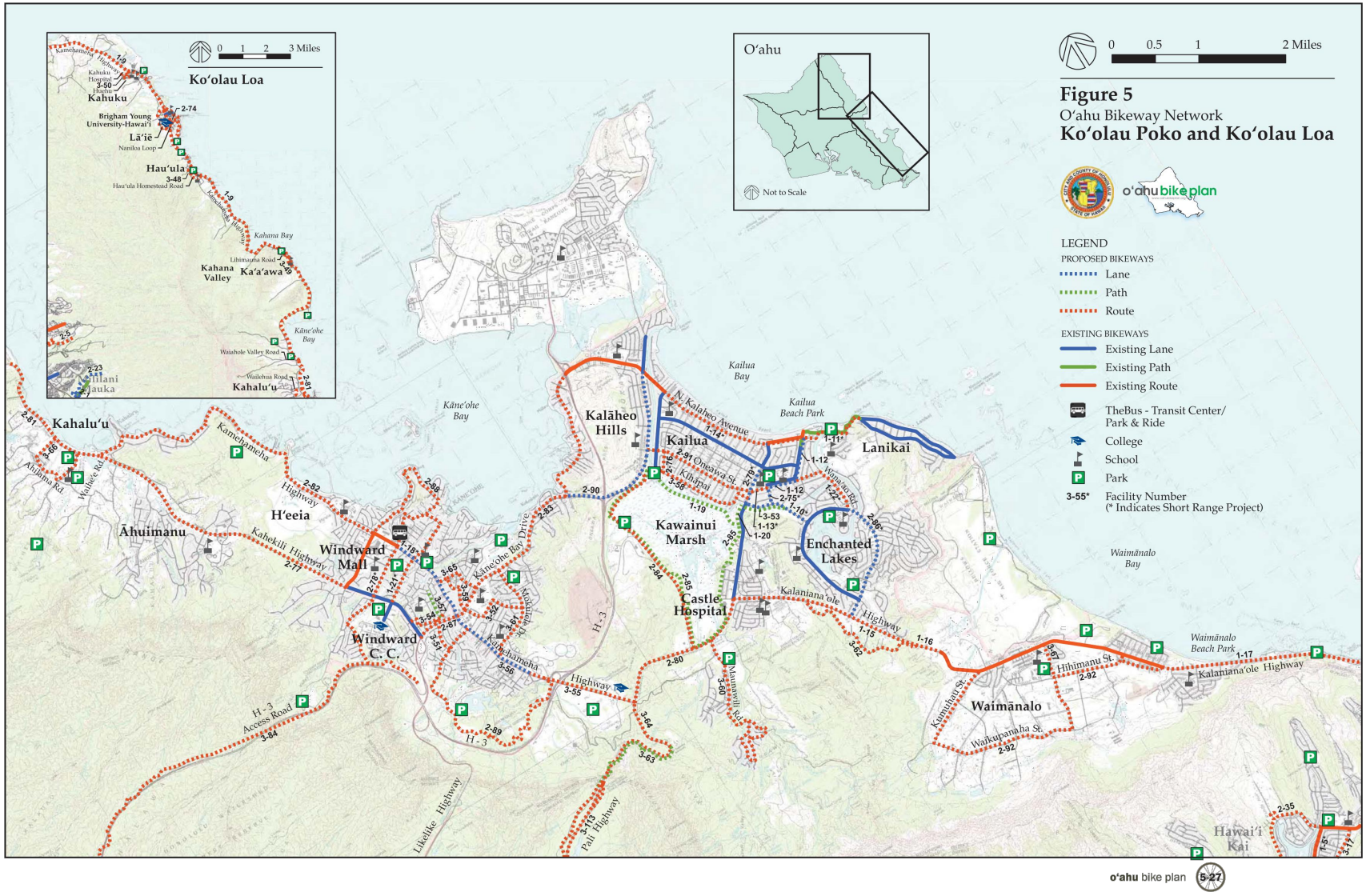
EXISTING PEDESTRIAN + BICYCLE ACCESSIBILITY

FIGURE
2.1



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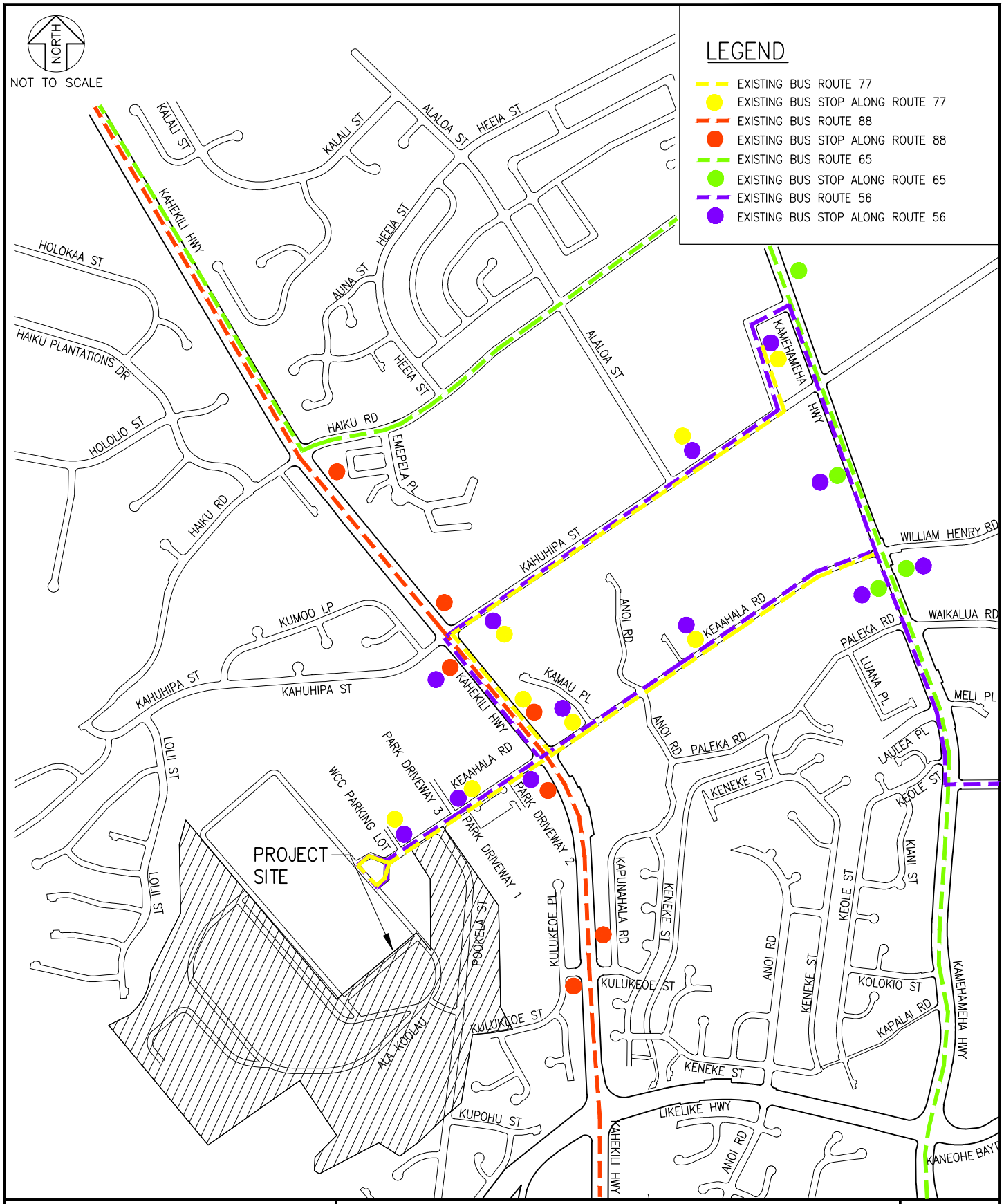
OAHU BIKE PLAN

FIGURE
2.2



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EXISTING TRANSIT SERVICE

FIGURE
2.3

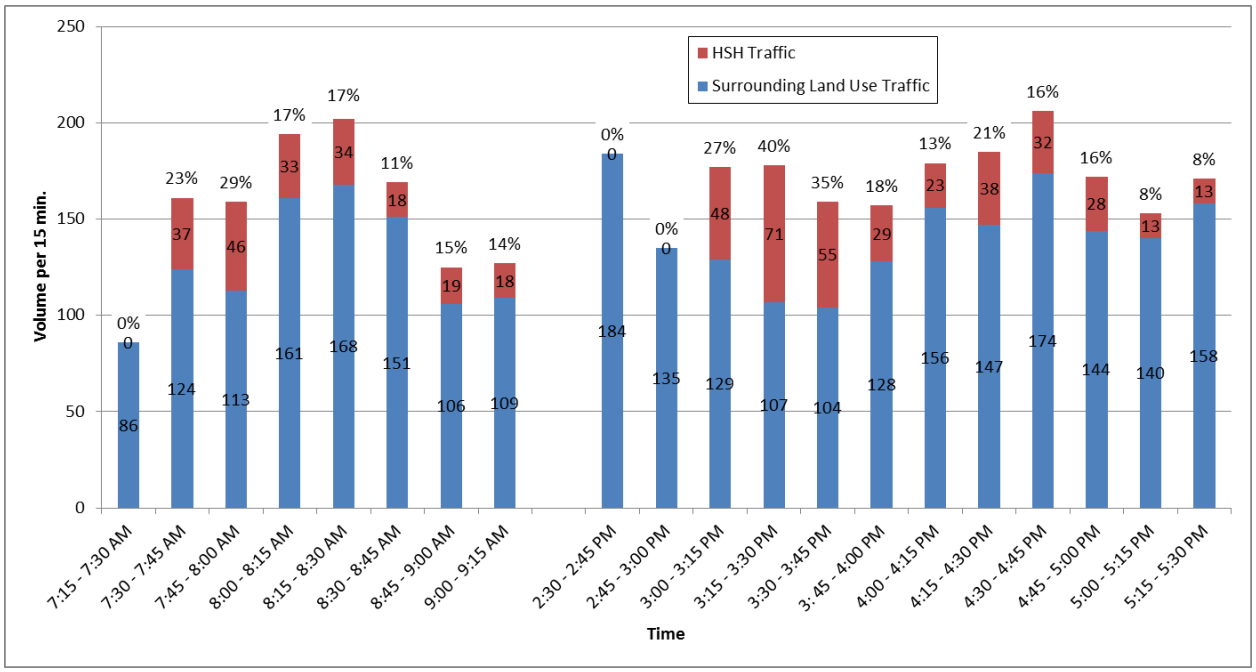


Figure 2.4: HSH contribution to Keaahala Street Traffic

Note: Volumes shown were compiled from the manual traffic data collection which occurred on Wednesday, April 27, 2016 during the AM and PM peak hours of traffic. Mid-day traffic data was not collected as part of this effort.

Figure 2.5 below shows parking accumulation within the campus over the course of a day.

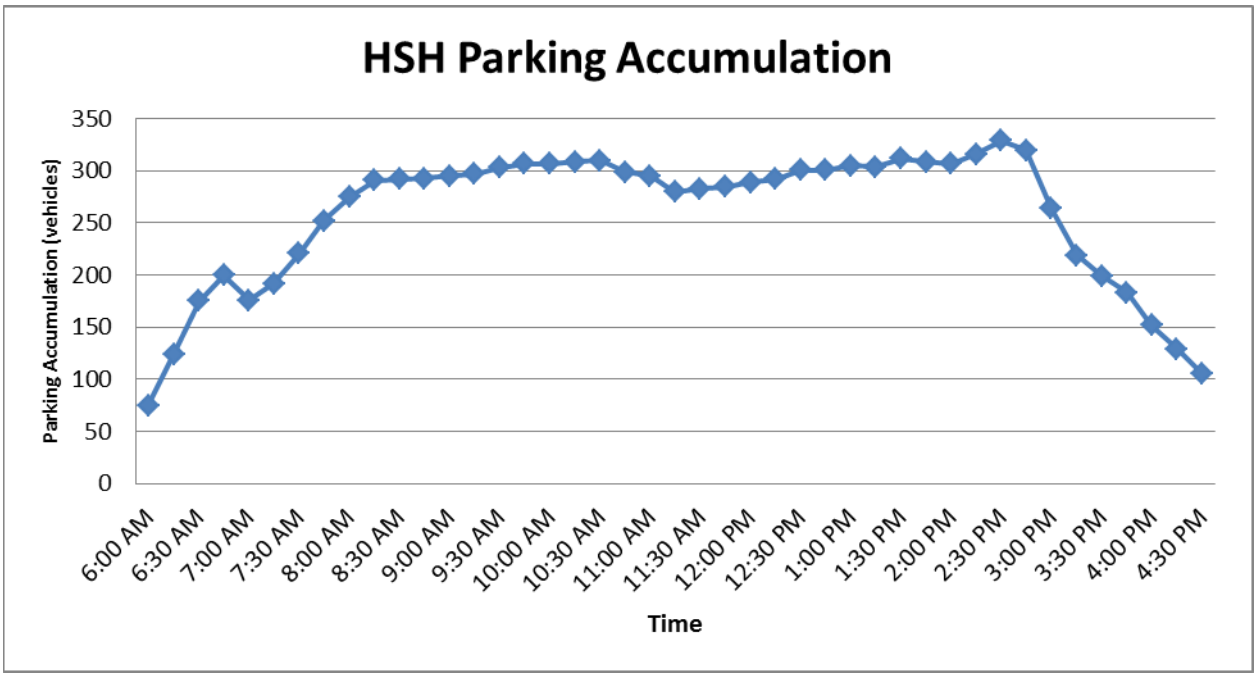


Figure 2.5: HSH parking accumulation across all parking lots at HSH

2.4.3 Intersection Observations and Analysis

Signalized intersections along Kahekili Highway are coordinated to accommodate the commuter traffic in the southbound direction during the AM peak hour and in the northbound direction during the PM peak hour. Due to the coordination along Kahekili Highway favoring throughput along the major arterial, Kahekili Highway, the minor movements and side streets experience delay.

2.4.3.1 AM Peak Hour of Traffic

Generally, during the AM peak hour of traffic, queues along Kahekili Highway studied intersections were observed to clear after each cycle length. The exception to this is the southbound through volumes at the Kahekili Highway/Haiku Road intersection, which experiences long queue lengths due to the neckdown of Kahekili Highway to one lane in each direction north of the intersection. Traffic through Keaahala Road was steady, but did not cause any points of congestion.

2.4.3.2 PM Peak Hour of Traffic

During the PM peak hour of traffic, congestion was observed to occur in the northbound direction along Kahekili Highway. The congestion occurs outside of the regional peak between 4:45 PM and 5:20 PM and is generally thought to be a result of the narrowing of Kahekili Highway from three (3) lanes to one (1) lane in the northbound direction past Haiku Road. Queues were observed to extend to near Kulukeoe Street and at times, northbound traffic along Kahekili Highway was observed not to clear intersections within a single green light. The analyses in this report have therefore been calibrated to reflect the measured congested saturation flows along Kahekili Highway. Traffic through Keaahala Road was steady, but did not cause any points of congestion.

2.4.3.3 Intersection Analysis

<u>Kahekili Highway & Likelike Highway</u> – This signalized intersection currently operates at overall LOS C(E) during the AM(PM) peak hours of traffic. All movements currently operate at LOS E or better with the exception of the northbound through movement, which operates at LOS F and overcapacity conditions during the PM peak hour of traffic. Moderate to heavy queuing was observed on this movement due to heavy influx of commuter traffic during the PM peak.

<u>Kahekili Highway & Kulukeoe Street</u> – This signalized intersection currently operates at overall LOS B(A) during the AM(PM) peak hours of traffic. The major through movements along Kahekili Highway operate at LOS B or better while the other minor movements operate at LOS D or better with the exception of the northbound left turn and southbound left turn, which operates at LOS E and LOS F, respectively, during the AM and PM peak hour of traffic.

<u>Kahekili Highway & Keaahala Road</u> – This signalized intersection currently operates at overall LOS C(D) during the AM(PM) peak hours of traffic. All movements currently operate at LOS E or better during the AM and PM peak hours of traffic. No major queuing was observed other than the mainline through during the respective peak periods.

<u>Kahekili Highway & Kahuhipa Street</u> – This signalized intersection currently operates at overall LOS C(C) during the AM(PM) peak hours of traffic. All movements currently operate at LOS D or better with the exception of the northbound, southbound and westbound left-turn movements

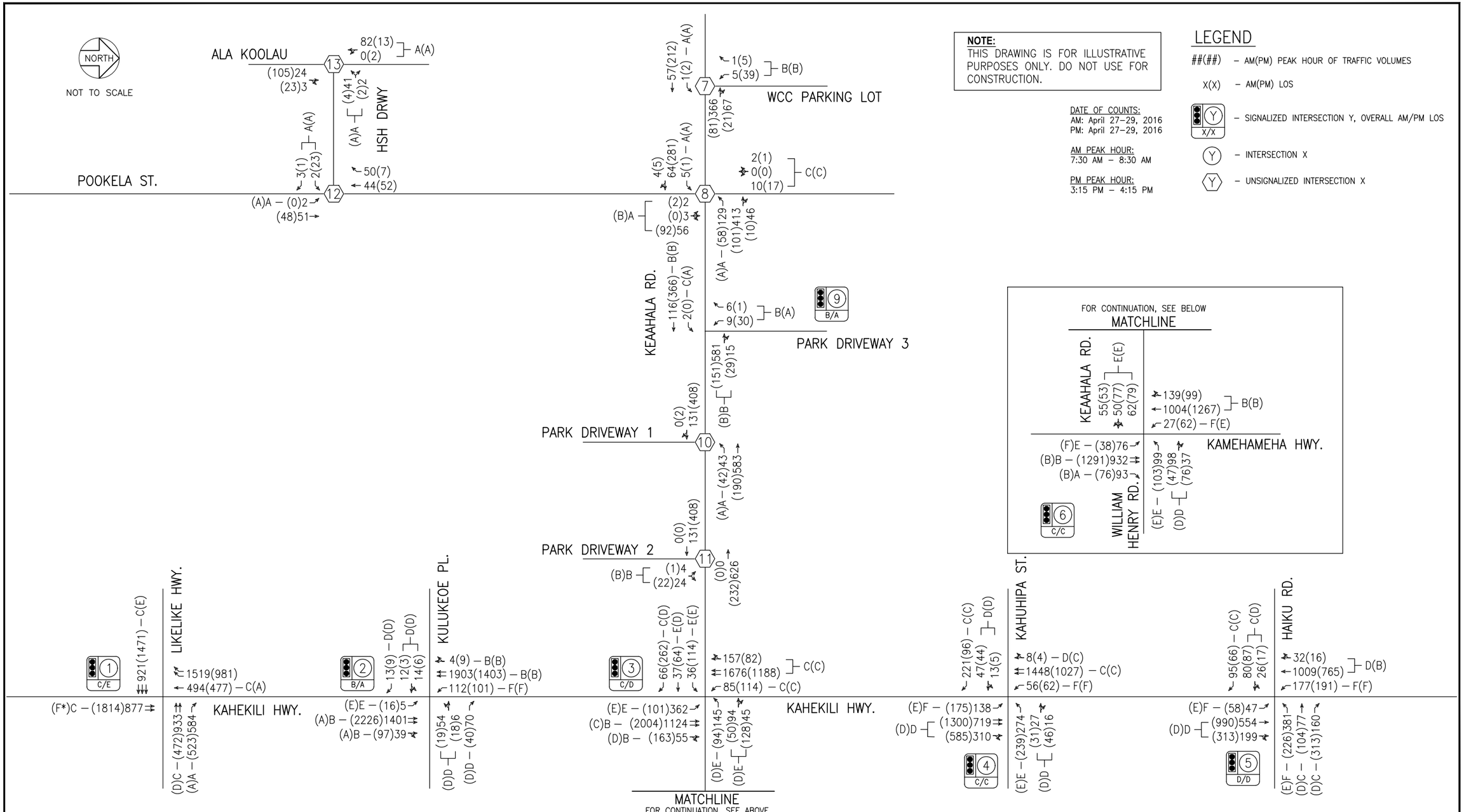
which operate at LOS E or worse. No major queuing was observed other than the mainline through during the respective peak periods.

Kahekili Highway & Haiku Road – This signalized intersection currently operates at overall LOS D(D) during the AM(PM) peak hours of traffic. All movements currently operate at LOS D or better with the exception of northbound, southbound, and westbound left-turn movements at LOS E or worse during the AM and PM peak. Queuing was observed on the westbound approach during the AM peak hour of traffic due to the heavy volume (381 vehicles) making a left-turn onto Kahekili Highway.

Kamehameha Highway & Keaahala Road – This signalized intersection currently operates at LOS C(C) during the AM(PM) peak hours of traffic. The major through movements along Kamehameha Highway operate at LOS B or better while the minor movements experience longer delays. Some queuing was observed on all approaches but generally cleared within one cycle length.

All unsignalized intersection movements operate at LOS C or better.

Figure 2.6 illustrates the existing lane configuration, existing traffic volumes, and LOS for each study intersection. Table 2.1 summarizes the existing LOS at the study intersections. LOS worksheets are provided in Appendix C.



NOTE:
THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

DATE OF COUNTS:
AM: April 27–29, 2016
PM: April 27–29, 2016

AM PEAK HOUR:
7:30 AM – 8:30 AM

PM PEAK HOUR:
3:15 PM – 4:15 PM

LEGEND

- ##(##) – AM(PM) PEAK HOUR OF TRAFFIC VOLUMES
- X(X) – AM(PM) LOS
- (Y) X/X – SIGNALIZED INTERSECTION Y, OVERALL AM/PM LOS
- (Y) – INTERSECTION X
- (Y) – UNSIGNALIZED INTERSECTION X

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EXISTING TRAFFIC VOLUMES, LANE CONFIGURATION AND MOVEMENT LOS

FIGURE
2.6

Table 2.1: Existing 2016 Level of Service Summary

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Kahekili Hwy & Likelike Hwy						
NB TH	30.7	0.6	C	72.8	1.1	F*
EB TH	28.5	0.4	C	60.4	1.0	E
WB TH	33.3	0.6	C	39.4	0.4	D
WB RT	0.0	0.0	A	0.0	0.0	A
SB TH	33.3	0.6	C	2.3	0.5	A
Overall	31.2	-	C	56.9	-	E
2: Kahekili Hwy & Kulukeoe St						
NB LT	78.3	0.2	E	68.9	0.3	E
NB TH	16.8	0.5	B	0.8	0.8	A
NB TH/RT	17.5	0.5	B	1.6	0.8	A
EB LT/TH	48.8	0.1	D	48.6	0.0	D
EB RT	47.0	0.0	D	44.6	0.0	D
WB LT/TH	50.3	0.2	D	49.6	0.1	D
WB RT	41.0	0.2	D	41.9	0.1	D
SB LT	106.0	0.9	F	130.9	0.9	F
SB TH	13.7	0.6	B	12.7	0.4	B
SB TH/RT	14.6	0.6	B	13.3	0.4	B
Overall	19.6	-	B	10.0	-	A
3: Kahekili Hwy & Keaahala Rd						
NB LT	71.0	0.9	E	61.7	0.5	E
NB TH	11.1	0.4	B	33.1	0.8	C
NB TH/RT	11.5	0.4	B	37.7	0.8	D
EB LT	66.8	0.3	E	59.3	0.5	E
EB TH	54.6	0.1	D	42.0	0.1	D
EB RT	29.3	0.1	C	33.6	0.5	C
WB LT	66.1	0.7	E	49.1	0.4	D
WB TH/RT	59.9	0.5	E	46.4	0.4	D
SB LT	79.8	0.8	E	78.2	0.8	E
SB TH	32.4	0.8	C	27.2	0.5	C
SB TH/RT	34.6	0.8	C	28.1	0.5	C
Overall	33.4	-	C	35.8	-	D
4: Kahekili Hwy/Kahekili Hwy & Kahuhipa St						
NB LT	93.9	0.9	F	57.7	0.8	E
NB TH	0.7	0.4	A	1.3	0.8	A
NB TH/RT	1.4	0.4	A	3.0	0.8	A
EB LT/TH	36.0	0.1	D	43.8	0.1	D
EB RT	30.5	0.4	C	30.9	0.2	C
WB LT	60.4	0.8	E	68.6	0.8	E
WB TH/RT	35.6	0.1	D	44.9	0.2	D
SB LT	88.3	0.8	F	159.2	0.9	F
SB TH	34.7	0.7	C	23.4	0.4	C
SB TH/RT	37.4	0.7	D	24.0	0.4	C
Overall	29.8	-	C	20.1	-	C

5: Kahekili Hwy & Haiku Rd						
NB LT	94.8	0.8	F	77.2	0.8	E
NB TH/RT	39.2	0.6	D	38.3	0.8	D
EB LT/TH	33.0	0.2	C	46.2	0.3	D
EB RT	21.7	0.1	C	30.8	0.1	C
WB LT	89.9	1.0	F	60.9	0.7	E
WB TH	32.3	0.1	C	46.1	0.3	D
WB RT	31.2	0.3	C	54.7	0.7	D
SB LT	93.9	0.9	F	95.6	0.9	F
SB TH/RT	39.7	0.8	D	17.6	0.4	B
Overall	49.0	-	D	41.2	-	D
6: Kamehameha Hwy & Keaahala Rd						
NB LT	75.5	0.8	E	81.0	0.8	F
NB TH	10.5	0.4	B	17.7	0.6	B
NB RT	7.8	0.1	A	10.6	0.1	B
EB LT/TH/RT	64.7	0.7	E	64.5	0.8	E
WB LT	59.8	0.5	E	55.8	0.5	E
WB TH/RT	54.1	0.4	D	50.0	0.4	D
SB LT	85.8	0.8	F	76.8	0.8	E
SB TH/RT	15.5	0.5	B	17.8	0.6	B
Overall	22.6	-	C	24.8	-	C
7: Keaahala St & WCC Parking Lot						
EB LT	8.3	0.0	A	7.4	0.0	A
SB LT/RT	11.7	0.0	B	10.7	0.1	B
8: Pookela St & Keaahala Rd						
NB LT/TH/RT	9.9	0.1	A	10.8	0.1	B
EB LT	8.4	0.0	A	7.5	0.0	A
WB LT	7.6	0.1	A	8.0	0.1	A
SB LT/TH/RT	19.6	0.1	C	15.7	0.1	C
9: Park Driveway 3 & Keaahala Rd						
EB LT	24.0	0.0	C	0.0	0.0	A
EB TH	11.0	0.2	B	14.9	0.7	B
WB TH/RT	19.5	0.8	B	12.3	0.3	B
SB LT/RT	11.2	0.0	B	7.3	0.0	A
Overall	18.0	-	B	13.7	-	B
10: Park Driveway 1 & Keaahala Rd**						
WB LT	7.6	0.0	A	8.4	0.0	A
11: Park Driveway 2 & Keaahala Rd						
NB U/LT	10.1	0.0	B	11.2	0.0	B
12: Pookela St & HSH Drwy						
NB LT	7.4	0.0	A	0.0	0.0	A
EB U/LT	8.9	0.0	A	9.2	0.0	A
13: Ala Koolau & HSH Drwy						
WB U/LT	9.3	0.1	A	9.2	0.0	A
SB LT	0.0	0.0	A	7.5	0.0	A

* Denotes overcapacity condition, v/c ≥ 1.0

** For analysis purposes, a "dummy" NBRT movement with no volume was added.

3. BASE YEAR 2021 TRAFFIC CONDITIONS

The Year 2021 was selected to reflect the Project completion year, which pertains to the short-term master plan and first phase of the HSH Master Plan Development. The Base Year 2021 scenario represents the traffic conditions within the study area without the Project. Traffic projections were formulated by applying a defacto growth rate to the existing 2016 traffic count volumes as well as trips generated by identified potential future developments in the vicinity of the Project.

3.1 Defacto Growth Rate

Projections for Base Year 2021 traffic were based upon traffic counts performed by HDOT and known nearby developments in the immediate vicinity of the Project. The resulting annual growth rate along Kahekili Highway was determined to be approximately 1.2 percent per year. This growth rate was applied on all movements to represent regional traffic growth in the vicinity of the Project through Year 2021.

3.2 Traffic Forecast for Identified Potential Future Developments

By year 2021, the Kaneohe area is anticipated to experience slow, but steady growth both in its residential population and medical/institutional/recreational land uses. In addition, other identified potential future developments are anticipated to generate vehicle trips and impact the study intersections. The vehicle trips shown in Table 3.1 were obtained from the Traffic Assessment Report for Skilled Nursing Facility Hawaii State Hospital Site published by Julian Ng Incorporated in June 2016 and were included in the Base Year 2021 traffic projections as a conservative, worst-case scenario.

The Skilled Nursing Facility development is anticipated to be located within the HSH campus in Kaneohe. The proposed development anticipates an average of 150 beds during the weekday and 58 parking stalls in two lots for employees and visitors. Vehicular access to these parking areas will be provided via the HSH main access. The Skilled Nursing Facility development is in the early stages of project planning and is anticipated to identify and address timing and details of its project work via separate processes and studies.

Table 3.1: Total Trips Generated by Identified Potential Future Developments in Project Vicinity

Known Development	Units	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Skilled Nursing Facility	150 Beds	21	9	30	22	33	55

3.3 Future Roadway Improvements

Phase 2 of the Kaheklili Highway Widening and Interchange are currently in the planning phase under a separate project. The project would widen Kahekili Highway from its existing two lanes to four lanes between Haiku Road and the northern intersection with Kamehameha Highway, with the possibility of contraflow operations during the AM and/or PM peak hours of traffic. Public input is still being sought and other alternatives will be considered. If constructed, this

project would likely improve capacity along Kahekili Highway through the study area as the existing bottleneck would be improved.

Given the uncertainty of the timeline for this project, it was not assumed to be constructed by Year 2021.

3.4 Base Year 2021 Analysis

All study intersections are forecast to operate with LOS similar to existing conditions. Intersection movements operating at LOS F and/or overcapacity conditions in existing conditions will continue to operate at LOS F and/or overcapacity conditions in the Base Year 2021 scenario. In general, the mainline through movements experienced some increase in delay over existing conditions.

Kahekili Highway & Likelike Highway – The northbound through movement will continue to operate at LOS F and overcapacity conditions during the PM peak hours of traffic. However, widening the intersection would be a regional improvement that would likely require right-of-way (ROW) acquisition, shoulder removal, and/or the elimination of the heavy "free" westbound right-turn from Likelike Highway onto Kahekili Highway. Therefore, no improvements are recommended at this intersection.

Kahekili Highway & Kulukeoe Street – While the southbound left-turn will continue to experience LOS F during the AM and PM peak hours of traffic, the volume is relatively low at 112(101) vehicles per hour during the AM(PM) peak hours of traffic; therefore, improvements are not recommended.

Kahekili Highway & Keaahala Road – Although some congestion occurs in the northbound direction during the afternoon peak hour of traffic as a result of the downstream bottleneck at Haiku Road, the intersection continues to operate at LOS E or better on its mainline and minor movements. Therefore, no improvements are recommended.

Kahekili Highway & Kahuhipa Street – This signalized intersection will continue to experience LOS E or worse at its northbound and southbound left-turn maneuvers. Although the northbound left-turn volume is moderate at 190 vehicles during the PM peak hour, no mitigation is recommended given the following:

- The left-turn volumes are significantly lower than 300 vehicles per hour, which is the general threshold for considering double left-turn lanes within the HCM.
- Existing physical and ROW constraints preclude the installation of a second left-turn lane.

Kahekili Highway & Haiku Road – Mitigation proposed and discussed in section 3.5.

Kamehameha Highway & Keaahala Road – The southbound left-turn lane will continue to experience LOS E during the AM and PM peak hour of traffic. However, no improvements are recommended given existing ROW and physical constraints, which preclude the widening of the roadway.

Figure 3.1 illustrates the Base Year 2021 forecast traffic volumes and LOS for the study intersection movements. Table 3.2 summarizes the Base Year 2021 LOS at the study intersections compared to existing conditions. LOS worksheets are provided in Appendix C.

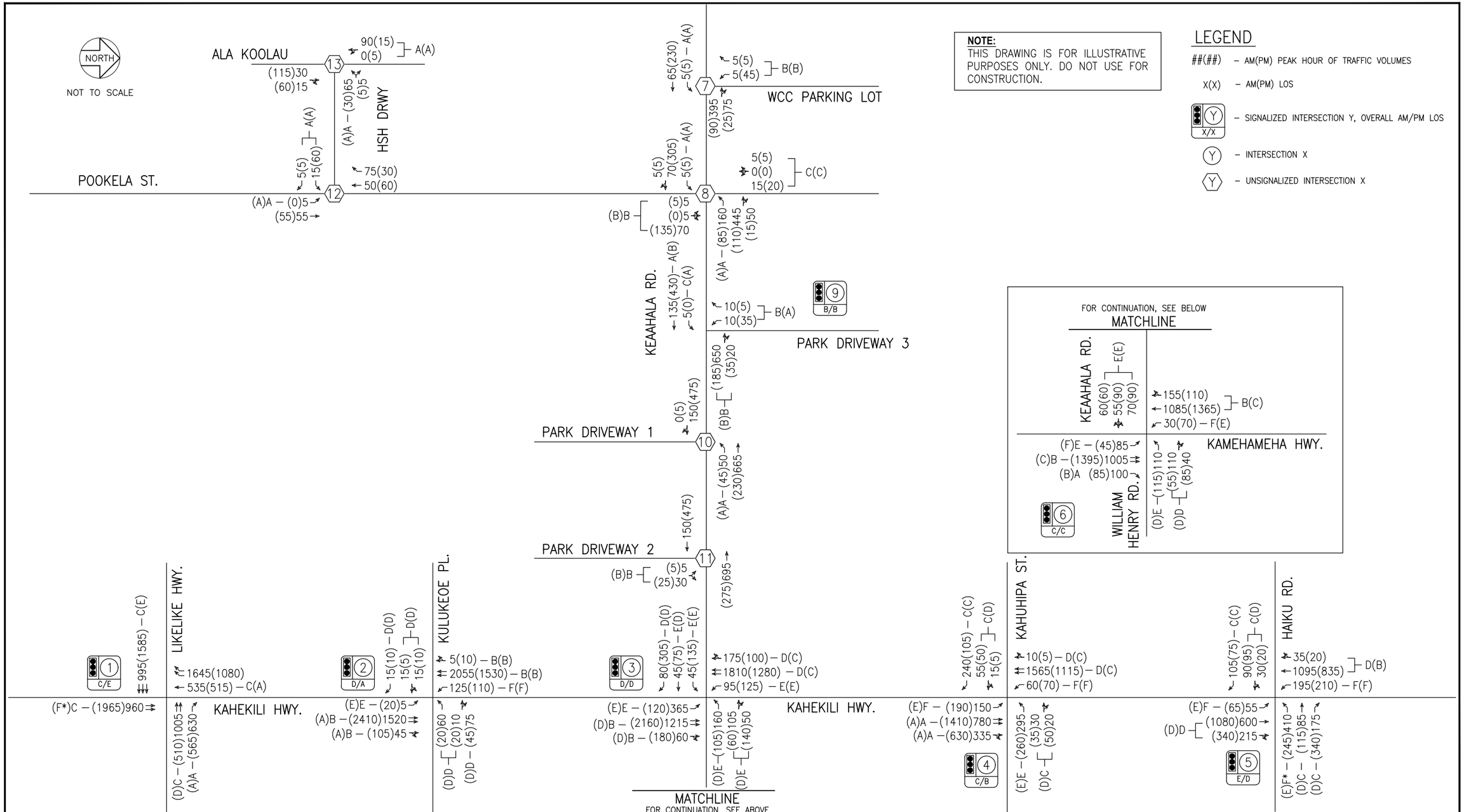
3.5 Base Year 2021 With Mitigation

Kahekili Highway & Haiku Road

Split-phase signal timing was recommended for the Kahekili Highway/Haiku Road intersection during the AM and PM peak hours of traffic, due to the large imbalance of traffic volumes on the minor eastbound and westbound approaches as well as restriping the westbound through lane into a shared left-turn through lane and removing the south crosswalk along Kahekili Highway.

With the mitigation, the Kahekili Highway/Haiku Road intersection will improve overall operations during the AM(PM) peak hour of traffic. All movements will operate within capacity; however, long delays will continue to be experienced for some movements.

Figure 3.3 provides an illustration of the recommended mitigation. Table 3.2 summarizes the Base Year 2021 with mitigation LOS at the study intersection compared to existing conditions and Base Year 2021 without mitigation. LOS worksheets are provided in Appendix C.



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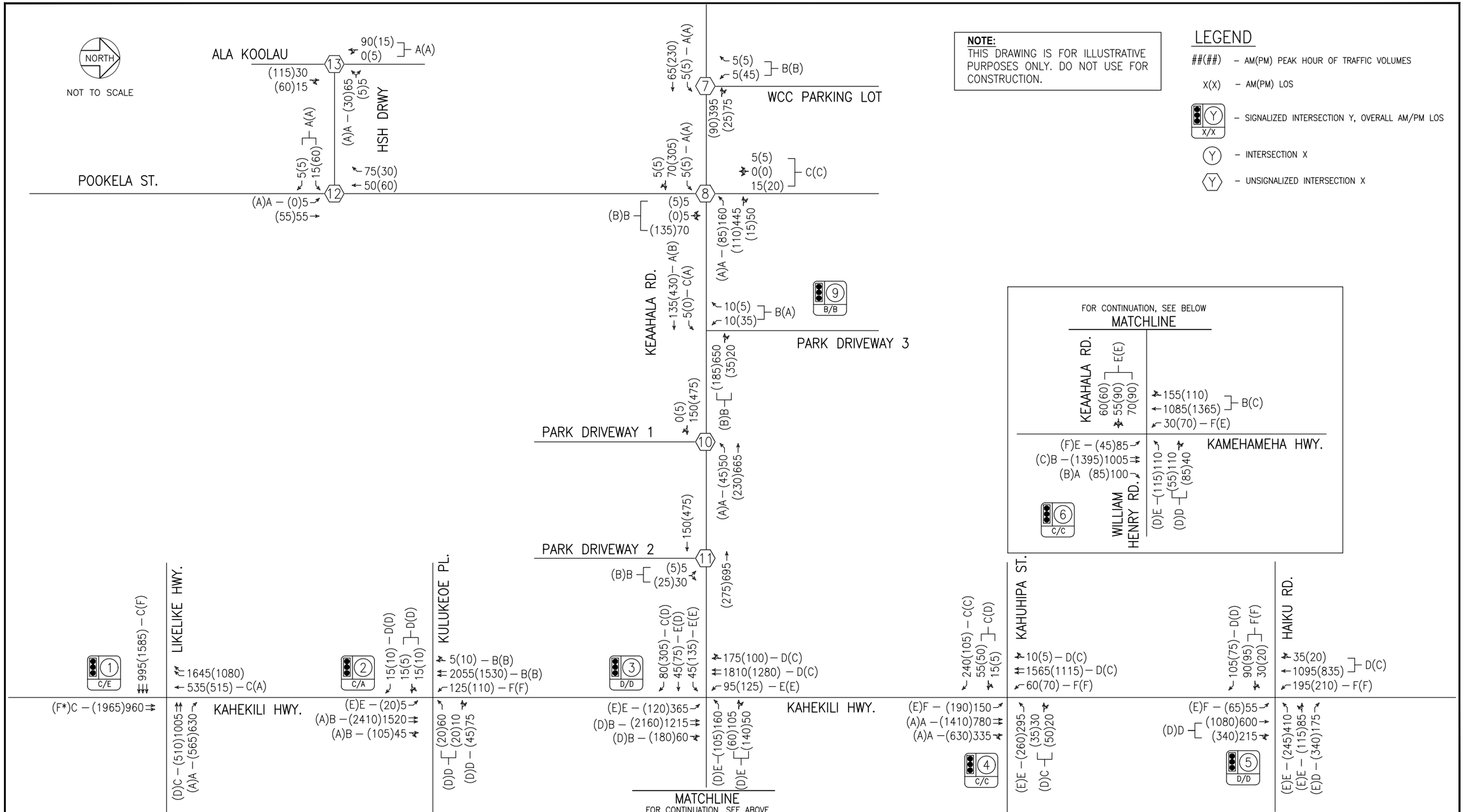
BY 2021 TRAFFIC VOLUMES, LANE CONFIGURATION AND MOVEMENT LOS

FIGURE 3.1



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BY 2021 WITH MITIGATION TRAFFIC VOLUMES, LANE CONFIGURATION AND MOVEMENT LOS

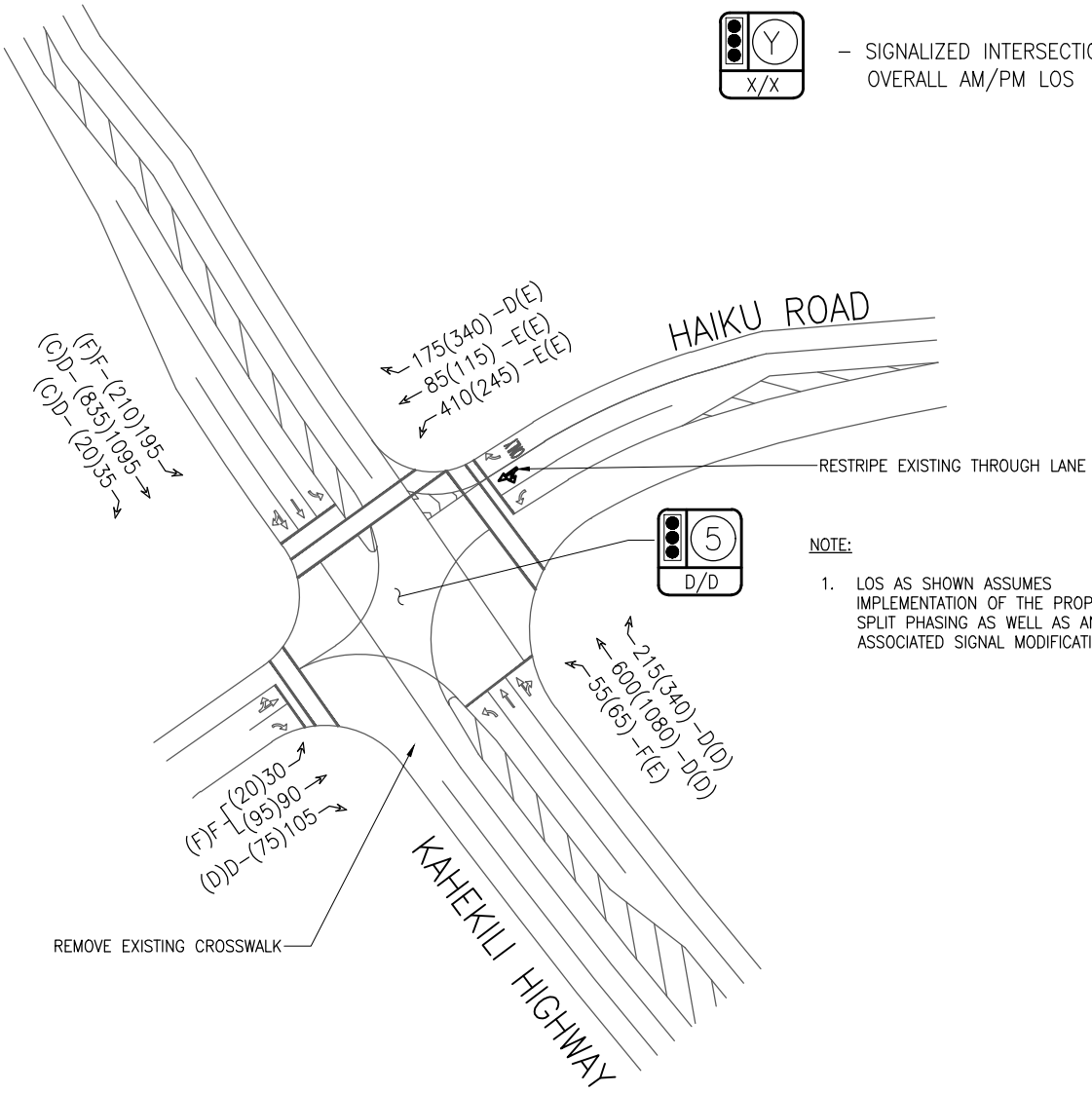
FIGURE
3.2

NORTH

NOT TO SCALE

LEGEND

##(##)	– AM(PM) PEAK HOUR OF TRAFFIC VOLUMES
X(X)	– AM(PM) LOS
*	– OVERCAPACITY, V/C >=1
Y / X/X	– SIGNALIZED INTERSECTION Y, OVERALL AM/PM LOS



NOTE:

1. LOS AS SHOWN ASSUMES IMPLEMENTATION OF THE PROPOSED SPLIT PHASING AS WELL AS ANY ASSOCIATED SIGNAL MODIFICATIONS

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PROPOSED MITIGATION AT KAHEKILI HIGHWAY/HAIKU ROAD

FIGURE

3.3

Table 3.2: Existing, Base Year 2021, and Base Year 2021 with Mitigations Level of Service Summary

Intersection	Existing Conditions						Base Year 2021						Base Year 2021 w/ mitigation					
	AM			PM			AM			PM			AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Kahekili Hwy & Likelike Hwy																		
NB TH	30.7	0.6	C	72.8	1.1	F*	31.8	0.6	C	107.9	1.2	F*	31.8	0.6	C	107.9	1.2	F*
EB TH	28.5	0.4	C	60.4	1.0	E	29.0	0.5	C	67.0	1.0	E	29.0	0.5	C	67.0	1.0	E
WB TH	33.3	0.6	C	39.4	0.4	D	34.5	0.7	C	38.9	0.5	D	34.5	0.7	C	38.9	0.5	D
WB RT	0.0	0.0	A	0.0	0.0	A	0.0	0.0	A	0.0	0.0	A	0.0	0.0	A	0.0	0.0	A
SB TH	33.3	0.6	C	2.3	0.5	A	34.6	0.7	C	3.1	0.5	A	34.6	0.7	C	3.1	0.5	A
Overall	31.2	-	C	56.9	-	E	32.2	-	C	74.1	-	E	32.2	-	C	74.1	-	E
2: Kahekili Hwy & Kulukeoe St																		
NB LT	78.3	0.2	E	68.9	0.3	E	78.3	0.2	E	73.8	0.6	E	78.3	0.2	E	73.8	0.6	E
NB TH	16.8	0.5	B	0.8	0.8	A	17.5	0.5	B	0.5	0.8	A	17.5	0.5	B	0.5	0.8	A
NB TH/RT	17.5	0.5	B	1.6	0.8	A	18.3	0.5	B	1.1	0.8	A	18.3	0.5	B	1.0	0.8	A
EB LT/TH	48.8	0.1	D	48.6	0.0	D	49.3	0.1	D	48.6	0.1	D	48.9	0.1	D	52.2	0.1	D
EB RT	47.0	0.0	D	44.6	0.0	D	47.0	0.1	D	46.1	0.0	D	47.0	0.1	D	47.7	0.0	D
WB LT/TH	50.3	0.2	D	49.6	0.1	D	51.2	0.2	D	49.5	0.1	D	50.7	0.2	D	54.6	0.2	D
WB RT	41.0	0.2	D	41.9	0.1	D	41.2	0.2	D	41.1	0.1	D	41.2	0.2	D	42.7	0.1	D
SB LT	106.0	0.9	F	130.9	0.9	F	119.6	0.9	F	124.8	0.9	F	119.6	0.9	F	124.8	0.9	F
SB TH	13.7	0.6	B	12.7	0.4	B	14.4	0.6	B	12.3	0.5	B	14.4	0.6	B	11.3	0.5	B
SB TH/RT	14.6	0.6	B	13.3	0.4	B	15.4	0.6	B	12.8	0.5	B	15.4	0.6	B	11.8	0.5	B
Overall	19.6	-	B	10.0	-	A	20.8	-	C	9.7	-	A	20.8	-	C	9.4	-	A
3: Kahekili Hwy & Keaahala Rd																		
NB LT	71.0	0.9	E	61.7	0.5	E	70.3	0.9	E	73.5	0.7	E	78.8	0.9	E	63.6	0.6	E
NB TH	11.1	0.4	B	33.1	0.8	C	15.7	0.4	B	40.8	0.9	D	14.9	0.4	B	40.8	0.9	D
NB TH/RT	11.5	0.4	B	37.7	0.8	D	16.2	0.4	B	49.2	0.9	D	15.5	0.4	B	49.2	0.9	D
EB LT	66.8	0.3	E	59.3	0.5	E	66.5	0.3	E	65.3	0.6	E	66.4	0.3	E	63.7	0.6	E
EB TH	54.6	0.1	D	42.0	0.1	D	52.0	0.2	D	42.3	0.2	D	53.2	0.2	D	42.3	0.2	D
EB RT	29.3	0.1	C	33.6	0.5	C	25.5	0.1	C	39.1	0.6	D	27.6	0.1	C	34.7	0.5	C
WB LT	66.1	0.7	E	49.1	0.4	D	64.8	0.7	E	48.6	0.3	D	65.4	0.7	E	50.6	0.4	D
WB TH/RT	59.9	0.5	E	46.4	0.4	D	58.4	0.6	E	47.3	0.5	D	58.7	0.6	E	47.3	0.5	D
SB LT	79.8	0.8	E	78.2	0.8	E	66.9	0.6	E	74.7	0.8	E	66.9	0.6	E	74.7	0.8	E
SB TH	32.4	0.8	C	27.2	0.5	C	42.1	0.9	D	24.4	0.5	C	37.5	0.9	D	28.1	0.6	C
SB TH/RT	34.6	0.8	C	28.1	0.5	C	46.8	0.9	D	25.3	0.5	C	41.0	0.9	D	29.2	0.6	C
Overall	33.4	-	C	35.8	-	D	39.4	-	D	40.4	-	D	37.6	-	D	40.9	-	D
4: Kahekili Hwy/Kahekili Hwy & Kahuhipa St																		
NB LT	93.9	0.9	F	57.7	0.8	E	101.4	0.9	F	60.8	0.9	E	101.4	0.9	F	60.9	0.9	E
NB TH	0.7	0.4	A	1.3	0.8	A	0.9	0.5	A	0.9	0.8	A	0.9	0.5	A	1.8	0.9	A
NB TH/RT	1.4	0.4	A	3.0	0.8	A	1.8	0.5	A	2.2	0.8	A	1.8	0.5	A	5.0	0.9	A
EB LT/TH	36.0	0.1	D	43.8	0.1	D	33.4	0.1	C	47.6	0.1	D	33.4	0.1	C	42.1	0.1	D
EB RT	30.5	0.4	C	30.9	0.2	C	27.8	0.4	C	34.8	0.2	C	27.8	0.4	C	30.0	0.2	C
WB LT	60.4	0.8	E	68.6	0.8	E	60.9	0.8	E	65.3	0.8	E	60.9	0.8	E	70.5	0.8	E
WB TH/RT	35.6	0.1	D	44.9	0.2	D	33.2	0.1	C	49.0	0.3	D	33.2	0.1	C	43.2	0.2	D
SB LT	88.3	0.8	F	159.2	0.9	F	90.6	0.8	F	101.6	0.8	F	90.6	0.8	F	81.8	0.7	F
SB TH	34.7	0.7	C	23.4	0.4	C	42.5	0.8	D	20.6	0.4	C	42.5	0.8	D	25.1	0.5	C
SB TH/RT	37.4	0.7	D	24.0	0.4	C	47.0	0.8	D	21.2	0.4	C	47.0	0.8	D	25.9	0.5	C
Overall	29.8	-	C	20.1	-	C	33.9	-	C	18.4	-	B	33.9	-	C	20.1	-	C
5: Kahekili Hwy & Haiku Rd																		
NB LT	94.8	0.8	F	77.2	0.8	E	109.3	0.8	F	76.4	0.8	E	98.0	0.8	F	76.4	0.8	E
NB TH/RT	39.2	0.6	D	38.3	0.8	D	42.0	0.7	D	41.8	0.8	D	38.1	0.6	D	48.0	0.9	D
EB LT/TH	33.0	0.2	C	46.2	0.3	D	33.3	0.2	C	47.2	0.3	D	96.5	0.8	F	104.9	0.9	F
EB RT	21.7	0.1	C	30.8	0.1	C	21.2	0.2	C	29.4	0.0	C	51.0	0.3	D	46.9	0.0	D
WB LT	89.9	1.0	F	60.9	0.7	E	116.5	1.1	F*	68.3	0.8	E	63.6	0.7	E	73.3	0.7	E
WB TH	32.3	0.1	C	46.1	0.3	D	32.5	0.1	C	47.0	0.3	D	-	-	-	-	-	-
WB RT	31.2	0.3	C	54.7	0.7	D	31.2	0.3	C	43.6	0.4	D	49.8	0.5	D	72.4	0.8	E
SB LT	93.9	0.9	F	95.6	0.9	F	95.5	0.9	F	99.7	0.9	F	87.7	0.9	F	108.1	0.9	F
SB TH/RT	39.7	0.8	D	17.6	0.4	B	44.2	0.8	D	18.1	0.4	B	38.0	0.8	D	20.6	0.5	C
Overall	49.0	-	D	41.2	-	D	55.2	-	E	42.8	-	D	51.1	-	D	52.9	-	D
6: Kamehameha Hwy & Keaahala Rd																		
NB LT	75.5	0.8	E	81.0	0.8	F	74.9	0.8	E	80.5	0.8	F	74.9	0.8	E	80.5	0.8	F
NB TH	10.5	0.4	B	17.7	0.6	B	12.6	0.5	B	22.0	0.7	C	12.6	0.5	B	22.2	0.7	C
NB RT	7.8	0.1	A	10.6	0.1	B	9.1	0.1	A	12.6	0.1	B	9.1	0.1	A	12.7	0.1	B
EB LT/TH/RT	64.7	0.7	E	64.5	0.8	E	63.8	0.7	E	67.4	0.8	E	63.8	0.7	E	65.9	0.8	E
WB LT	59.8	0.5	E	55.8	0.5	E	56.9	0.5	E	52.8	0.5	D	56.9	0.5	E	52.6	0.5	D
WB TH/RT	54.1	0.4	D	50.0	0.4	D	51.6	0.4	D	47.4	0.4	D	51.6	0.4	D	47.2	0.4	D
SB LT	85.8	0.8	F	76.8	0.8	E	83.8	0.8	F	76.0	0.8	E	83.8	0.8	F	76.0	0.8	E
SB TH/RT	15.5	0.5	B	17.8	0.6	B	18.9	0.6	B	22.1	0.7	C	18.9	0.6	B	22.3	0.7	C
Overall	22.6	-	C	24.8	-	C	24.7	-	C	28.6	-	C	24.7	-	C	28.7	-	C
7: Keaahala St & WCC Parking Lot																		
EB LT	8.3	0.0	A	7.4	0.0	A	8.4	0.0	A	7.5	0.0	A	8.4	0.0	A	7.5	0.0	A
SB LT/RT	11.7	0.0	B	10.7	0.1	B	11.8	0.0	B	11.0	0.1	B	11.8	0.0	B	11.0	0.1	B
8: Pookela St & Keaahala Rd																		
NB LT/TH/RT	9.9	0.1	A	10.8	0.1	B	11.0	0.1	B	11.7	0.2	B	11.0	0.1	B	11.7	0.2	B
EB LT	8.4	0.0	A	7.5	0.0	A	8.5	0.0	A	7.5	0.0	A	8.5	0.0	A	7.5	0.0	A
WB LT	7.6	0.1	A	8.0	0.1	A	7.7	0.1	A	8.2	0.1	A	7.7	0.1	A	8.2	0.1	A
SB LT/TH/RT	19.6	0.1	C	15.7	0.1	C	22.6	0.1	C	18.3	0.1	C	22.6	0.1	C	18.3	0.1	C
9: Park Driveway 3 & Keaahala Rd																		
EB LT	24.0	0.0	C	0.0	0.0	A	22.3	0.0	C	0.0	0.0	A	22.3	0.0	C	0.0	0.0	A
EB TH	11.0	0.2	B	14.9	0.7	B	9.1	0.2	A	14.8	0.7	B	9.1	0.2	A	14.8	0.7	B
WB TH/RT	19.5	0.8	B	12.3	0.3	B	17.8	0.8	B	11.9	0.4	B	17.8	0.8	B	11.9	0.4	B
SB LT/RT	11.2	0.0	B	7.3	0.0	A	12.7	0.0	B	8.4	0.1	A	12.7	0.0	B	8.4	0.1	A
Overall	18.0	-	B	13.7	-	B	16.2	-	B	13.5	-	B	16.2	-	B	13.5	-	B
10: Park Driveway 1 & Keaahala Rd**																		
WB LT	7.6	0.0	A	8.4	0.0	A	7.7	0.0	A	8.6	0.0	A	7.7	0.0	A	8.6	0.0	A
11: Park Driveway 2 & Keaahala Rd																		
NB U/LT	10.1	0.0	B	11.2	0.0	B	11.1	0.1	B	12.5	0.1	B	10.6	0.0	B	12.8	0.1	B
12: Pookela St & HSH Drwy																		
NB LT	7.4	0.0	A	0.0	0.0	A	7.5	0.0	A	7.4	0.0	A	7.5	0.0	A	7.4	0.0	A
EB U/LT	8.9	0.0	A	9.2	0.0	A	9.3	0.0	A	9.6	0.1	A	9.3	0.0	A	9.6	0.1	A
13: Ala Koolau & HSH Drwy																		
WB U/LT	9.3	0.1	A	9.2	0.0	A	9.6	0.1	A	9.7	0.0	A	9.6	0.1	A	9.7	0.0	A
SB LT	0.0	0.0	A	7.5	0.0	A	7.3	0.0	A	7.6	0.0	A	7.3	0.0	A	7.6	0.0	A

* Denotes overcapacity condition, v/c ≥ 1.0

** For analysis purposes, a "dummy" NBRT movement with no volume was added.

4. FUTURE YEAR 2021 TRAFFIC CONDITIONS

The Future Year 2021 scenario represents the traffic conditions within the Project study area with the full buildout of the Project. Future Year 2021 pertains to the first phase of improvements to the 2015 MPU, also known as the New Patient Facility and the short-term master plan.

4.1 Background

The Project proposes to construct a 144-bed New Patient Facility and a rehabilitation treatment mall within the State Hospital campus in Kaneohe. Vehicular access to the two (2) new parking lots will be from the main access to the HSH.

The HSH operates 24 hours a day, 7 days a week: and therefore, staffs the facility around the clock. There are three (3) staff shifts: from 7:00 AM to 3:00 PM, from 3:00 PM to 11:00 PM, and from 11:00 PM to 7:00 AM. Generally, workers arrive within the hour preceding their start shift time and leave within the hour following their end shift time. As the traffic counts collected for the Project indicate, the peak hours of traffic for the Hawaii State Hospital, which are indicated by the staff shift times, do not coincide with the regional peak hours, especially during the PM peak hour of traffic. During the AM peak hour of traffic, there is a small, half-hour window of overlap in the peak hour between the Hawaii State Hospital peak hour of traffic and the regional peak hour of traffic. Therefore, traffic entering and exiting the Project will have minimal impact on the regional traffic conditions.

4.2 Travel Demand Estimations

4.2.1 Trip Generation

The Institute of Transportation Engineers (ITE) publishes a book based on empirical data compiled from a body of more than 4,250 trip generation studies submitted by public agencies, developers, consulting firms, and associations. This publication, titled Trip Generation Manual, 9th Edition, provides trip rates and/or formulae based on graphs that correlate vehicular trips with independent variables.

In the absence of an ITE trip generation land use that is specifically geared to the Project's proposed land uses focusing on a new patient facility center and a rehabilitation treatment mall, it was determined that trips would be generated based on our manual traffic counts within the Project and the estimated staff counts provided by Brown and Caldwell and approved by DAGS/DOH. Please refer to the Appendix D for HSH's population assumption summary.

HSH currently generates 150(145) trips during the AM(PM) peak hours of traffic. Future projections for the Project were based upon estimated employment, visitor, and hospital bed projections. The first phase will increase the number of employees at HSH from 374 to 622, which will result in the Project generating 237(230) trips during the AM(PM) peak hours of traffic, a 66-percent increase in HSH-related traffic.

See Tables 4.1 and 4.2 for Trip Generation formulae and projections for the Project.

Table 4.1: Trip Generation Rates for the Project

Land Use	Independent Variable	AM Peak Hour of Traffic		PM Peak Hour of Traffic	
		Trip Rate	% Entering	Trip Rate	% Entering
HSH Medical Building	Employees	0.40	82%	0.39	12%

Table 4.2: Peak Hour Trips Generated by the Project

Land Use Designation	Independent Variable	AM Peak Hour of Traffic		PM Peak Hour of Traffic	
		Enter (vph)	Exit (vph)	Enter (vph)	Exit (vph)
HSH Medical Building	248 Employees	82	18	11	85

4.2.2 Trip Distribution

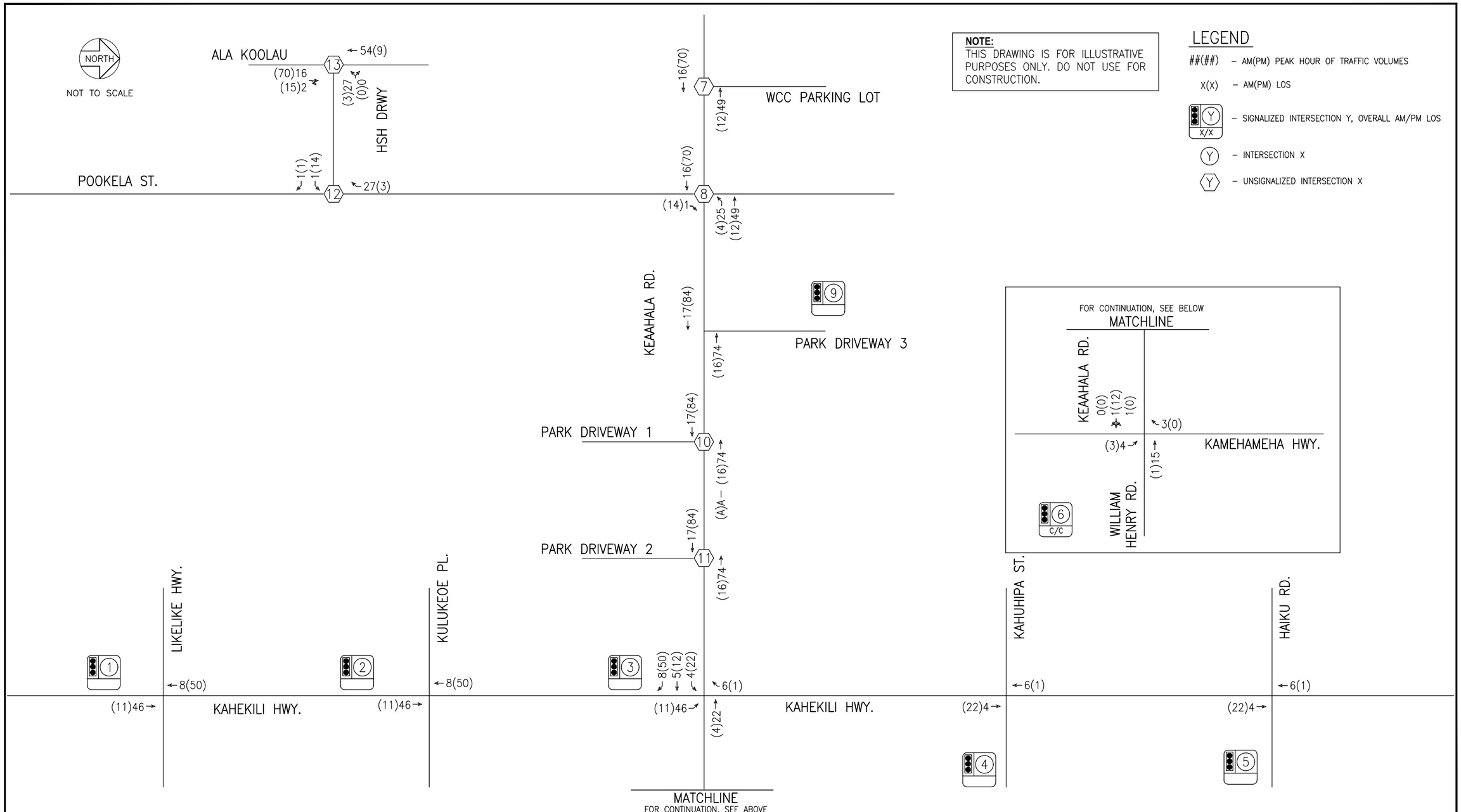
Trips generated by the Project were assigned throughout the study area based generally upon existing travel patterns. The traffic generated by the Project was added to the forecast Base Year 2021 traffic volumes within the vicinity of the Project to constitute the traffic volumes for the Future Year 2021 traffic conditions. Figure 4.1 illustrates the Project-generated trip distribution.

4.3 Future Year 2021 Analysis

Upon completion of the Project, all study intersections are forecast to operate with LOS similar to Base Year 2021 conditions. The main access to the Project site, Keaahala Road/Kahekili Highway experiences some increase in delay mainly during the PM peak hour of traffic exiting the Project area.

Project-generated traffic will have minimal impacts to the study impacts and associated LOS due to its relatively small traffic generation; therefore no additional mitigation is recommended beyond Base Year 2021 conditions for the reasons outlined in section 3.1.4.

Figure 4.2 illustrates the Future Year 2021 forecast traffic volumes and LOS for the study intersection movements. Table 4.3 summarizes the Future Year 2021 LOS at the study intersections compared to Base Year 2020 conditions. LOS worksheets are provided in Appendix C.



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PROJECT-GENERATED TRIPS

FIGURE
4.1

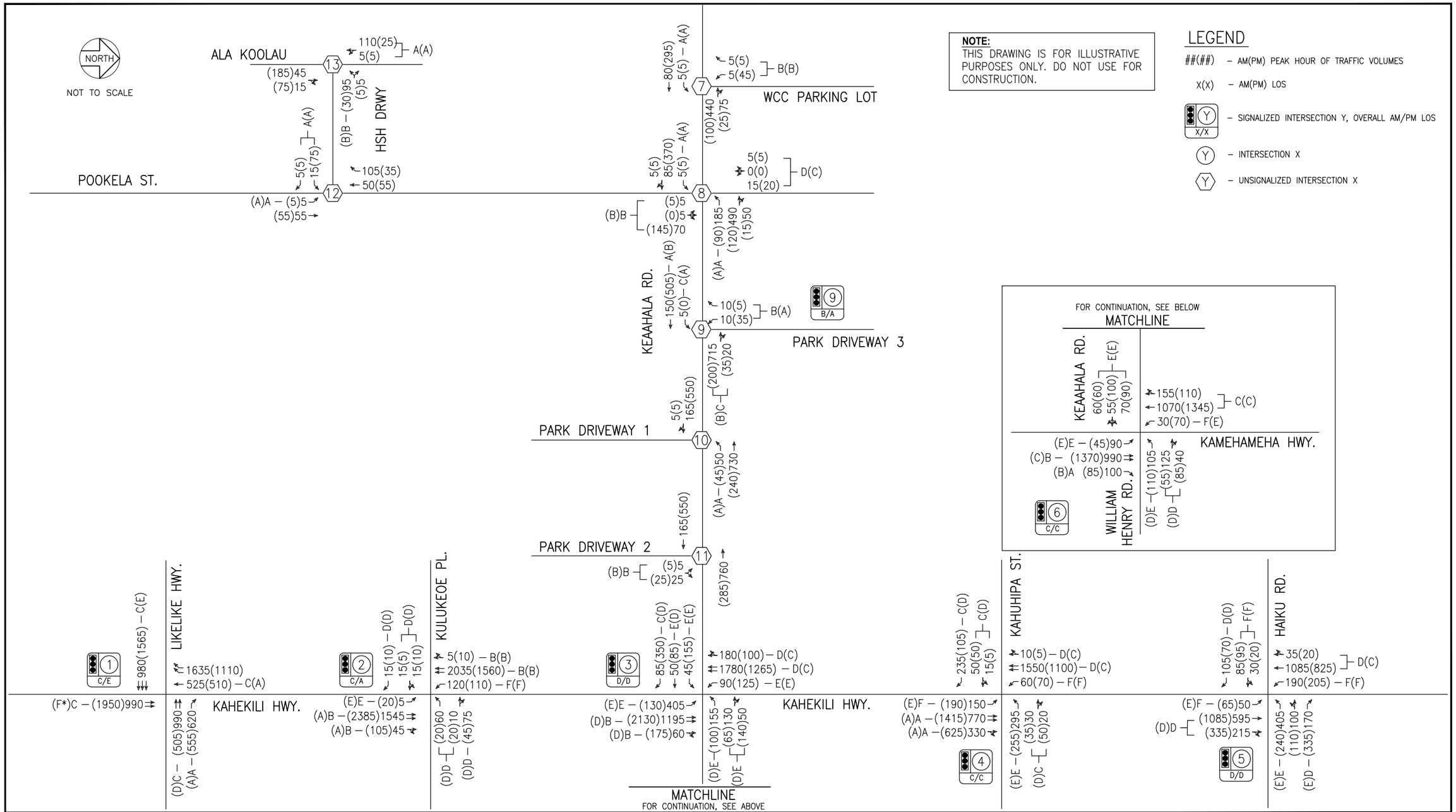

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FIGURE
4.2

FUTURE YEAR 2021 TRAFFIC VOLUMES, LANE CONFIGURATION AND MOVEMENT LOS

Table 4.3: Existing, Base Year 2021 with Mitigations and Year 2021 with Project Level of Service Summary

Intersection	Existing Conditions						Base Year 2021 with Mitigations						Year 2021 with Project with Base Year Mitigations					
	AM			PM			AM			PM			AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Kahekili Hwy & Likelike Hwy																		
NB TH	30.7	0.58	C	72.8	1.07	F*	31.8	0.62	C	107.9	1.15	F*	32.7	0.65	C	111.8	1.16	F*
EB TH	28.5	0.43	C	60.4	0.95	E	29.0	0.46	C	67.0	0.98	E	29.0	0.46	C	67.0	0.98	E
WB TH	33.3	0.63	C	39.4	0.44	D	34.5	0.67	C	38.9	0.46	D	34.5	0.67	C	38.9	0.46	D
WB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
SB TH	33.3	0.62	C	2.3	0.48	A	34.6	0.66	C	3.1	0.52	A	34.6	0.66	C	3.0	0.52	A
Overall	31.2	-	C	56.9	-	E	32.2	-	C	74.1	-	E	32.4	-	C	75.9	-	E
2: Kahekili Hwy & Kulukeoe St																		
NB LT	78.3	0.22	E	68.9	0.28	E	78.3	0.22	E	73.8	0.62	E	78.3	0.22	E	73.5	0.62	E
NB TH	16.8	0.49	B	0.8	0.77	A	17.5	0.52	B	0.5	0.81	A	17.8	0.54	B	0.4	0.81	A
NB TH/RT	17.5	0.49	B	1.6	0.77	A	18.3	0.52	B	1.0	0.82	A	18.6	0.54	B	0.8	0.82	A
EB LT/TH	48.8	0.08	D	48.6	0.03	D	48.9	0.09	D	52.2	0.08	D	48.9	0.09	D	50.6	0.05	D
EB RT	47.0	0.04	D	44.6	0.03	D	47.0	0.05	D	47.7	0.03	D	47.0	0.05	D	48.0	0.03	D
WB LT/TH	50.3	0.20	D	49.6	0.12	D	50.7	0.22	D	54.6	0.19	D	50.7	0.22	D	51.5	0.13	D
WB RT	41.0	0.17	D	41.9	0.10	D	41.2	0.18	D	42.7	0.12	D	41.2	0.18	D	43.0	0.12	D
SB LT	106.0	0.86	F	130.9	0.93	F	119.6	0.92	F	124.8	0.92	F	119.6	0.92	F	124.8	0.92	F
SB TH	13.7	0.58	B	12.7	0.44	B	14.4	0.62	B	11.3	0.46	B	14.5	0.62	B	11.3	0.47	B
SB TH/RT	14.6	0.58	B	13.3	0.44	B	15.4	0.62	B	11.8	0.46	B	15.5	0.62	B	11.9	0.47	B
Overall	19.6	-	B	10.0	-	A	20.8	-	C	9.4	-	A	20.9	-	C	9.3	-	A
3: Kahekili Hwy & Keaahala Rd																		
NB LT	71.0	0.86	E	61.7	0.47	E	78.8	0.92	E	63.6	0.55	E	78.0	0.93	E	64.4	0.60	E
NB TH	11.1	0.37	B	33.1	0.83	C	14.9	0.42	B	40.8	0.91	D	12.0	0.39	B	41.9	0.92	D
NB TH/RT	11.5	0.37	B	37.7	0.84	D	15.5	0.42	B	49.2	0.93	D	12.4	0.39	B	50.8	0.94	D
EB LT	66.8	0.27	E	59.3	0.50	E	66.4	0.29	E	63.7	0.62	E	68.9	0.36	E	65.5	0.68	E
EB TH	54.6	0.14	D	42.0	0.14	D	53.2	0.15	D	42.3	0.17	D	52.8	0.17	D	40.6	0.17	D
EB RT	29.3	0.12	C	33.6	0.45	C	27.6	0.13	C	34.7	0.52	C	24.9	0.13	C	34.6	0.58	C
WB LT	66.1	0.67	E	49.1	0.35	D	65.4	0.68	E	50.6	0.40	D	65.0	0.67	E	49.2	0.40	D
WB TH/RT	59.9	0.54	E	46.4	0.44	D	58.7	0.56	E	47.3	0.49	D	59.4	0.63	E	45.1	0.47	D
SB LT	79.8	0.81	E	78.2	0.84	E	66.9	0.56	E	74.7	0.77	E	76.7	0.81	E	74.6	0.77	E
SB TH	32.4	0.76	C	27.2	0.54	C	37.5	0.85	D	28.1	0.58	C	41.2	0.88	D	28.6	0.58	C
SB TH/RT	34.6	0.77	C	28.1	0.54	C	41.0	0.86	D	29.2	0.58	C	45.7	0.89	D	29.8	0.58	C
Overall	33.4	-	C	35.8	-	D	37.6	-	D	40.9	-	D	39.3	-	D	41.7	-	D
4: Kahekili Hwy/Kahekili Hwy & Kahuhipa St																		
NB LT	93.9	0.88	F	57.7	0.80	E	101.4	0.92	F	60.9	0.91	E	101.7	0.92	F	61.1	0.91	E
NB TH	0.7	0.42	A	1.3	0.78	A	0.9	0.48	A	1.8	0.88	A	0.9	0.48	A	2.0	0.89	A
NB TH/RT	1.4	0.43	A	3.0	0.79	A	1.8	0.48	A	5.0	0.92	A	1.9	0.48	A	5.8	0.93	A
EB LT/TH	36.0	0.11	D	43.8	0.11	D	33.4	0.11	C	42.1	0.12	D	33.4	0.11	C	42.1	0.12	D
EB RT	30.5	0.36	C	30.9	0.17	C	27.8	0.36	C	30.0	0.18	C	27.8	0.36	C	44.2	0.27	D
WB LT	60.4	0.81	E	68.6	0.80	E	60.9	0.82	E	70.5	0.82	E	60.9	0.82	E	70.5	0.82	E
WB TH/RT	35.6	0.08	D	44.9	0.20	D	33.2	0.09	C	43.2	0.21	D	33.2	0.09	C	43.2	0.21	D
SB LT	88.3	0.79	F	159.2	0.94	F	90.6	0.79	F	81.8	0.67	F	90.6	0.79	F	81.8	0.67	F
SB TH	34.7	0.73	C	23.4	0.42	C	42.5	0.83	D	25.1	0.46	C	42.7	0.83	D	25.1	0.46	C
SB TH/RT	37.4	0.73	D	24.0	0.42	C	47.0	0.83	D	25.9	0.46	C	47.3	0.83	D	25.9	0.46	C
Overall	29.8	-	C	20.1	-	C	33.9	-	C	20.1	-	C	34.0	-	C	20.6	-	C
5: Kahekili Hwy & Haiku Rd																		
NB LT	94.8	0.78	F	77.2	0.79	E	98.0	0.78	F	76.4	0.80	E	98.0	0.78	F	76.4	0.80	E
NB TH/RT	39.2	0.59	D	38.3	0.80	D	38.1	0.61	D	48.0	0.88	D	38.2	0.61	D	50.1	0.90	D
EB LT/TH	33.0	0.19	C	46.2	0.26	D	96.5	0.82	F	104.9	0.85	F	96.5	0.82	F	104.8	0.85	F
EB RT	21.7	0.13	C	30.8	0.12	C	51.0	0.33	D	46.9	0.04	D	51.0	0.33	D	47.2	0.07	D
WB LT	89.9	0.97	F	60.9	0.70	E	63.6	0.74	E	73.3	0.73	E	63.6	0.74	E	73.3	0.73	E
WB TH	32.3	0.13	C	46.1	0.25	D	-	-	-	-	-	-	-	-	-	-	-	-
WB RT	31.2	0.28	C	54.7	0.74	D	49.8	0.47	D	72.4	0.80	E	49.8	0.47	D	73.0	0.80	E
SB LT	93.9	0.88	F	95.6	0.90	F	87.7	0.88	F	108.1	0.94	F	87.7	0.88	F	108.1	0.94	F
SB TH/RT	39.7	0.77	D	17.6	0.40	B	38.0	0.78	D	20.6	0.45	C	38.3	0.79	D	20.7	0.45	C
Overall	49.0	-	D	41.2	-	D	51.1	-	D	52.9	-	D	51.2	-	D	54.0	-	D
6: Kamehameha Hwy & Keaahala Rd																		
NB LT	75.5	0.81	E	81.0	0.78	F	74.9	0.82	E	80.5	0.78	F	74.5	0.83	E	79.2	0.78	E
NB TH	10.5	0.41	B	17.7	0.62	B	12.6	0.46	B	22.2	0.70	C	13.2	0.46	B	23.0	0.70	C
NB RT	7.8	0.09	A	10.6	0.08	B	9.1	0.10	A	12.7	0.10	B	9.6	0.10	A	13.1	0.10	B
EB LT/TH/RT	64.7	0.71	E	64.5	0.76	E	63.8	0.73	E	65.9	0.78	E	63.9	0.73	E	66.4	0.80	E
WB LT	59.8	0.53	E	55.8	0.50	E	56.9	0.51	E	52.6	0.49	D	55.7	0.50	E	52.4	0.50	D
WB TH/RT	54.1	0.43	D	50.0	0.36	D	51.6	0.42	D	47.2	0.36	D	51.1	0.45	D	46.3	0.35	D
SB LT	85.8	0.79	F	76.8	0.79	E	83.8	0.78	F	76.0	0.80	E	83.8	0.78	F	76.0	0.80	E
SB TH/RT	15.5	0.53	B	17.8	0.63	B	18.9	0.59	B	22.3	0.70	C	20.2	0.61	C	23.8	0.71	C
Overall	22.6	-	C	24.8	-	C	24.7	-	C	28.7	-	C	25.7	-	C	29.8	-	C
7: Keaahala St & WCC Parking Lot																		
EB LT	8.3	0.00	A	7.4	0.00	A	8.4	0.01	A	7.5	0.00	A	8.6	0.01	A	7.5	0.00	A
SB LT/RT	11.7	0.01	B	10.7	0.07	B	11.8	0.02	B	11.0	0.08	B	12.4	0.02	B	11.8	0.09	B
8: Pookela St & Keaahala Rd																		
NB LT/TH/RT	9.9	0.08	A	10.8	0.14	B	11.0	0.13	B	11.7	0.22	B	11.7	0.14	B	12.8	0.26	B
EB LT	8.4	0.01	A	7.5	0.00	A	8.5	0.01	A	7.5	0.00	A	8.7	0.01	A	7.5	0.00	A
WB LT	7.6	0.09	A	8.0	0.05	A	7.7	0.12	A	8.2	0.08	A	7.8	0.14	A	8.4	0.09	A
SB LT/TH/RT	19.6	0.05	C	15.7	0.06	C	22.6	0.10	C	18.3	0.09	C	27.3	0.12	D	21.8	0.11	C
9: Park Driveway 3 & Keaahala Rd																		
EB LT	24.0	0.01	C	0.0	0.00	A	22.3	0.02	C	0.0	0.00	A	24.4	0.03	C	0.0	0.00	A
EB TH	11.0	0.16	B	14.9	0.68	B	9.1	0.17	A	14.8	0.71	B	8.7	0.18	A	14.9	0.75	B
WB TH/RT	19.5	0.83	B	12.3	0.34	B	17.8	0.83	B	11.9	0.38	B	20.9	0.87	C	11.2	0.36	B
SB LT/RT	11.2	0.03	B	7.3	0.04	A	12.7	0.04	B	8.4	0.06	A	14.3	0.04	B	9.9	0.06	A
Overall	18.0	-	B	0.0			16.2	-	B	13.5	-	B	18.7	-	B	13.5	-	B
10: Park Driveway 1 & Keaahala Rd**																		
WB LT	7.6	0.0	A	8.4	0.0	A	7.7	0.0	A	8.6	0.0	A	7.6	0.0	A	8.8	0.0	A
11: Park Driveway 2 & Keaahala Rd																		
NB U/LT	10.1	0.0	B	11.2	0.0	B	10.6	0.0	B	12.8	0.1	B	11.7	0.1	B	13.6	0.1	B
12: Pookela St & HSH Drwy																		
NB LT	7.4	0.0	A	0.0	0.0	A	7.5	0.0	A	7.4	0.0	A	7.6	0.0	A	7.4	0.0	A
EB U/LT	8.9	0.0	A	9.2	0.0	A	9.3	0.0	A	9.6	0.1	A	9.4	0.0	A	9.7	0.1	A
13: Ala Koolau & HSH Drwy																		
WB U/LT	9.3	0.1	A	9.2	0.0	A	9.6	0.1	A	9.7	0.0	A	10.1	0.1	B	10.3	0.1	B
SB LT	0.0	0.0	A	7.5	0.0	A	7.3	0.0	A	7.6	0.0	A	7.4	0.0	A	7.8	0.0	A

* Denotes overcapacity condition, v/c ≥ 1.0

** For analysis purposes, a "dummy" NBRT movement with no volume was added.

5. HSH MASTER PLAN DEVELOPMENT (FULL BUILDOUT) TRAFFIC CONDITIONS

While the focus and main intent of this study is on the first phase of the HSH Master Plan Development, the Master Plan full buildout is briefly discussed here to provide an understanding of a possible future scenario for the complete development. Numerous assumptions were made with regard to the ultimate buildout year, and land plans commensurate with the 2015 Master Plan Update and indefinite timing and details for future improvements. The full buildout scenario thus does not include a full analysis and only suggests potential preliminary improvements, which are subject to change. Separate or supplemental traffic impact studies are anticipated to be completed later for future improvements when their details and timing are known and identified.

5.1 Background

The 2015 HSH Plan Update proposes to replace and construct primarily four (4) buildings in addition to the new 144-bed New Patient Facility in the first phase and will include an additional 144-bed patient care facility in place of the existing Guensberg building, 72-bed patient care facility on the existing J-Pad site, 72-bed patient care facility in place of existing Building I, and Plant Operations building. Construction will occur over four (4) or more phases as the needs are justified and funding becomes available. There is no set timeline for the progression of these phases. For the purpose of this discussion, it is estimated that the full buildout of the HSH Master Plan will occur in year 2031, ten (10) years following the first phase.

5.2 Ambient Traffic

By year 2031, ambient traffic along Kahekili Highway is estimated to increase by approximately 14% over the first phase conditions. It is also assumed that by the full buildout of the HSH Master Plan, Phase 2 of the Kahekili Highway Widening and Interchange will be complete, widening Kahekili Highway from its existing two lanes to four lanes between Haiku Road and the northern intersection with Kamehameha Highway. This is anticipated to relieve the bottleneck in traffic during the currently congested AM and PM peak periods.

Both high school graduating seniors in the Windward area as well as enrollment at WCC is anticipated to decrease between 2016 to 2021[3]. It is conservatively anticipated that this trend will remain stagnant through 2031, thereby not contributing any additional traffic along Keaahala Road.

5.3 Trip Generation

The full buildout of the HSH Master Plan will increase the number of employees at HSH from 622 in the first phase to 1,214, which will almost double the number of staff. Similarly, this will result in nearly doubling the HSH-related traffic as well. See Table 5.1 for the Trip Generation projections for the Master Plan scenario.

[3] Source: http://www.hawaii.edu/cgi-bin/iro/maps?Epuhf16.pdf

Table 5.1: HSH Master Plan Generated Trips (Additional to First Phase)

Land Use Designation	Independent Variable	AM Peak Hour of Traffic		PM Peak Hour of Traffic	
		Enter (vph)	Exit (vph)	Enter (vph)	Exit (vph)
HSH Medical Buildings	592 Employees	195	43	27	203

5.4 Traffic Analysis

Although ambient traffic is projected to increase by approximately 14% over the first phase conditions, the Kahekili Highway Widening is anticipated to relieve the bottleneck in traffic during the currently congested AM and PM peak periods by increasing the capacity on Kahekili Highway between Haiku Road and the northern intersection with Kamehameha Highway. Northbound throughput along Kahekili Highway during the critical PM peak period is anticipated to improve over existing conditions with this widening.

With the doubling of HSH-generated traffic, the northbound and eastbound approaches at the Kahekili Highway/Keaahala Road intersection are anticipated to experience operational issues. It is anticipated that a second northbound left-turn lane (and additional receiving lane), a northbound right-turn lane, and signal timing optimization may be necessary for operations. Left-turn and right-turn storage lanes at the eastbound approach may also need to be lengthened to minimize queuing. Traffic at this intersection should be monitored and evaluated for improvements as HSH Master Plan phases progress due to potential fluctuations in traffic demand.

Keaahala Road is anticipated to experience an up to 34% increase in traffic over Future Year 2021; however, it is not anticipated to be problematic for operations except for potential queuing at the eastbound approach to the Kahekili Highway/Keaahala Road intersection.

6. VEHICULAR CIRCULATION

6.1 Existing Vehicular Circulation

The existing vehicular circulation condition at the HSH campus was documented by Brown & Caldwell. Figure 6.1 shows that all main roads (including Keaahala Road, Pookela Street, Pikake Road, and Ala Koolau Road) and minor roads that provide access to existing facilities are two-way roadways. The exception to this is the one-way access road off Keaahala Road between Pookela Street and the WCC Parking Lot and the one-way circulation road around the existing Goddard facility. Vehicles currently access the HSH campus via the main HSH entrance/exit along Ala Koolau Road, south of the Ala Koolau/HSH Driveway intersection. There were no observed operational issues at the main entrance/exit in existing conditions.

See Figure 6.1 for the existing site access and vehicular circulation.

6.2 Vehicular Circulation for Project (First Phase)

The existing site access and vehicular circulation will remain similar for first phase operations. The existing vehicular circulation is not anticipated to be significantly impacted due to the first phase.

Based on the publication Parking, published by the Eno Foundation for Transportation, typical maximum service rates for access points with no required stops are 700 vehicles per hour for entrances and 300 vehicles per hour for exits. As total inflow and total outflow during the peak hours of the first phase scenario do not exceed these maximums, HSH main entrance/exit is anticipated to operate adequately.

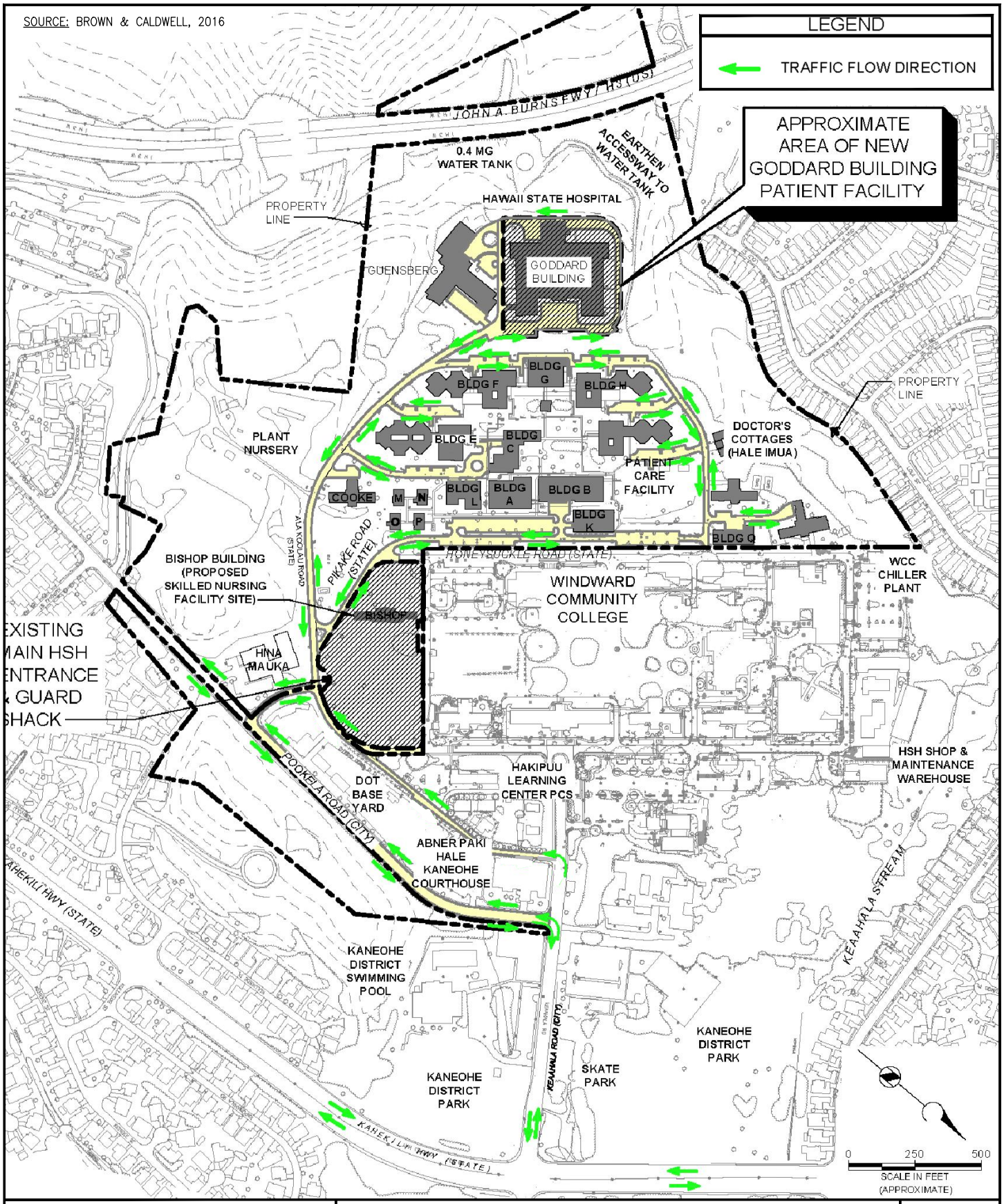
See Figure 6.2, 6.4, and 6.5 for the site access and vehicular circulation for the first phase.

6.3 Vehicular Circulation for HSH Master Plan Development (Full Buildout)

The existing site access and vehicular circulation will generally remain the same for the full HSH Master Plan buildout scenario. At full buildout, the access road around the Goddard and Guensberg facilities will continue to operate as a one-way, counter-clockwise circulation roadway; however, consideration should be taken to identify the need of a two-way roadway during the planning stages of the new Guensberg facility. The existing vehicular circulation is not anticipated to be significantly impacted due to full buildout; however, a traffic circulation study should be conducted to evaluate any areas where the traffic circulation may be problematic for pedestrians and bicyclists.

At full buildout, total outflow is anticipated to be 415 during the PM peak hour of traffic. Based on the publication Parking, this exceeds the maximum service rate of 300 vehicles per hour for exits. Therefore, the HSH main entrance/exit may potentially experience some operational issues in the full buildout of the HSH Master Plan during the PM peak hour.

See Figure 6.3, 6.4, and 6.5 for the site access and vehicular circulation for the full buildout.



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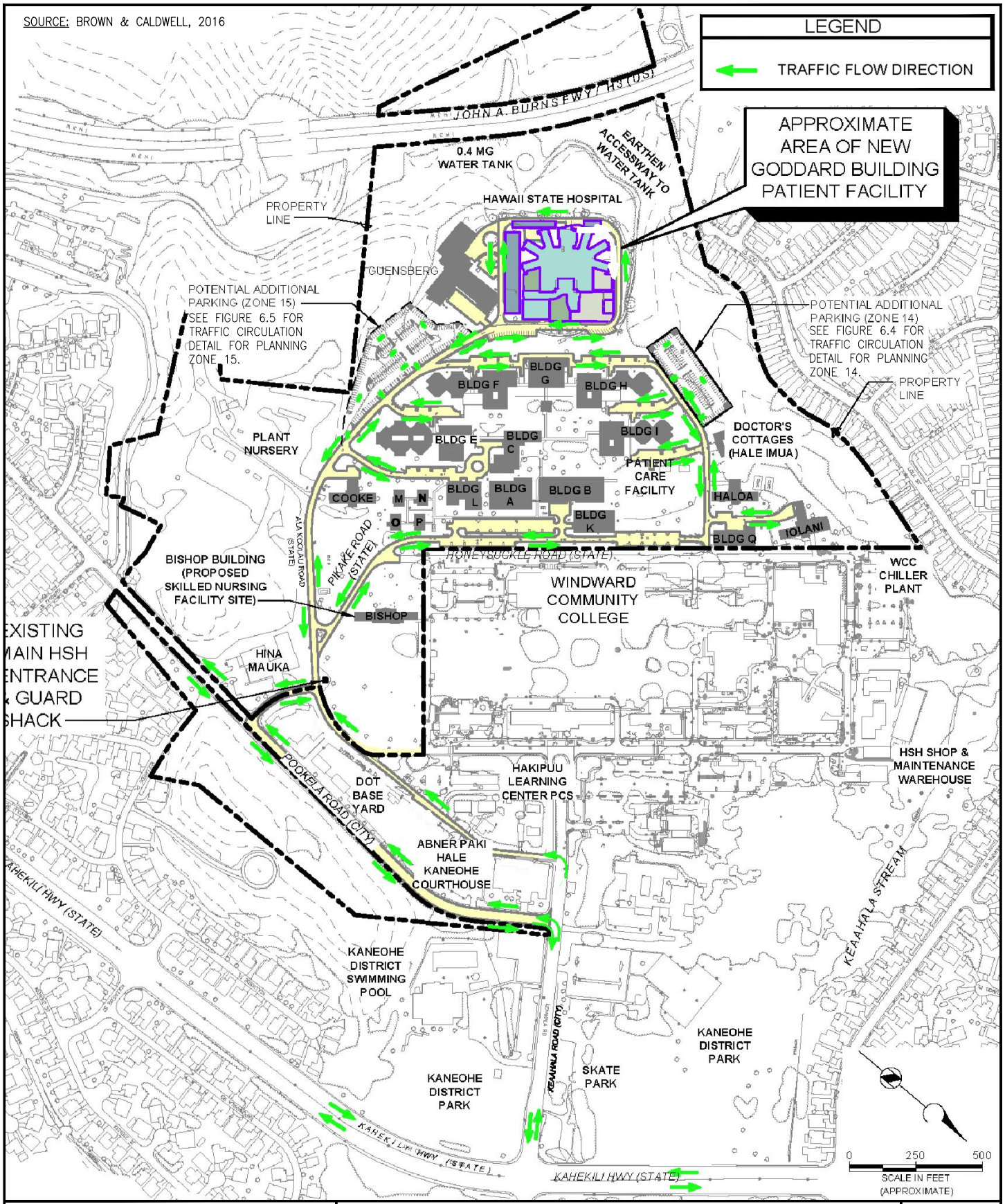
EXISTING SITE ACCESS AND VEHICULAR CIRCULATION

FIGURE 6.1



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PROJECT SITE ACCESS AND VEHICULAR CIRCULATION

FIGURE 6.2

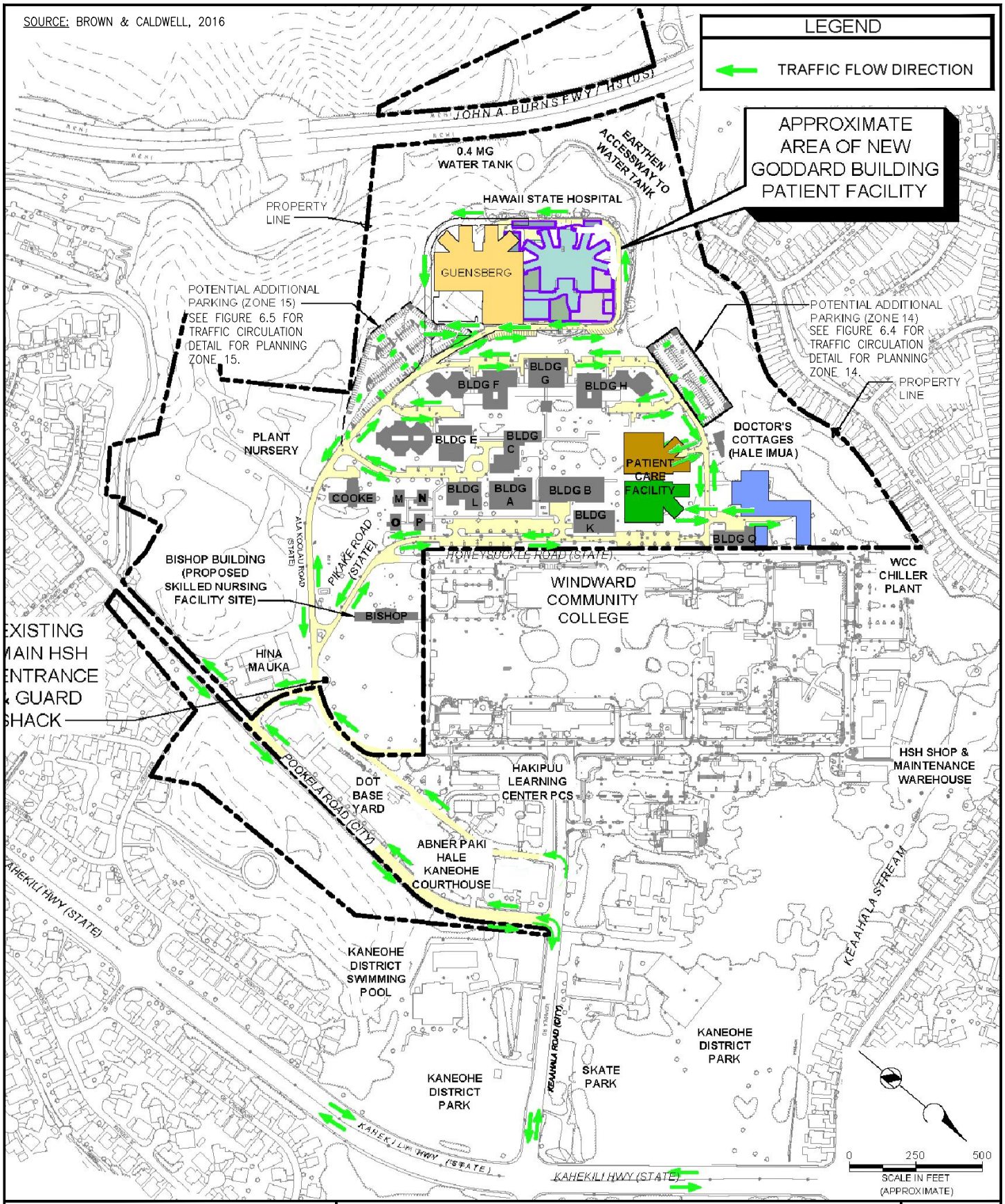

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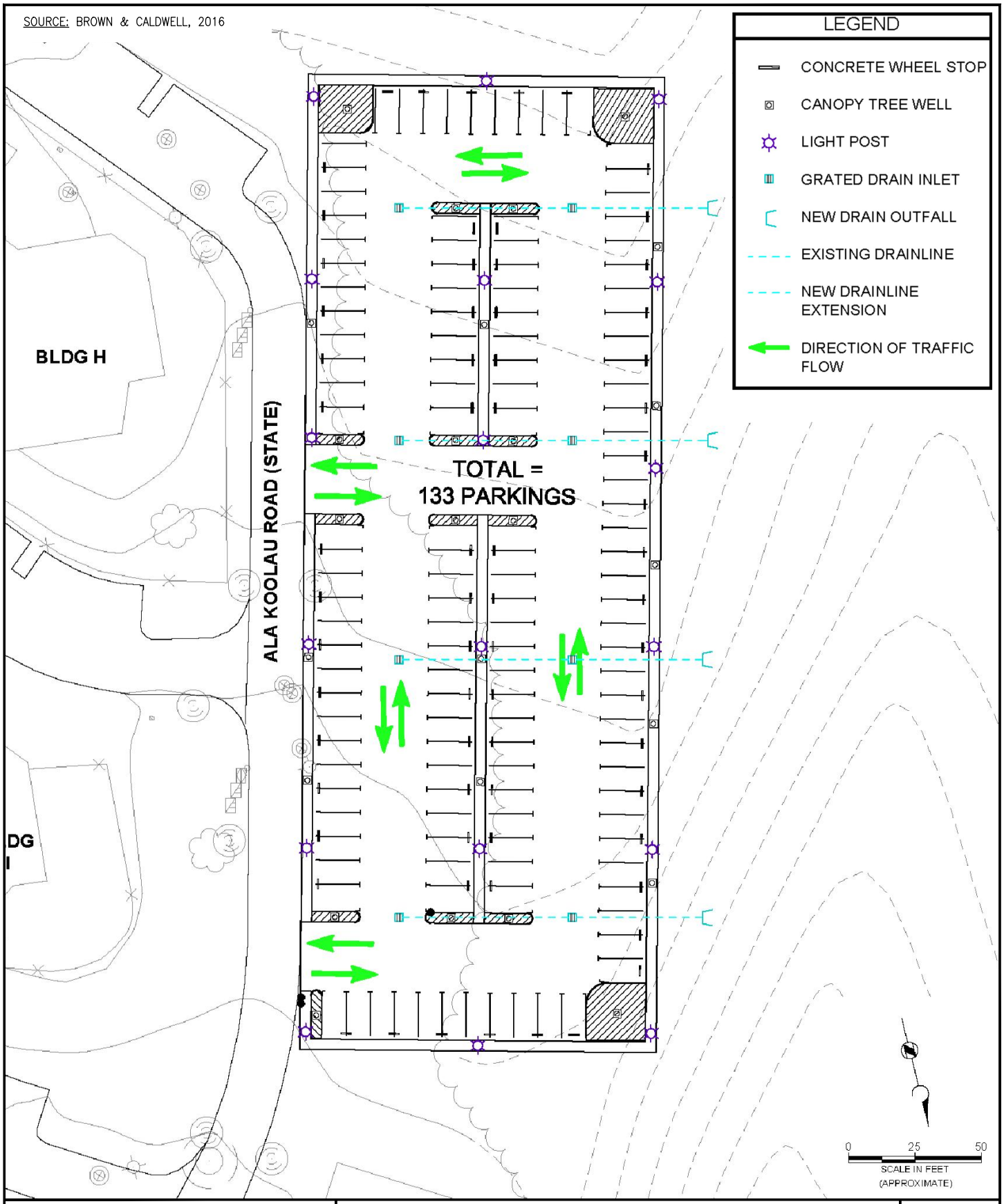
FIGURE 6.3

FULL BUILDOUT SITE ACCESS AND VEHICULAR CIRCULATION



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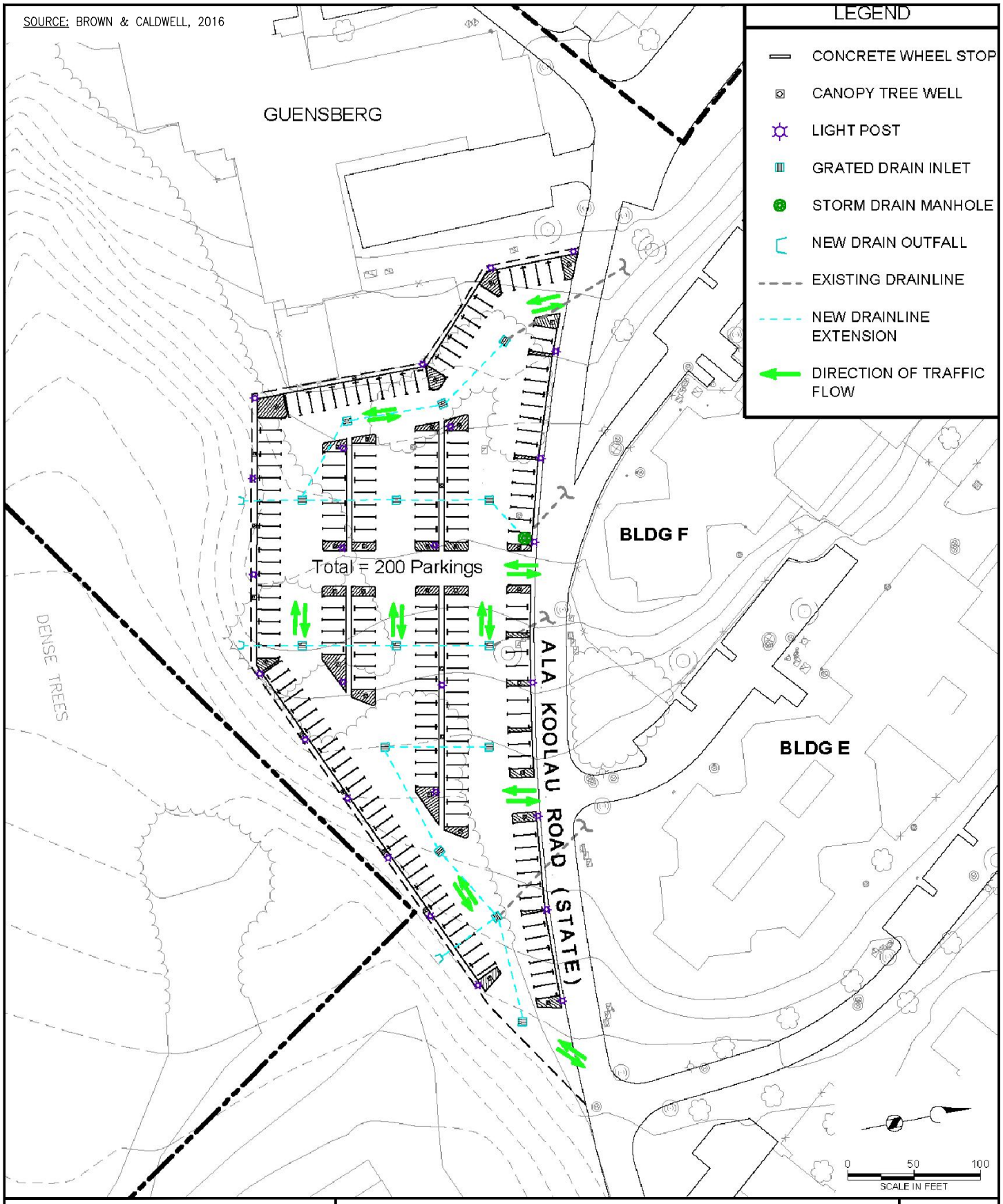
PLANNING ZONE 14 TRAFFIC CIRCULATION

FIGURE
6.4



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PLANNING ZONE 15 TRAFFIC CIRCULATION

FIGURE
6.5

7. PARKING ANALYSIS

In order to determine the parking demand within the HSH campus, 24-hour tube traffic count data was collected at various locations within the campus from Wednesday, April 27, 2016 to Friday, April 29, 2016. To supplement the 24-hour tube traffic count data, field observations were made to assess the parking stall need at each parking lot area at regular intervals on Wednesday, April 27, 2016.

7.1 Existing Parking Conditions

See Figure 7.1 for a map of the existing HSH campus parking areas. Based on the traffic count data and field observations, the HSH campus currently has 381 available parking stalls with some overflow parking on the lawn area near Patient Care Unit I. Majority of parking areas were observed to be near, at, or over capacity at some point of the day. The exception to this was the 51-parking stall lot north of the Admin/Rehab/Dietary building, the 19-parking stall lot fronting the Iolani building, and the 20-parking stall lot fronting the Patient Care Unit I, which were consistently observed to be under capacity throughout the day.

Generally, drivers appear to prefer to park in lots adjacent to their destination building. Although the 51-parking stall lot north of the Admin/Rehab/Dietary building was consistently under capacity and could accommodate more parked vehicles throughout the day, many parking lots were over capacity, with vehicles parked in unmarked stalls.

Due to the current overcapacity conditions of parking stall needs near the first phase, a shuttle service is currently shuttling employees from the 51-parking stall lot north of the Admin/Rehab/Dietary building, seen in Figure 7.1, to the existing Guensberg facility. This shuttle service is anticipated to be continued when the Project develops.

7.2 Parking Requirements for Project (First Phase)

Under the assumption that the first phase facilities will be similar to the existing Guensberg facility in use, staff, and parking requirements, the first phase parking stall requirements were determined by applying a ratio of the 70-bed Guensberg facility and its parking stall needs. To be conservative, it was assumed that all overflow parking in the 51-parking stall lot north of the Admin/Rehab/Dietary building was destined for the Guensberg facility.

Based on the aforementioned, it is estimated that the first phase will require approximately 208 parking stalls. To accommodate the existing overcapacity conditions of the Guensberg facility parking, an additional 47 stalls are recommended for the facility needs. Thus, 255 parking stalls should be planned to accommodate the first phase with the existing Guensberg facility.

It is anticipated that the shuttle service between the 51-parking stall lot north of the Admin/Rehab/Dietary building and the Project area will be continued beyond the development of the Project.

7.3 Parking Requirements for HSH Master Plan Development (Full Buildout)

Upon full buildout, the HSH will include a total of four (4) patient care facilities totaling 666 patient beds, 1,214 staff, and an assumed 37 visitors. Using the average of ratios comparing these metrics to the existing conditions, it is estimated that the HSH full buildout will require 1,357 parking stalls. However, the City and County of Honolulu, Plan Review Use (PRU) Application may ultimately establish parking stall requirements for the Project as determined and requested by the user, the DOH, and accepted and approved by the City Council. Separate or supplemental traffic impact and parking need studies are anticipated to be completed at a later date for future improvements when their details and timing are known and identified. See Table 7.1 for a summary of the parking stall requirements for the multiple scenarios.

Table 7.1: Parking Stall Requirement Summary

	Existing	**First Phase**	**Full Buildout with SNF**
Patient Beds	178	322	666
Staff	374	622	1,214
Visitors	10	18	37
Total Parking Stalls	381	636	1,357
Additional Parking Stalls Required (Based off Existing Stall Count)	n/a	255	976

Parking is anticipated to possibly be added in areas in the immediate vicinity of each future building improvement and/or in new parking lots (Planning Zones 14 and 15) as needed. Furthermore, DOH options for supplemental parking, as needed, include continues use of the J-Pad site and/or shared use of the asphalt concrete paved area currently used as the DOT-HWY Baseyard, with shuttle service to and from the New Patient Facility and other future improvements.

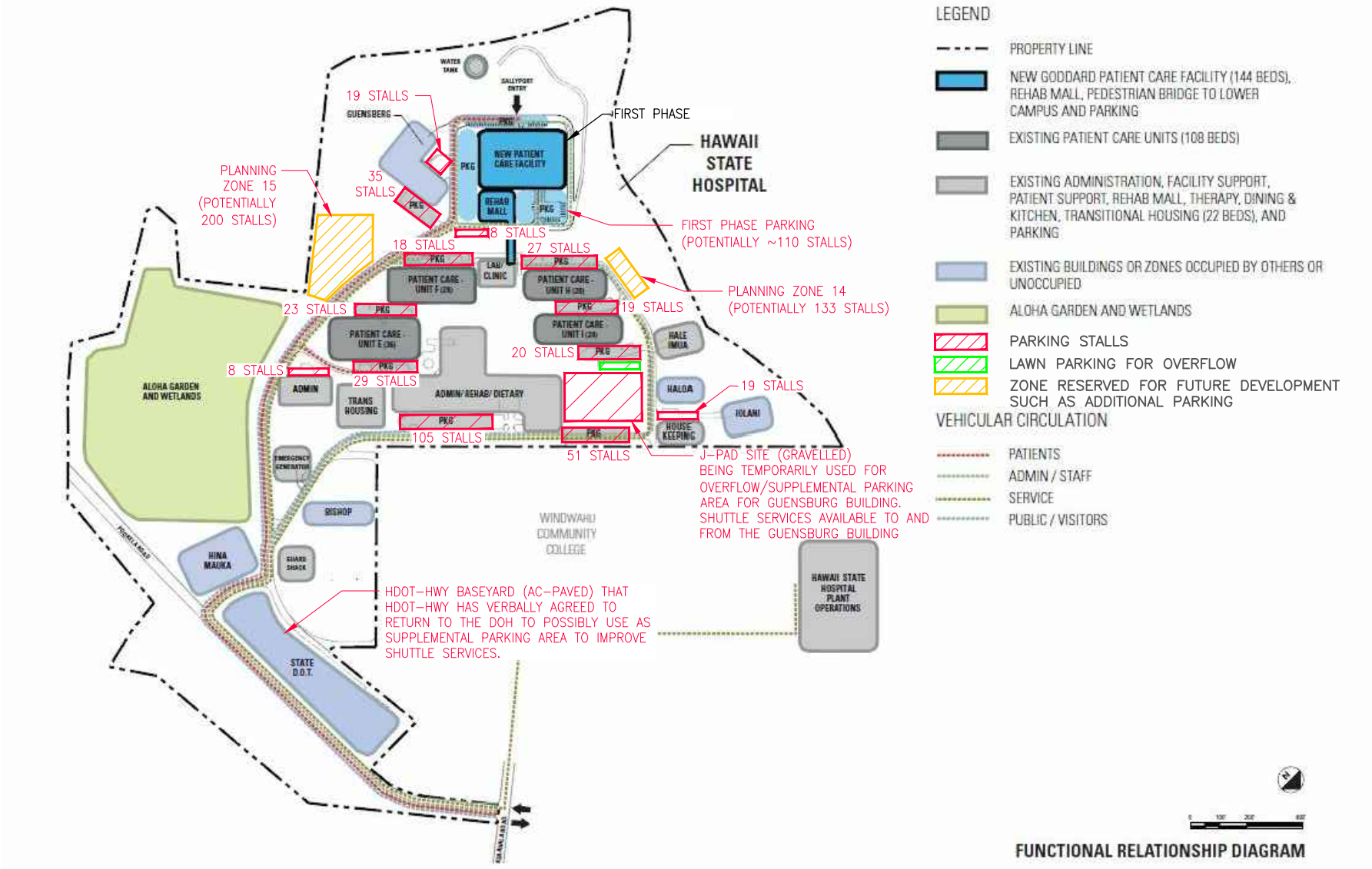

FIGURE ADAPTED FROM HAWAII STATE HOSPITAL 2015 MASTER PLAN UPDATE DATED AUGUST 28, 2015 PAGE 2-21

HAWAII STATE HOSPITAL, NEW PATIENT FACILITY AND CAMPUS MASTER PLAN DEVELOPMENT TIAR	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU,HAWAII EXISTING HSH PARKING AREAS	FIGURE 7.1

8. TRAVEL DEMAND MEASURES

Based on a report, *Mitigating Traffic Congestion – The Role of Demand-Side Strategies*, by The Association for Commuter Transportation, in partnership with the Federal Highway Administration (FHWA), transportation management programs that focused on information or promotion alone exhibited no measurable decrease in automobile trips. In contrast, programs that implemented financial incentives and/or other enhanced alternatives realized average reductions between 15-25 percent. Therefore, it is recommended that HSH consider a transportation allowance program that provides incentives to employees who utilize alternative modes of transportation. The following are various incentives to encourage transit, bicycle, and pedestrian travel to HSH:

- Bicycle parking and/or lockers
- Special events and promotions, including:
    - Bike-to-work day; and
    - Commuter fairs and other events
- Employee support, including:
    - Information packets – commuting to work;
    - Trip planning services
- Preferential parking for carpoolers
- Financial incentives, including:
    - Pre-tax transportation benefit – employees set aside a set amount of pre-tax income to pay for TheBus expenses or other transportation methods for comparable tax benefits.
    - Shared-cost transportation benefit – HSH shares a portion of expenses for TheBus or other transportation methods and employees set aside a set amount of pre-tax income to pay for the remaining expenses.

Precaution should be taken when recommending employees to switch to certain alternative modes of transportation due to the nature of the HSH Campus' environment and the services it provides.

9. CONCLUSION

The Project proposes to construct a new 144-bed New Patient Facility with a rehabilitation treatment mall within the HSH campus in Kaneohe. Vehicular access to the two (2) new parking lots will be from the main access to the HSH. The Project is anticipated to be completed and fully occupied by Year 2021.

9.1 2016 Existing Conditions

Hawaii State Hospital and Surrounding Land Uses

HSH currently generates approximately 150(145) trips during the AM(PM) peak hours of traffic; sole direct access is provided via Keaahala Road, which also provides sole access to:

- Windward Community College – Currently enrolls approximately 2,600 students which has generally remained stagnant between 2010 and 2015[4]
- Kaneohe District Courthouse – operational 7:45 AM to 4:30 PM, Monday through Friday, except State holidays.
- Hawaii Department of Transportation Kaneohe Baseyard – provides the Motorcycle Skill and Commercial Driver License test.
- Windward Comprehensive Health Center – provides education, support and promotion, and health care and social service referrals.
- Kaneohe District Park – includes a gymnasium, swimming pool, and baseball field.
- A residential neighborhood.

HSH on average accounts for approximately 24 percent of the traffic along Keaahala Road during the peak hours of traffic.

AM Peak Hour of Traffic (7:30-8:30 AM)

Traffic generally operated smoothly during the AM peak hour of traffic along Kahekili Highway and Kamehameha Highway, with the exception of Kahekili Highway/Haiku Road where the southbound through movement experiences long queue lengths due to the neckdown of Kahekili Highway to one lane in either direction. Some minor movements at the study intersections experience LOS F; however this generally occurs at low-volume approaches where LOS is caused by the time waiting between green lights.

LOS F conditions occurred at numerous minor movements throughout the study area, while Kahekili Highway operated at LOS D or better through the study area. Traffic along Keaahala Road did not experience congestion.

PM Peak Hour of Traffic (3:15-4:15 PM)

LOS F conditions occurred at numerous minor movements throughout the study area; Kahekili Highway operated at LOS D or better through the study area, with the exception being at the

[4] Source: http://www.hawaii.edu/cgi-bin/iro/maps?Epuhf16.pdf

Kahekili Highway/Likelike Highway intersection where Kahekili Highway's northbound approach operates at LOS F and overcapacity conditions.

No major delays or queues were observed at the unsignalized intersections or signalized intersection at the Kahekili Highway/Keaahala Road intersection. Traffic along Keaahala Road did not experience congestion.

It should be noted that congestion was observed to occur in the northbound direction along Kahekili Highway outside of the regional peak between 4:45 PM and 5:20 PM and is generally thought to be a result of the narrowing of Kahekili Highway from three (3) through lanes to one (1) lane in the northbound direction past Haiku Road. Queues were observed to extend to near Kulukeoe Street and at times, northbound traffic along Kahekili Highway was observed not to clear intersections within a single green light. The analyses in this report have therefore been calibrated to reflect the measured congested saturation flows along Kahekili Highway.

9.2 Base Year 2021 without the Project

Traffic growth in the study area was estimated for Year 2021 by using the historical HDOT count data, which resulted in an anticipated growth rate of approximately 1.2 percent per year. Nearby future developments that are assumed to be potentially completed by Year 2021 include the Skilled Nusing Facility.

All study intersections are forecast to operate with LOS similar to existing conditions, during the AM and PM peak hours of traffic. Due to physical limitations, only the intersection of Haiku Road/Kahekili Highway has a proposed mitigation.

9.3 Base Year 2021 with Mitigation

<u>Kahekili Highway & Haiku Road</u>

Split-phase signal timing was recommended for the Kahekili Highway/Haiku Road intersection during the AM and PM peak hours of traffic, due to the large imbalance of traffic volumes on the minor eastbound and westbound approaches as well as restriping the westbound through lane into a shared left-turn through lane.

With the mitigation, the Kahekili Highway/Haiku Road intersection will improve overall operations during the AM(PM) peak hour of traffic. All movements will operate within capacity; however, long delays will continue to be experienced for some movements.

9.4 Future Year 2021 with the Project

The Project currently plans to construct a new 144-bed New Patient Facility with a rehabilitation treatment mall within the HSH campus in Kaneohe. Vehicular access to the two (2) new potential parking lots (Planning Zones 14 and 15) will be from the main access to the Hawaii State Hospital. The Project is anticipated to generate approximately 107 AM peak hour trips and 101 PM peak hour trips. Due to minimal impacts generated by the Project, all study intersections are forecast to operate similarly to Base Year 2021 conditions, during the AM and PM peak hours of traffic. Therefore, no additional mitigation is recommended beyond Base Year 2021 conditions.

9.5 HSH Master Plan Development (Full Buildout) Traffic Conditions

The Hawaii State Hospital Master Plan proposes to replace and construct primarily four (4) buildings in addition to the new 144-bed New Patient Facility in the first phase and will include an additional 144-bed patient care facility in place of the existing Guensberg building, a 72-bed patient care facility on the existing J-Pad site, a 72-bed patient care facility in place of existing Building I, and a Plan Operations building. Construction will occur over four (4) or more phases as the needs are justified. The HSH Master Plan scenario is anticipated to generate approximately 238 AM peak hour trips and 230 PM peak hour trips.

The Kahekili Highway Widening is anticipated to relieve the bottleneck in traffic during the currently congested AM and PM peak periods by increasing the capacity on Kahekili Highway between Haiku Road and the northern intersection with Kamehameha Highway. Northbound throughput along Kahekili Highway during the critical PM peak period is anticipated to improve over existing conditions with this widening.

With the HSH Master Plan full buildout, it is anticipated that a second northbound left-turn lane (and additional receiving lane), a northbound right-turn lane, and signal timing optimization may be necessary for operations at the Kahekili Highway/Keaahala Road intersection. Left-turn and right-turn storage lanes at the eastbound approach may also need to be lengthened to minimize queuing. Traffic at this intersection should be monitored and evaluated for improvements as HSH Master Plan phases progress due to potential fluctuations in traffic demand.

Separate or supplemental traffic impact studies are anticipated to be completed at a later date for future improvements when their details and timing are known and identified.

9.6 Vehicular Circulation

The existing vehicular circulation provides two-way access for all main roads and minor roads. The exception to this is the one-way access road off Keaahala Road between Pookela Street and the WCC Parking lot and the one-way circulation road around the existing Goddard facility. Vehicles currently access the HSH campus via the main HSH entrance/exit along Ala Koolau Road. There were no observed operational issues at the main entrance in existing conditions.

The existing site access and vehicular circulation will remain similar for first phase operations and the HSH Master Plan full buildout scenario with one-way circulation planned around the Goddard and Guensberg facilities. Vehicular circulation is not anticipated to be significantly impacted due to the first phase or HSH Master Plan full buildout.

The main HSH entrance/exit is anticipated to operate adequately during the first phase operations but may experience some operational issues in the HSH Master Plan full buildout scenario during the PM peak hour of traffic.

Separate or supplemental traffic impact studies are anticipated to be completed at a later date for future improvements when their details and timing are known and identified.

9.7 Parking Analysis

Based on the traffic count data and field observations, the HSH campus currently has 381 available parking stalls with some overflow parking on the lawn area near Patient Care Unit I.

Majority of parking areas were observed to be near, at, or over capacity at some point of the day.

Due to the current overcapacity conditions of parking stall needs near the first phase development, a shuttle service currently transports employees from the 51-parking stall lot north of the Admin/Rehab/Dietary building to the existing Guensberg facility. This shuttle service is anticipated to be continued beyond the Project's development. Parking is anticipated to possibly be added in areas in the immediate vicinity of each future building improvements and/or in new parking lots (Planning Zone 14 and 15), as needed. Furthermore, DOH options for supplemental parking, as needed, include continued use of the J-Pad site and/or shared use of the asphalt concrete paved are currently used as the DOT-HWY Baseyard, with shuttle service to and from the New Patient Facility and other future improvements.

In order to accommodate the existing parking demands and future demands generated by the Project, the HSH is anticipated to require an additional 255 parking stalls for the first phase for a total of 636 parking stalls. It is estimated that the HSH full buildout will require a total of 1,357 parking stalls; however, the City and County of Honolulu, PRU Application may ultimately establish parking stall requirements for the facility as determined and requested by the user, the DOH, and accepted and approved by the City Council. Additionally, separate or supplemental traffic impact and parking need studies are anticipated to be completed at a later date for future improvements when their details and timings are known and identified.

9.8 Travel Demand Measures

The following travel demand measures can be considered by the DOH to help decrease automobile traffic into the HSH Campus:

- Bicycle parking and/or lockers
- Special events and promotions, including:
    - Bike-to-work day; and
    - Commuter fairs and other events
- Employee support, including:
    - Information packets – commuting to work;
    - Trip planning services
- Preferential parking for carpoolers
- Financial incentives, including:
    - Pre-tax transportation benefit – employees set aside a set amount of pre-tax income to pay for TheBus expenses or other transportation methods for comparable tax benefits.
    - Shared-cost transportation benefit – HSH shares a portion of expenses for TheBus or other transportation methods and employees set aside a set amount of pre-tax income to pay for the remaining expenses.

10. PROJECT RECOMMENDATIONS

Base Year 2021 With Mitigation

Kahekili Highway & Haiku Road

- Modify the intersection signal phasing to allow split phasing on the eastbound and westbound approaches.
- Remove the south crosswalk along Kahekili Highway to allow unimpeded westbound left-turns.
- Restripe the westbound through lane into a shared left-turn/through lane.

11. REFERENCES

1. Architects Hawaii, LLC, Hawaii State Hospital 2015 Master Plan Update, August 2015.
2. Department of Transportation Services City and County of Honolulu, Oahu Bike Plan: A Bicycle Master Plan, August 2012.
3. Institute of Transportation Engineers (ITE), Manual of Transportation Engineering Studies, 1994.
4. Transportation Research Board, Highway Capacity Manual, 2010.
5. Federal Highway Administration (FHWA), Manual on Uniform Traffic Control Devices (MUTCD), 2009
6. Weant and Levinson, Parking, 1990.

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A P P E N D I C E S

APPENDIX A

TRAFFIC COUNT DATA

Austin Tsutsumi & Associates

501 Sumner Street, Suite 521
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File Name : AM_Ala Koolau - HSH Dwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	Eastbound				HSH DWY Westbound				ALA KOOLAU Northbound				ALA KOOLAU Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	13	0	1	0	0	4	0	0	0	20	0	0	38
07:45 AM	0	0	0	0	10	0	0	0	0	6	2	0	0	28	0	0	46
Total	0	0	0	0	23	0	1	0	0	10	2	0	0	48	0	0	84
08:00 AM	0	0	0	0	8	0	1	0	0	5	1	0	0	19	0	0	34
08:15 AM	0	0	0	0	10	0	0	0	0	9	0	0	0	15	0	0	34
08:30 AM	0	0	0	0	2	0	0	0	0	8	1	0	1	7	0	0	19
08:45 AM	0	0	0	0	3	0	0	0	0	7	1	0	1	8	0	0	20
Total	0	0	0	0	23	0	1	0	0	29	3	0	2	49	0	0	107
09:00 AM	0	0	0	0	5	0	1	0	0	7	1	0	0	5	0	0	19
Grand Total	0	0	0	0	51	0	3	0	0	46	6	0	2	102	0	0	210
Apprch %	0	0	0	0	94.4	0	5.6	0	0	88.5	11.5	0	1.9	98.1	0	0	
Total %	0	0	0	0	24.3	0	1.4	0	0	21.9	2.9	0	1	48.6	0	0	

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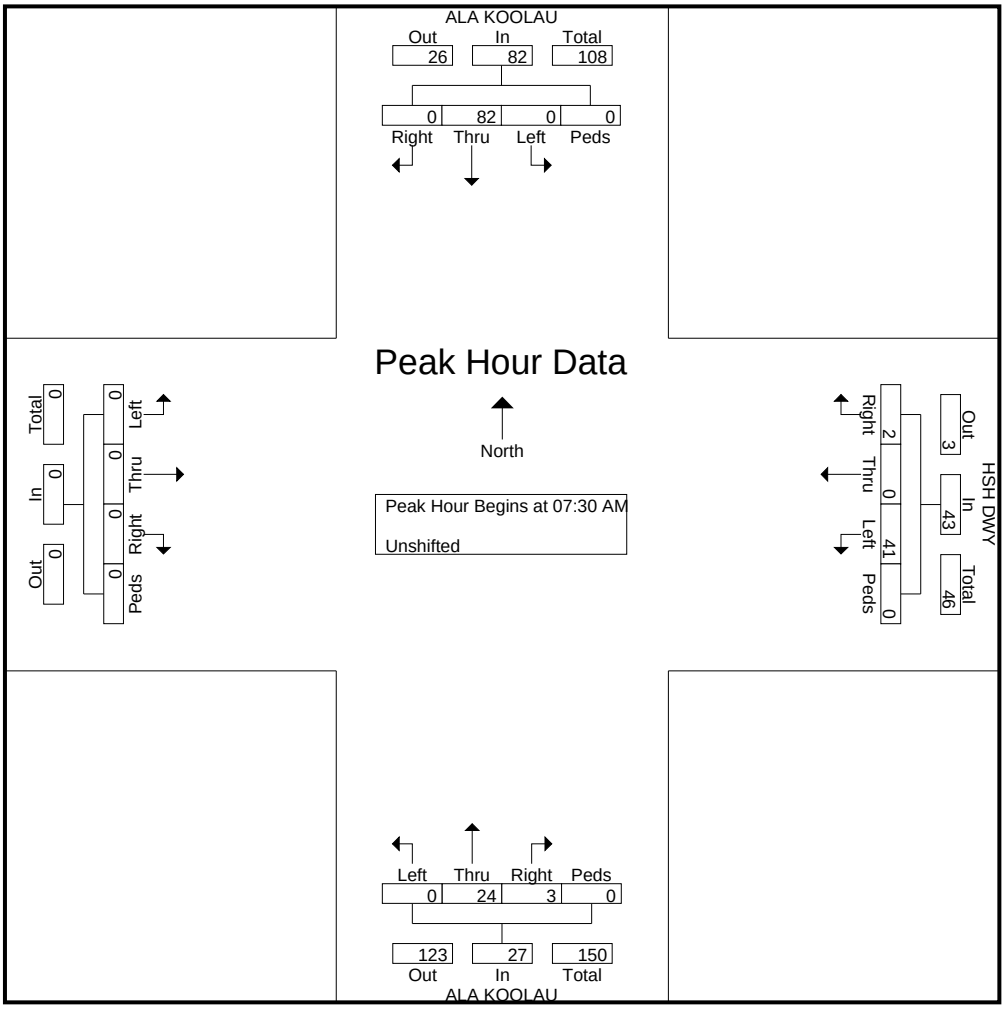
File Name : AM_Ala Koolau - HSH Dwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	Eastbound					HSH DWY Westbound					ALA KOOLAU Northbound					ALA KOOLAU Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 09:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	13	0	1	0	14	0	4	0	0	4	0	20	0	0	20	38
07:45 AM	0	0	0	0	0	10	0	0	0	10	0	6	2	0	8	0	28	0	0	28	46
08:00 AM	0	0	0	0	0	8	0	1	0	9	0	5	1	0	6	0	19	0	0	19	34
08:15 AM	0	0	0	0	0	10	0	0	0	10	0	9	0	0	9	0	15	0	0	15	34
Total Volume	0	0	0	0	0	41	0	2	0	43	0	24	3	0	27	0	82	0	0	82	152
% App. Total	0	0	0	0		95.3	0	4.7	0		0	88.9	11.1	0		0	100	0	0		
PHF	.000	.000	.000	.000	.000	.788	.000	.500	.000	.768	.000	.667	.375	.000	.750	.000	.732	.000	.000	.732	.826



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File Name : AM_Kahekili Hwy - Haiku Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	HAIKU RD Eastbound				HAIKU RD Westbound				KAHEKILI HWY Northbound				KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	7	21	46	0	133	21	23	0	3	118	54	1	40	268	12	0	747
07:30 AM	7	26	35	2	122	24	26	1	4	138	56	0	39	251	8	0	739
07:45 AM	4	25	24	2	102	28	47	0	16	137	57	0	48	240	9	0	739
Total	18	72	105	4	357	73	96	1	23	393	167	1	127	759	29	0	2225
08:00 AM	9	17	23	2	85	10	48	0	19	145	46	2	33	238	9	0	686
08:15 AM	6	12	13	1	72	15	39	1	8	134	40	1	57	280	6	1	686
08:30 AM	4	19	20	1	61	4	33	1	12	169	47	0	50	270	7	0	698
08:45 AM	3	10	16	0	66	8	34	0	11	148	42	0	40	212	5	0	595
Total	22	58	72	4	284	37	154	2	50	596	175	3	180	1000	27	1	2665
09:00 AM	3	7	22	2	51	10	32	1	8	168	32	0	43	214	4	0	597
Grand Total	43	137	199	10	692	120	282	4	81	1157	374	4	350	1973	60	1	5487
Apprch %	11.1	35.2	51.2	2.6	63	10.9	25.7	0.4	5	71.6	23.1	0.2	14.7	82.8	2.5	0	
Total %	0.8	2.5	3.6	0.2	12.6	2.2	5.1	0.1	1.5	21.1	6.8	0.1	6.4	36	1.1	0	

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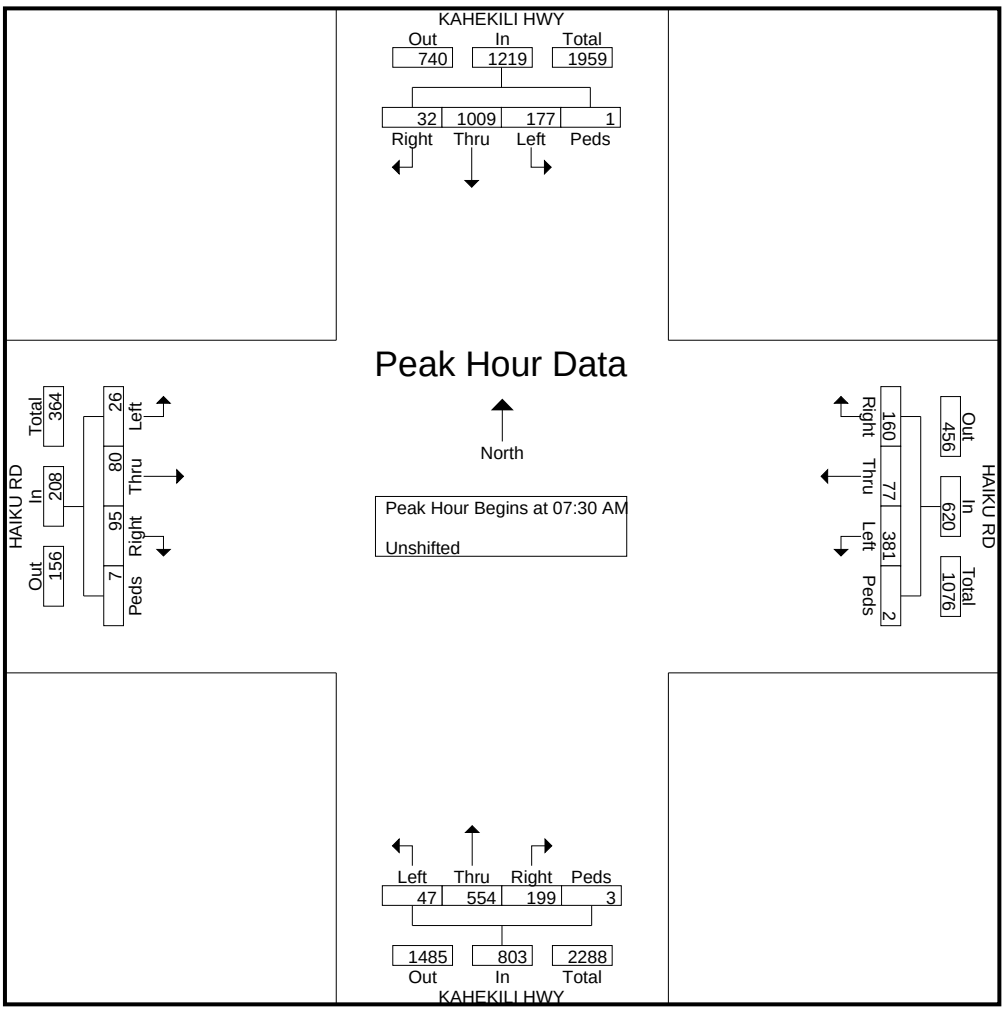
File Name : AM_Kahekili Hwy - Haiku Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	HAIKU RD Eastbound					HAIKU RD Westbound					KAHEKILI HWY Northbound					KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	7	26	35	2	70	122	24	26	1	173	4	138	56	0	198	39	251	8	0	298	739
07:45 AM	4	25	24	2	55	102	28	47	0	177	16	137	57	0	210	48	240	9	0	297	739
08:00 AM	9	17	23	2	51	85	10	48	0	143	19	145	46	2	212	33	238	9	0	280	686
08:15 AM	6	12	13	1	32	72	15	39	1	127	8	134	40	1	183	57	280	6	1	344	686
Total Volume	26	80	95	7	208	381	77	160	2	620	47	554	199	3	803	177	1009	32	1	1219	2850
% App. Total	12.5	38.5	45.7	3.4		61.5	12.4	25.8	0.3		5.9	69	24.8	0.4		14.5	82.8	2.6	0.1		
PHF	.722	.769	.679	.875	.743	.781	.688	.833	.500	.876	.618	.955	.873	.375	.947	.776	.901	.889	.250	.886	.964



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File Name : AM_Kahekili Hwy - Kahuhipa St
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KAHUHIPA ST Eastbound				KAHUHIPA ST Westbound				KAHEKILI HWY Northbound				KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	2	3	60	0	86	12	5	2	22	174	72	1	7	425	3	4	878
07:30 AM	5	7	72	0	76	10	5	2	40	178	74	2	10	414	1	2	898
07:45 AM	3	18	61	2	86	9	2	3	42	184	87	1	13	369	3	2	885
Total	10	28	193	2	248	31	12	7	104	536	233	4	30	1208	7	8	2661
08:00 AM	2	15	43	1	58	4	4	1	26	177	73	3	19	325	2	3	756
08:15 AM	3	7	45	0	54	4	5	0	30	180	76	2	14	340	2	4	766
08:30 AM	1	8	31	2	55	3	8	2	14	189	82	1	23	301	1	3	724
08:45 AM	0	7	35	1	67	5	11	1	15	186	66	1	19	275	2	2	693
Total	6	37	154	4	234	16	28	4	85	732	297	7	75	1241	7	12	2939
09:00 AM	0	5	29	3	51	2	5	2	13	182	60	2	18	269	1	2	644
Grand Total	16	70	376	9	533	49	45	13	202	1450	590	13	123	2718	15	22	6244
Apprch %	3.4	14.9	79.8	1.9	83.3	7.7	7	2	9	64.3	26.2	0.6	4.3	94.4	0.5	0.8	
Total %	0.3	1.1	6	0.1	8.5	0.8	0.7	0.2	3.2	23.2	9.4	0.2	2	43.5	0.2	0.4	

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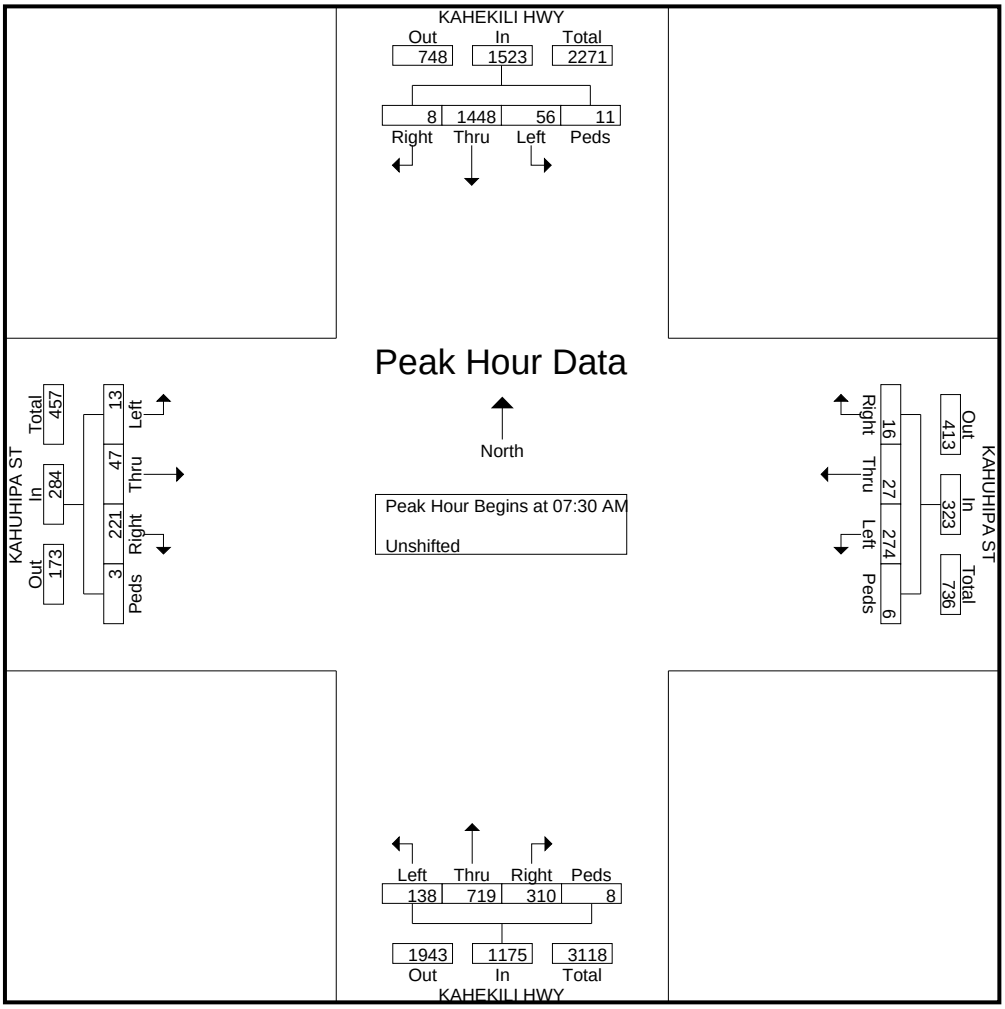
File Name : AM_Kahekili Hwy - Kahuhipa St
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KAHUHIPA ST Eastbound					KAHUHIPA ST Westbound					KAHEKILI HWY Northbound					KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	5	7	72	0	84	76	10	5	2	93	40	178	74	2	294	10	414	1	2	427	898
07:45 AM	3	18	61	2	84	86	9	2	3	100	42	184	87	1	314	13	369	3	2	387	885
08:00 AM	2	15	43	1	61	58	4	4	1	67	26	177	73	3	279	19	325	2	3	349	756
08:15 AM	3	7	45	0	55	54	4	5	0	63	30	180	76	2	288	14	340	2	4	360	766
Total Volume	13	47	221	3	284	274	27	16	6	323	138	719	310	8	1175	56	1448	8	11	1523	3305
% App. Total	4.6	16.5	77.8	1.1		84.8	8.4	5	1.9		11.7	61.2	26.4	0.7		3.7	95.1	0.5	0.7		
PHF	.650	.653	.767	.375	.845	.797	.675	.800	.500	.808	.821	.977	.891	.667	.936	.737	.874	.667	.688	.892	.920



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File Name : AM_Kahekili Hwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				KAHEKILI HWY Northbound				KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	9	3	11	0	58	12	9	0	34	258	10	0	16	478	17	0	915
07:30 AM	3	11	17	0	34	15	17	0	64	271	18	0	24	487	51	0	1012
07:45 AM	10	6	11	0	39	20	11	0	82	306	11	0	30	456	30	0	1012
Total	22	20	39	0	131	47	37	0	180	835	39	0	70	1421	98	0	2939
08:00 AM	8	10	25	0	47	25	8	0	92	310	12	0	18	374	34	0	963
08:15 AM	15	10	13	0	25	34	9	2	88	237	14	0	13	359	42	2	863
08:30 AM	13	16	18	0	26	21	13	0	66	260	11	0	16	353	35	1	849
08:45 AM	17	7	16	2	30	14	8	0	47	247	17	1	23	334	24	3	790
Total	53	43	72	2	128	94	38	2	293	1054	54	1	70	1420	135	6	3465
09:00 AM	18	10	16	2	26	17	15	0	45	222	11	0	14	318	21	0	735
Grand Total	93	73	127	4	285	158	90	2	518	2111	104	1	154	3159	254	6	7139
Apprch %	31.3	24.6	42.8	1.3	53.3	29.5	16.8	0.4	18.9	77.2	3.8	0	4.3	88.4	7.1	0.2	
Total %	1.3	1	1.8	0.1	4	2.2	1.3	0	7.3	29.6	1.5	0	2.2	44.2	3.6	0.1	

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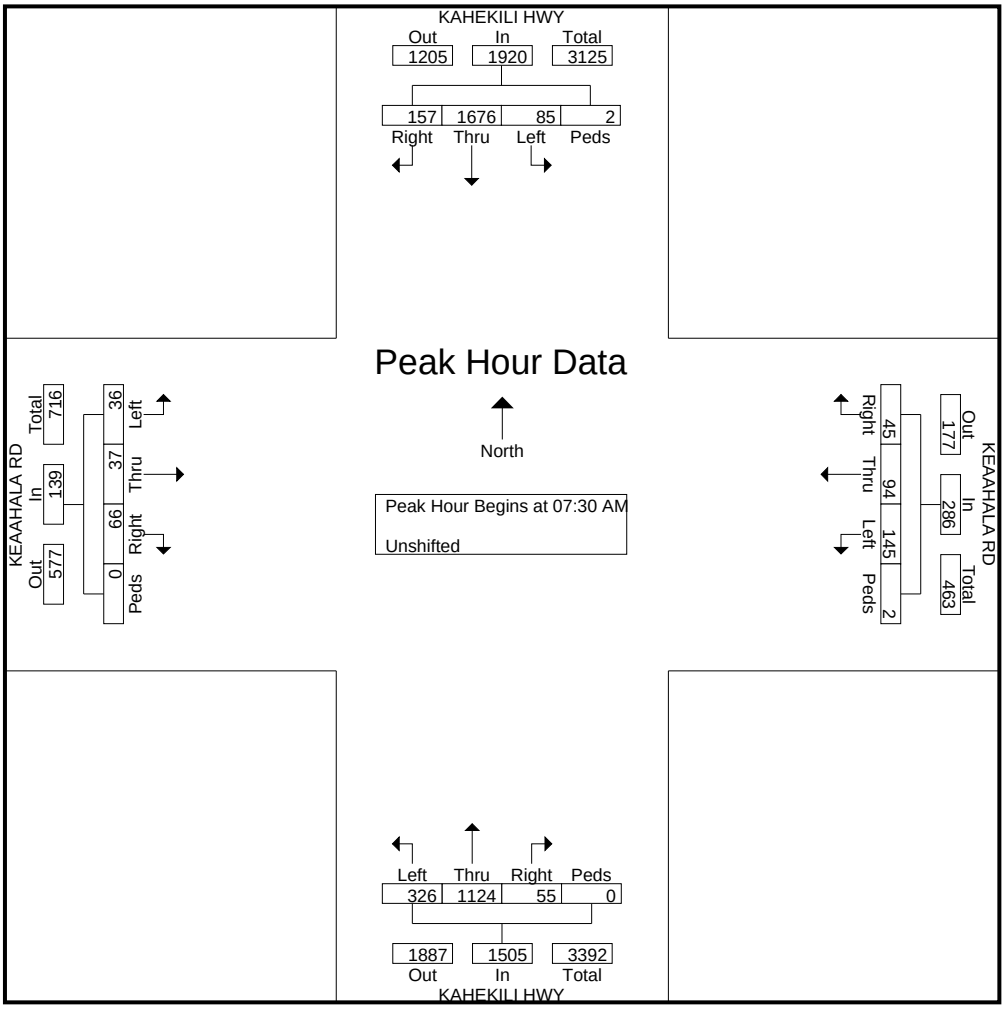
File Name : AM_Kahekili Hwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					KAHEKILI HWY Northbound					KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	3	11	17	0	31	34	15	17	0	66	64	271	18	0	353	24	487	51	0	562	1012
07:45 AM	10	6	11	0	27	39	20	11	0	70	82	306	11	0	399	30	456	30	0	516	1012
08:00 AM	8	10	25	0	43	47	25	8	0	80	92	310	12	0	414	18	374	34	0	426	963
08:15 AM	15	10	13	0	38	25	34	9	2	70	88	237	14	0	339	13	359	42	2	416	863
Total Volume	36	37	66	0	139	145	94	45	2	286	326	1124	55	0	1505	85	1676	157	2	1920	3850
% App. Total	25.9	26.6	47.5	0		50.7	32.9	15.7	0.7		21.7	74.7	3.7	0		4.4	87.3	8.2	0.1		
PHF	.600	.841	.660	.000	.808	.771	.691	.662	.250	.894	.886	.906	.764	.000	.909	.708	.860	.770	.250	.854	.951



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File Name : AM_Kahekili Hwy - Kulukeoe St
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KULUKEOE ST Eastbound				KULUKEOE ST Westbound				KAHEKILI HWY Northbound					KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	U-Turn	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	4	5	3	0	16	3	11	0	2	287	9	0	0	18	584	0	0	942
07:30 AM	3	4	6	0	14	0	18	0	1	329	10	1	0	34	522	0	0	942
07:45 AM	5	6	0	0	16	2	20	1	0	374	8	1	0	36	477	1	0	947
Total	12	15	9	0	46	5	49	1	3	990	27	2	0	88	1583	1	0	2831
08:00 AM	4	2	4	0	15	4	20	0	0	342	14	2	0	27	462	3	0	899
08:15 AM	2	0	3	0	9	0	12	1	4	356	7	2	0	15	442	0	0	853
08:30 AM	2	2	5	0	13	1	8	0	1	327	2	0	0	9	398	4	0	772
08:45 AM	3	1	5	0	4	3	4	0	1	308	7	3	0	23	346	1	0	709
Total	11	5	17	0	41	8	44	1	6	1333	30	7	0	74	1648	8	0	3233
09:00 AM	0	2	2	1	4	3	1	0	3	315	7	1	0	12	376	3	0	730
Grand Total	23	22	28	1	91	16	94	2	12	2638	64	10	0	174	3607	12	0	6794
Apprch %	31.1	29.7	37.8	1.4	44.8	7.9	46.3	1	0.4	96.8	2.3	0.4	0	4.6	95.1	0.3	0	
Total %	0.3	0.3	0.4	0	1.3	0.2	1.4	0	0.2	38.8	0.9	0.1	0	2.6	53.1	0.2	0	

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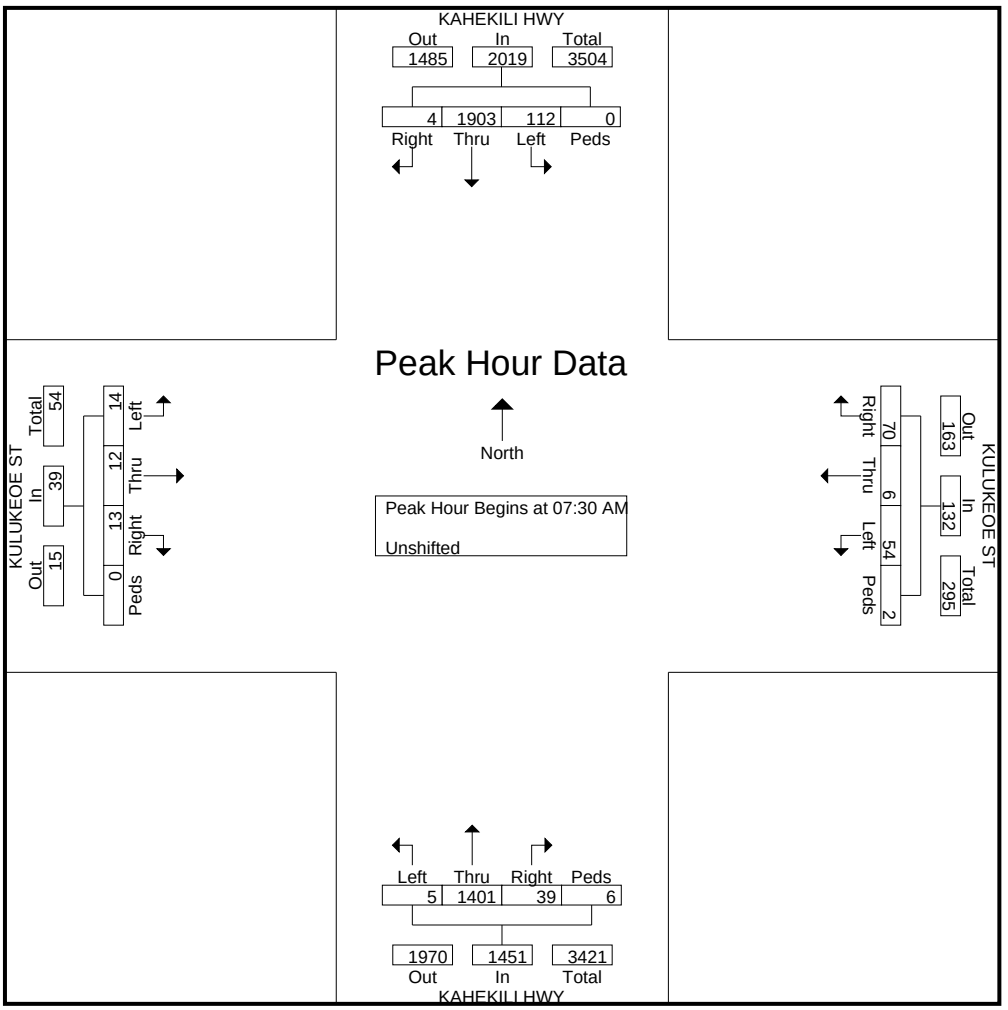
File Name : AM_Kahekili Hwy - Kulukeoe St
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KULUKEOE ST Eastbound					KULUKEOE ST Westbound					KAHEKILI HWY Northbound						KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 07:30 AM																						
07:30 AM	3	4	6	0	13	14	0	18	0	32	1	329	10	1	0	341	34	522	0	0	556	942
07:45 AM	5	6	0	0	11	16	2	20	1	39	0	374	8	1	0	383	36	477	1	0	514	947
08:00 AM	4	2	4	0	10	15	4	20	0	39	0	342	14	2	0	358	27	462	3	0	492	899
08:15 AM	2	0	3	0	5	9	0	12	1	22	4	356	7	2	0	369	15	442	0	0	457	853
Total Volume	14	12	13	0	39	54	6	70	2	132	5	1401	39	6	0	1451	112	1903	4	0	2019	3641
% App. Total	35.9	30.8	33.3			40.9						96.6						94.3				
PHF	.700	.500	.542	.000		.844	.375	.875	.500	.846	.313	.936	.696	.750	.000		.778	.911	.333	.000		



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File Name : AM_Kahekili Hwy - Likelike Hwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	LIKELIKE HWY Eastbound				LIKELIKE HWY Westbound				KAHEKILI HWY Northbound				KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	0	295	0	0	0	266	96	0	0	205	0	0	0	154	509	0	1525
07:30 AM	0	267	0	0	0	269	117	0	0	243	0	0	0	183	387	0	1466
07:45 AM	0	256	0	0	0	232	167	0	0	217	0	0	0	133	379	0	1384
Total	0	818	0	0	0	767	380	0	0	665	0	0	0	470	1275	0	4375
08:00 AM	0	193	0	0	0	243	157	0	0	181	0	0	0	85	402	0	1261
08:15 AM	0	205	0	0	0	189	143	0	0	236	0	0	0	93	351	0	1217
08:30 AM	0	215	0	0	0	171	122	0	0	187	0	0	0	69	274	0	1038
08:45 AM	0	202	0	0	0	164	116	0	0	235	0	0	0	107	287	0	1111
Total	0	815	0	0	0	767	538	0	0	839	0	0	0	354	1314	0	4627
09:00 AM	0	188	0	0	0	141	102	0	0	192	0	0	0	75	283	0	981
Grand Total	0	1821	0	0	0	1675	1020	0	0	1696	0	0	0	899	2872	0	9983
Apprch %	0	100	0	0	0	62.2	37.8	0	0	100	0	0	0	23.8	76.2	0	
Total %	0	18.2	0	0	0	16.8	10.2	0	0	17	0	0	0	9	28.8	0	

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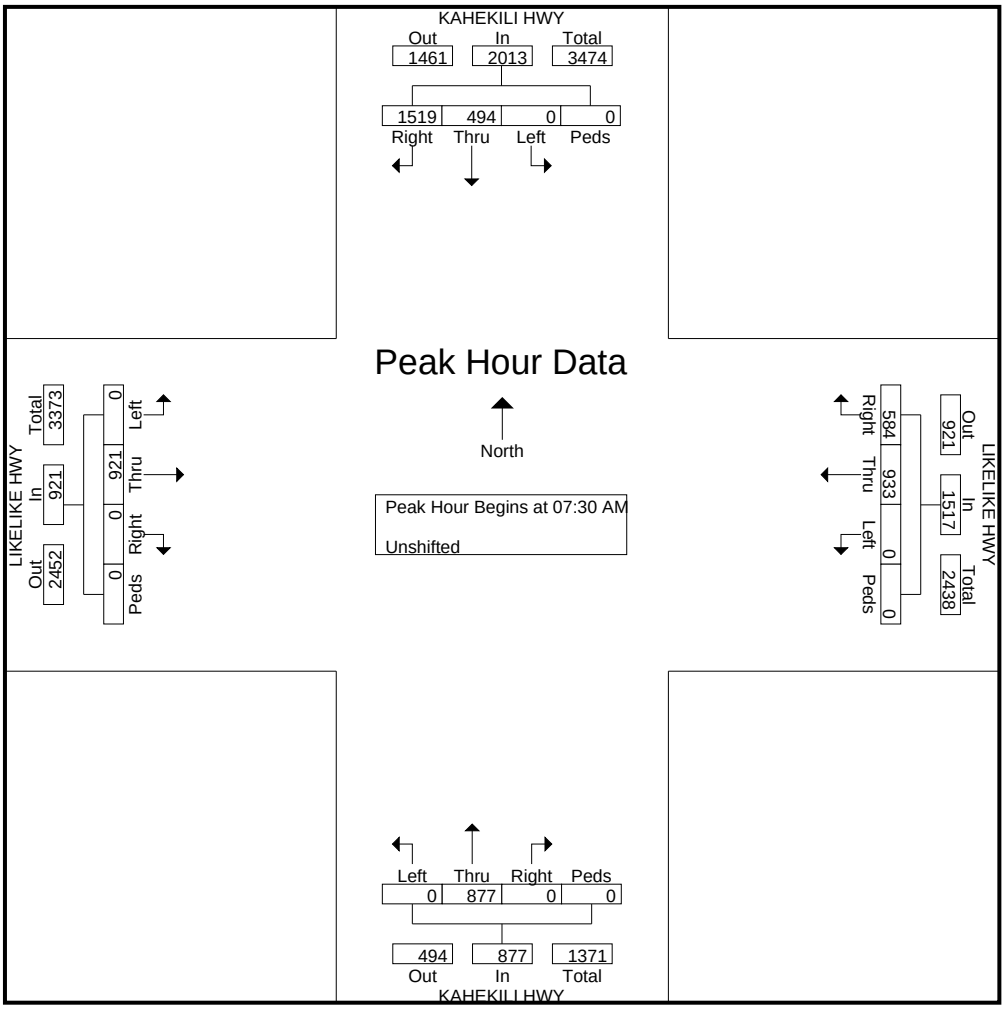
File Name : AM_Kahekili Hwy - Likelike Hwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	LIKELIKE HWY Eastbound					LIKELIKE HWY Westbound					KAHEKILI HWY Northbound					KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	267	0	0	267	0	269	117	0	386	0	243	0	0	243	0	183	387	0	570	1466
07:45 AM	0	256	0	0	256	0	232	167	0	399	0	217	0	0	217	0	133	379	0	512	1384
08:00 AM	0	193	0	0	193	0	243	157	0	400	0	181	0	0	181	0	85	402	0	487	1261
08:15 AM	0	205	0	0	205	0	189	143	0	332	0	236	0	0	236	0	93	351	0	444	1217
Total Volume	0	921	0	0	921	0	933	584	0	1517	0	877	0	0	877	0	494	1519	0	2013	5328
% App. Total																					
PHF	.000	.862	.000	.000	.862	.000	.867	.874	.000	.948	.000	.902	.000	.000	.902	.000	.675	.945	.000	.883	.909



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File Name : AM_Kamehameha Hwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				KAMEHAMEHA HWY Northbound				KAMEHAMEHA HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	9	6	12	2	26	24	5	0	9	144	13	0	2	248	19	2	521
07:30 AM	19	11	16	3	29	28	16	0	15	235	18	1	6	297	30	1	725
07:45 AM	10	12	9	2	30	28	3	7	24	275	32	11	9	289	46	2	789
Total	38	29	37	7	85	80	24	7	48	654	63	12	17	834	95	5	2035
08:00 AM	15	14	13	5	16	22	9	7	22	238	21	2	5	216	35	5	645
08:15 AM	18	13	17	0	24	20	9	3	15	184	22	1	7	202	28	1	564
08:30 AM	19	4	13	0	14	17	6	1	22	180	17	1	6	201	15	0	516
08:45 AM	14	8	16	4	9	17	19	2	6	188	21	2	10	206	34	2	558
Total	66	39	59	9	63	76	43	13	65	790	81	6	28	825	112	8	2283
09:00 AM	14	8	11	1	13	19	6	2	8	193	13	4	6	173	19	1	491
Grand Total	118	76	107	17	161	175	73	22	121	1637	157	22	51	1832	226	14	4809
Apprch %	37.1	23.9	33.6	5.3	37.4	40.6	16.9	5.1	6.2	84.5	8.1	1.1	2.4	86.3	10.6	0.7	
Total %	2.5	1.6	2.2	0.4	3.3	3.6	1.5	0.5	2.5	34	3.3	0.5	1.1	38.1	4.7	0.3	

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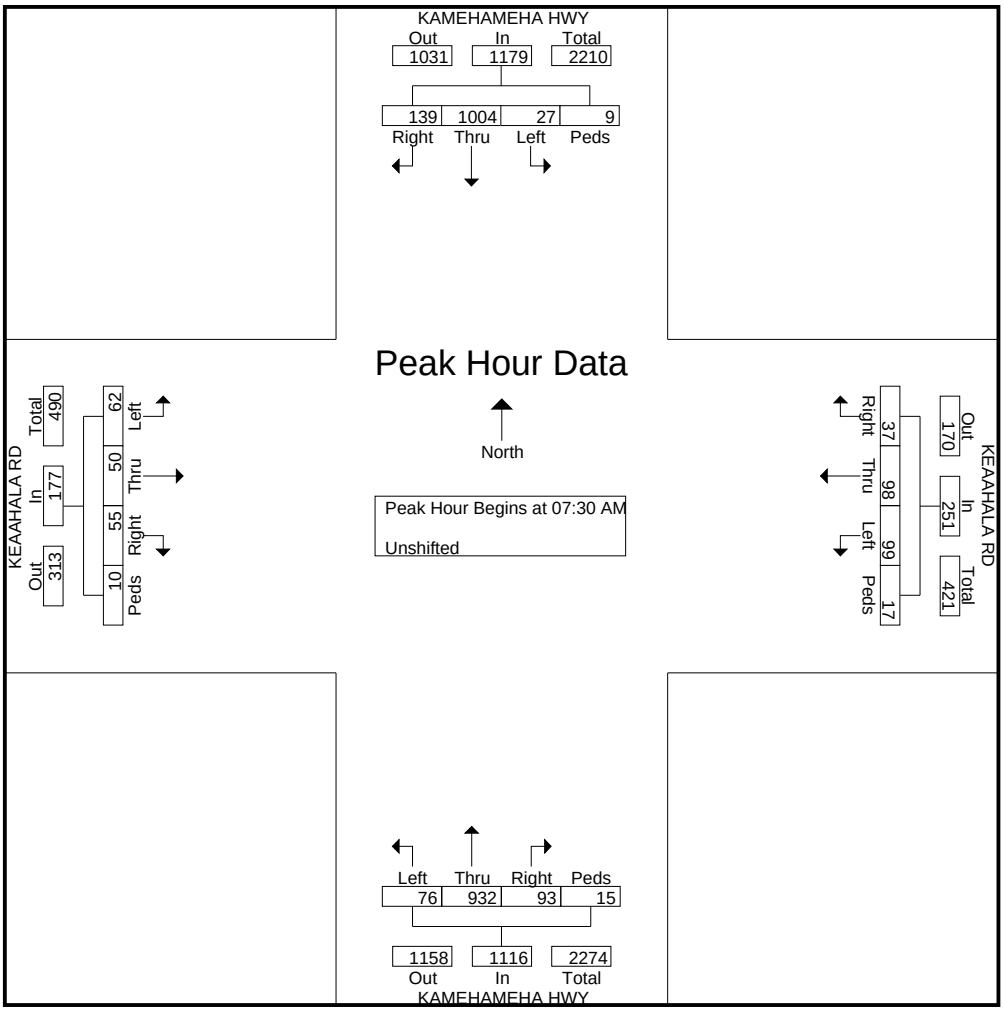
File Name : AM_Kamehameha Hwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					KAMEHAMEHA HWY Northbound					KAMEHAMEHA HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 09:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	**19**	11	16	3	**49**	29	**28**	**16**	0	**73**	15	235	18	1	269	6	**297**	30	1	334	725
07:45 AM	10	12	9	2	33	**30**	28	3	**7**	68	**24**	**275**	**32**	**11**	**342**	**9**	289	**46**	2	**346**	**789**
08:00 AM	15	**14**	13	**5**	47	16	22	9	7	54	22	238	21	2	283	5	216	35	**5**	261	645
08:15 AM	18	13	**17**	0	48	24	20	9	3	56	15	184	22	1	222	7	202	28	1	238	564
Total Volume	62	50	55	10	177	99	98	37	17	251	76	932	93	15	1116	27	1004	139	9	1179	2723
% App. Total	35	28.2	31.1	5.6		39.4	39	14.7	6.8		6.8	83.5	8.3	1.3		2.3	85.2	11.8	0.8		
PHF	.816	.893	.809	.500	.903	.825	.875	.578	.607	.860	.792	.847	.727	.341	.816	.750	.845	.755	.450	.852	.863



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File Name : AM_Kaneohe District Park Dwy 1 - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				KANEOHE DISTRICT PARK DWY 1 Northbound				Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	0	26	0	0	2	63	0	0	0	0	1	0	0	0	0	0	92
07:30 AM	0	29	0	0	6	109	0	0	0	0	1	0	0	0	0	0	145
07:45 AM	0	26	0	0	7	144	0	0	0	0	5	0	0	0	0	0	182
Total	0	81	0	0	15	316	0	0	0	0	7	0	0	0	0	0	419
08:00 AM	0	43	0	0	16	150	0	0	2	0	11	0	0	0	0	0	222
08:15 AM	0	33	0	0	14	180	0	0	2	0	7	0	0	0	0	0	236
08:30 AM	0	50	0	0	10	120	0	0	1	0	9	0	0	0	0	0	190
08:45 AM	0	42	0	0	3	89	0	0	1	0	7	0	0	0	0	0	142
Total	0	168	0	0	43	539	0	0	6	0	34	0	0	0	0	0	790
09:00 AM	0	39	0	0	5	85	0	0	0	0	9	0	0	0	0	0	138
Grand Total	0	288	0	0	63	940	0	0	6	0	50	0	0	0	0	0	1347
Apprch %	0	100	0	0	6.3	93.7	0	0	10.7	0	89.3	0	0	0	0	0	
Total %	0	21.4	0	0	4.7	69.8	0	0	0.4	0	3.7	0	0	0	0	0	

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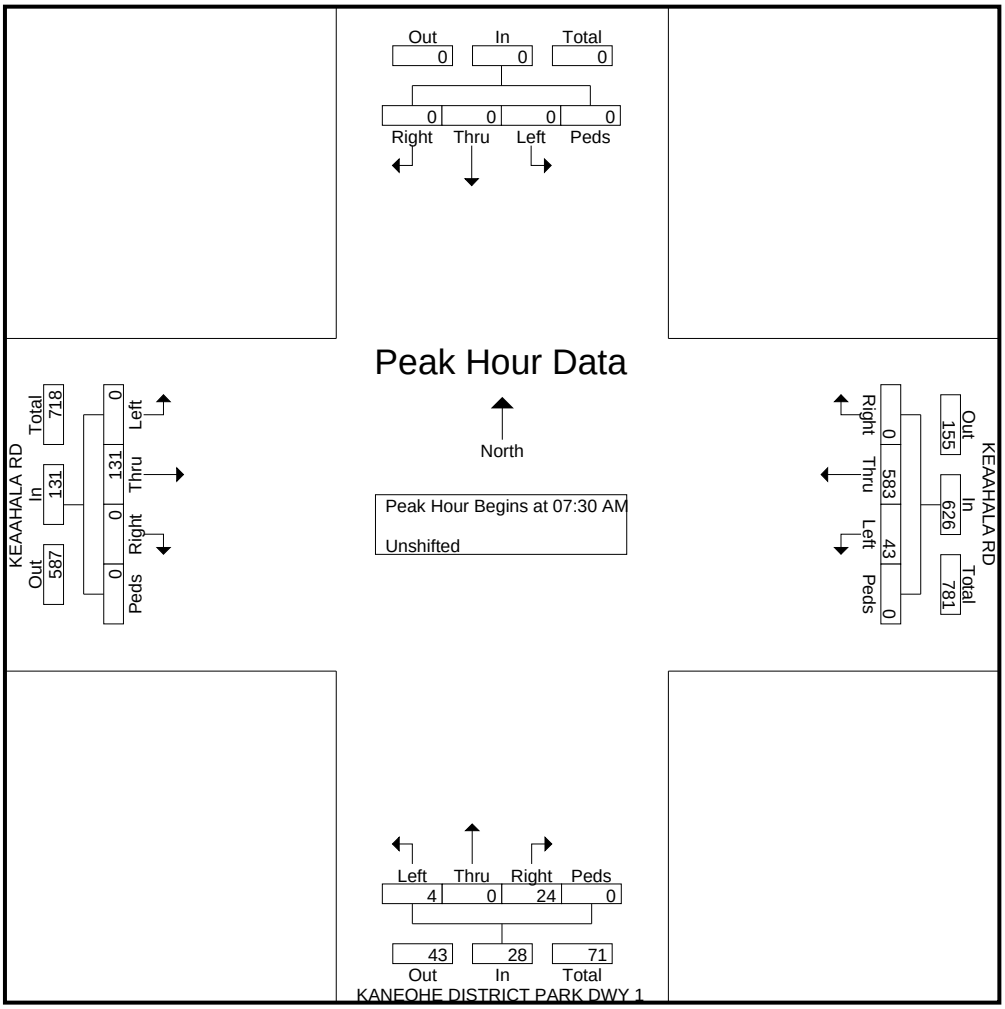
File Name : AM_Kaneohe District Park Dwy 1 - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					KANEOHE DISTRICT PARK DWY 1 Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	29	0	0	29	6	109	0	0	115	0	0	1	0	1	0	0	0	0	0	145
07:45 AM	0	26	0	0	26	7	144	0	0	151	0	0	5	0	5	0	0	0	0	0	182
08:00 AM	0	43	0	0	43	16	150	0	0	166	2	0	11	0	13	0	0	0	0	0	222
08:15 AM	0	33	0	0	33	14	180	0	0	194	2	0	7	0	9	0	0	0	0	0	236
Total Volume	0	131	0	0	131	43	583	0	0	626	4	0	24	0	28	0	0	0	0	0	785
% App. Total	0	100	0	0		6.9	93.1	0	0		14.3	0	85.7	0		0	0	0	0		
PHF	.000	.762	.000	.000	.762	.672	.810	.000	.000	.807	.500	.000	.545	.000	.538	.000	.000	.000	.000	.000	.832



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File Name : AM_Kaneohe District Park Dwy 2 - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				Northbound				KANEOHE DISTRICT PARK DWY 2 Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	0	20	0	0	0	59	0	0	0	0	0	0	2	0	1	0	82
07:30 AM	0	26	0	0	0	102	2	0	0	0	0	0	0	0	1	0	131
07:45 AM	1	26	0	0	0	138	3	0	0	0	0	0	2	0	2	0	172
Total	1	72	0	0	0	299	5	0	0	0	0	0	4	0	4	0	385
08:00 AM	1	35	0	0	0	159	5	0	0	0	0	0	2	0	1	0	203
08:15 AM	0	29	0	0	0	182	5	0	0	0	0	0	5	0	2	0	223
08:30 AM	1	47	0	0	0	109	4	0	0	0	0	0	3	0	1	0	165
08:45 AM	1	40	0	0	0	93	4	0	0	0	0	0	1	0	0	0	139
Total	3	151	0	0	0	543	18	0	0	0	0	0	11	0	4	0	730
09:00 AM	0	41	0	0	0	79	3	0	0	0	0	0	0	0	0	0	123
Grand Total	4	264	0	0	0	921	26	0	0	0	0	0	15	0	8	0	1238
Apprch %	1.5	98.5	0	0	0	97.3	2.7	0	0	0	0	0	65.2	0	34.8	0	
Total %	0.3	21.3	0	0	0	74.4	2.1	0	0	0	0	0	1.2	0	0.6	0	

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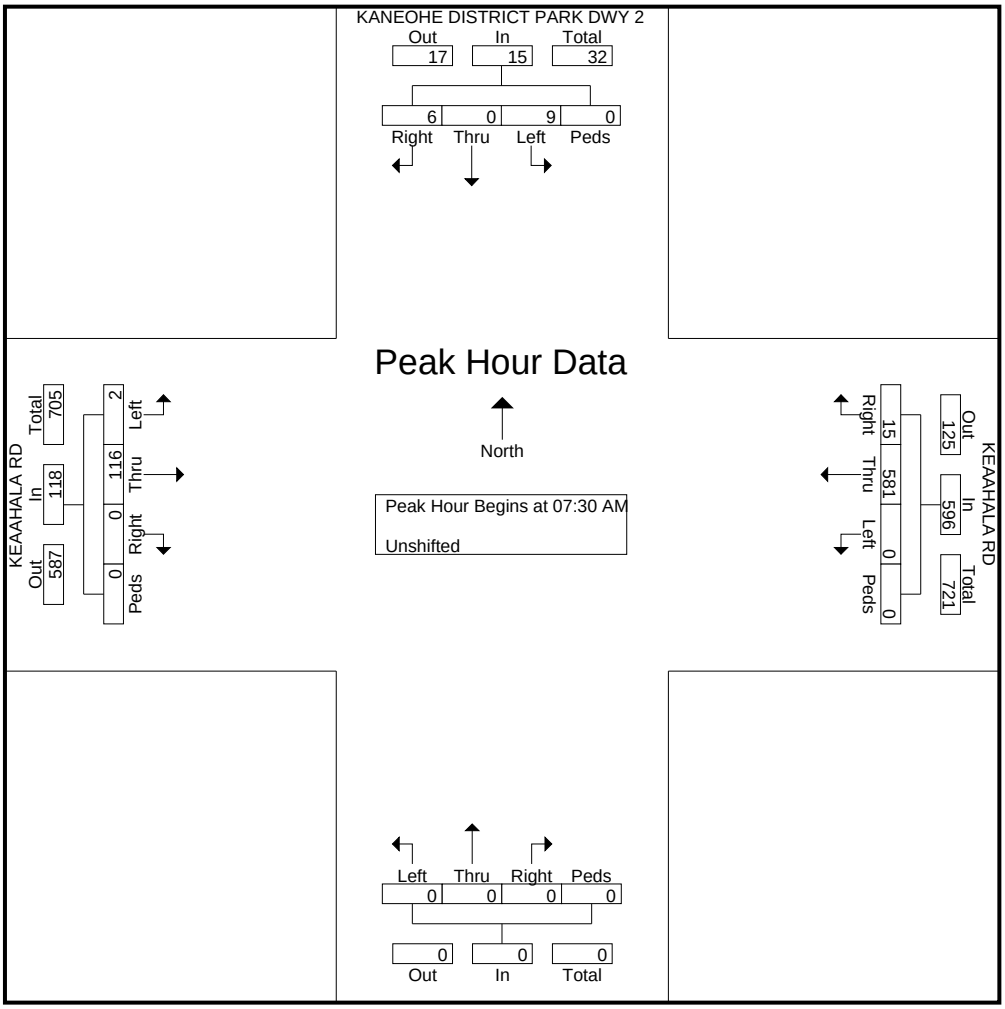
File Name : AM_Kaneohe District Park Dwy 2 - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					Northbound					KANEOHE DISTRICT PARK DWY 2 Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	26	0	0	26	0	102	2	0	104	0	0	0	0	0	0	0	1	0	1	131
07:45 AM	1	26	0	0	27	0	138	3	0	141	0	0	0	0	0	2	0	2	0	4	172
08:00 AM	1	35	0	0	36	0	159	5	0	164	0	0	0	0	0	2	0	1	0	3	203
08:15 AM	0	29	0	0	29	0	182	5	0	187	0	0	0	0	0	5	0	2	0	7	223
Total Volume	2	116	0	0	118	0	581	15	0	596	0	0	0	0	0	9	0	6	0	15	729
% App. Total	1.7	98.3	0	0		0	97.5	2.5	0		0	0	0	0		60	0	40	0		
PHF	.500	.829	.000	.000	.819	.000	.798	.750	.000	.797	.000	.000	.000	.000	.000	.450	.000	.750	.000	.536	.817



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File Name : AM_Pookela St - HSH Dwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	HSH DWY Eastbound				Westbound				POOKELA ST Northbound				POOKELA ST Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	1	0	0	0	0	0	0	0	0	15	0	0	0	11	13	0	40
07:45 AM	1	0	2	0	0	0	0	0	0	14	0	0	0	16	13	0	46
Total	2	0	2	0	0	0	0	0	0	29	0	0	0	27	26	0	86
08:00 AM	0	0	1	0	0	0	0	0	2	17	0	0	0	9	12	0	41
08:15 AM	0	0	0	0	0	0	0	0	0	5	0	0	0	8	12	0	25
08:30 AM	2	0	0	0	0	0	0	0	0	11	0	0	0	9	3	0	25
08:45 AM	1	0	0	0	0	0	0	0	0	9	0	0	0	10	4	0	24
Total	3	0	1	0	0	0	0	0	2	42	0	0	0	36	31	0	115
09:00 AM	2	0	0	0	0	0	0	0	0	7	0	0	0	11	6	0	26
Grand Total	7	0	3	0	0	0	0	0	2	78	0	0	0	74	63	0	227
Apprch %	70	0	30	0	0	0	0	0	2.5	97.5	0	0	0	54	46	0	
Total %	3.1	0	1.3	0	0	0	0	0	0.9	34.4	0	0	0	32.6	27.8	0	

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File Name : AM_Pookela St - HSH Dwy
Site Code : 00000000
Start Date : 4/27/2016
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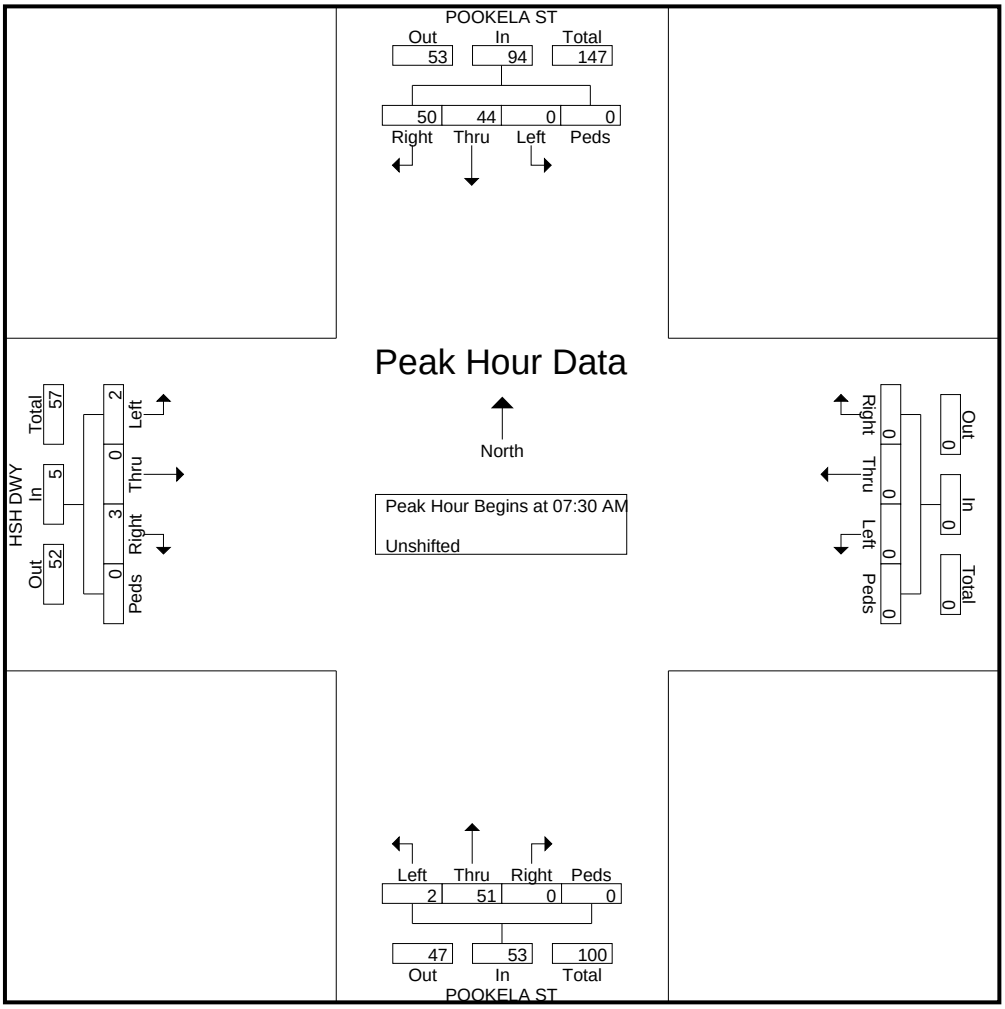
	HSH DWY Eastbound					Westbound					POOKELA ST Northbound					POOKELA ST Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 09:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	1	0	0	0	1	0	0	0	0	0	0	15	0	0	15	0	11	13	0	24	40
07:45 AM	1	0	2	0	3	0	0	0	0	0	0	14	0	0	14	0	16	13	0	29	46
08:00 AM	0	0	1	0	1	0	0	0	0	0	2	17	0	0	19	0	9	12	0	21	41
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	8	12	0	20	25
Total Volume	2	0	3	0	5	0	0	0	0	0	2	51	0	0	53	0	44	50	0	94	152
% App. Total	40	0	60	0		0	0	0	0		3.8	96.2	0	0		0	46.8	53.2	0		
PHF	.500	.000	.375	.000	.417	.000	.000	.000	.000	.000	.250	.750	.000	.000	.697	.000	.688	.962	.000	.810	.826



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File Name : AM_WCC Parking Lot Dwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				Northbound				WCC PARKING LOT DWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	1	13	0	0	0	32	2	0	0	0	0	0	0	0	1	1	50
07:30 AM	1	9	0	0	0	55	5	0	0	0	0	0	1	0	0	0	71
07:45 AM	0	13	0	0	0	75	9	0	0	0	0	0	1	0	1	2	101
Total	2	35	0	0	0	162	16	0	0	0	0	0	2	0	2	3	222
08:00 AM	0	18	0	0	0	92	24	0	0	0	0	0	2	0	0	3	139
08:15 AM	0	17	0	0	0	114	29	0	0	0	0	0	1	0	0	2	163
08:30 AM	1	18	0	0	0	76	20	0	0	0	0	0	9	0	0	4	128
08:45 AM	0	22	0	0	0	49	13	0	0	0	0	0	1	0	1	9	95
Total	1	75	0	0	0	331	86	0	0	0	0	0	13	0	1	18	525
09:00 AM	1	14	0	0	0	37	6	0	0	0	0	0	0	0	0	3	61
Grand Total	4	124	0	0	0	530	108	0	0	0	0	0	15	0	3	24	808
Apprch %	3.1	96.9	0	0	0	83.1	16.9	0	0	0	0	0	35.7	0	7.1	57.1	
Total %	0.5	15.3	0	0	0	65.6	13.4	0	0	0	0	0	1.9	0	0.4	3	

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File Name : AM_WCC Parking Lot Dwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
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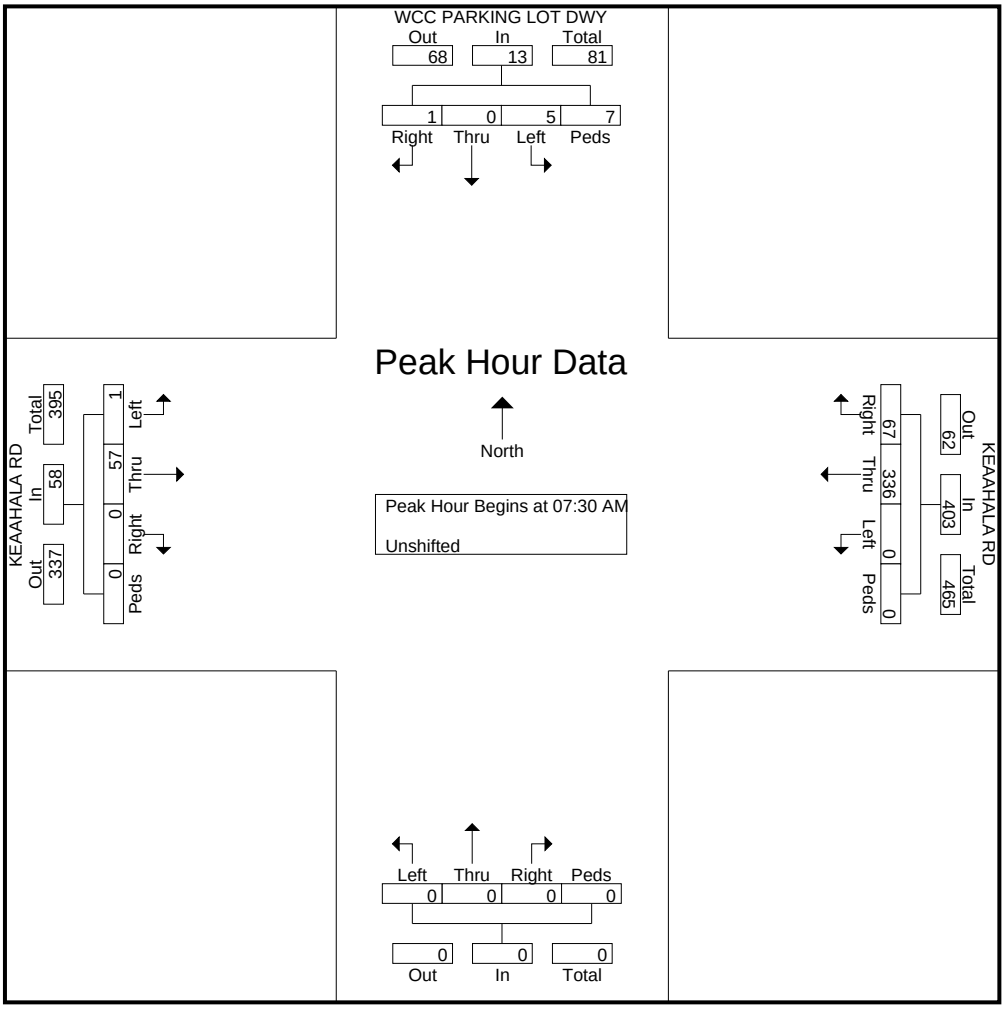
	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					Northbound					WCC PARKING LOT DWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	1	9	0	0	10	0	55	5	0	60	0	0	0	0	0	1	0	0	0	1	71
07:45 AM	0	13	0	0	13	0	75	9	0	84	0	0	0	0	0	1	0	1	2	4	101
08:00 AM	0	18	0	0	18	0	92	24	0	116	0	0	0	0	0	2	0	0	3	5	139
08:15 AM	0	17	0	0	17	0	114	29	0	143	0	0	0	0	0	1	0	0	2	3	163
Total Volume	1	57	0	0	58	0	336	67	0	403	0	0	0	0	0	5	0	1	7	13	474
% App. Total	1.7	98.3	0	0		0	83.4	16.6	0		0	0	0	0		38.5	0	7.7	53.8		
PHF	.250	.792	.000	.000	.806	.000	.737	.578	.000	.705	.000	.000	.000	.000	.000	.625	.000	.250	.583	.650	.727



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File Name : AM_WCHC Dwy_Pookela St - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				POOKELA ST Northbound				WCHC DWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:15 AM	0	14	1	0	18	39	6	0	0	0	10	1	0	0	0	0	89
07:30 AM	0	16	1	0	36	61	12	0	1	0	21	1	0	0	1	0	150
07:45 AM	4	12	2	0	32	88	19	0	1	1	12	0	5	0	0	0	176
Total	4	42	4	0	86	188	37	0	2	1	43	2	5	0	1	0	415
08:00 AM	0	20	0	0	30	115	12	0	0	1	17	0	1	0	1	0	197
08:15 AM	1	16	1	0	31	149	3	0	0	1	6	0	4	0	0	0	212
08:30 AM	0	28	0	0	15	93	7	0	1	0	18	0	5	0	1	0	168
08:45 AM	1	18	0	0	32	58	6	0	1	0	11	0	3	0	0	0	130
Total	2	82	1	0	108	415	28	0	2	2	52	0	13	0	2	0	707
09:00 AM	0	9	1	0	26	42	6	0	0	0	26	0	3	0	0	0	113
Grand Total	6	133	6	0	220	645	71	0	4	3	121	2	21	0	3	0	1235
Apprch %	4.1	91.7	4.1	0	23.5	68.9	7.6	0	3.1	2.3	93.1	1.5	87.5	0	12.5	0	
Total %	0.5	10.8	0.5	0	17.8	52.2	5.7	0	0.3	0.2	9.8	0.2	1.7	0	0.2	0	

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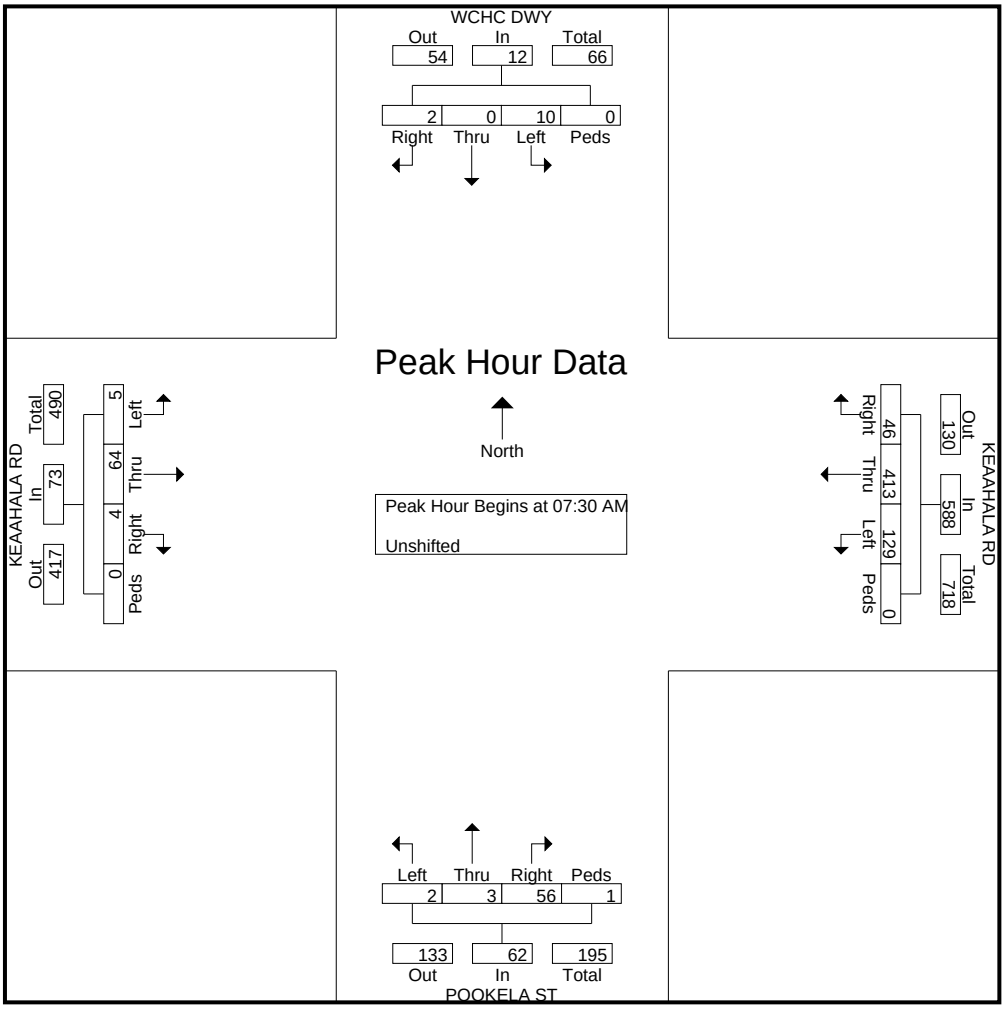
File Name : AM_WCHC Dwy_Pookela St - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					POOKELA ST Northbound					WCHC DWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	16	1	0	17	36	61	12	0	109	1	0	21	1	23	0	0	1	0	1	150
07:45 AM	4	12	2	0	18	32	88	19	0	139	1	1	12	0	14	5	0	0	0	5	176
08:00 AM	0	20	0	0	20	30	115	12	0	157	0	1	17	0	18	1	0	1	0	2	197
08:15 AM	1	16	1	0	18	31	149	3	0	183	0	1	6	0	7	4	0	0	0	4	212
Total Volume	5	64	4	0	73	129	413	46	0	588	2	3	56	1	62	10	0	2	0	12	735
% App. Total	6.8	87.7	5.5	0		21.9	70.2	7.8	0		3.2	4.8	90.3	1.6		83.3	0	16.7	0		
PHF	.313	.800	.500	.000	.913	.896	.693	.605	.000	.803	.500	.750	.667	.250	.674	.500	.000	.500	.000	.600	.867



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File Name : PM_Ala Koolau - HSH Dwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	Eastbound				HSH DWY Westbound				ALA KOOLAU Northbound				ALA KOOLAU Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	4	0	0	0	0	27	2	0	0	15	0	0	48
Total	0	0	0	0	4	0	0	0	0	27	2	0	0	15	0	0	48
03:00 PM	0	0	0	0	2	0	1	0	0	59	6	0	1	4	0	0	73
03:15 PM	0	0	0	0	2	0	0	0	0	40	11	0	0	2	0	0	55
03:30 PM	0	0	0	0	1	0	1	0	0	22	2	0	1	4	0	0	31
03:45 PM	0	0	0	0	0	0	1	0	0	18	2	0	1	3	0	0	25
Total	0	0	0	0	5	0	3	0	0	139	21	0	3	13	0	0	184
04:00 PM	0	0	0	0	1	0	0	0	0	25	8	0	0	4	0	0	38
04:15 PM	0	0	0	0	0	0	0	0	0	26	3	0	0	3	0	0	32
04:30 PM	0	0	0	0	2	0	0	0	0	21	4	0	1	1	0	0	29
04:45 PM	0	0	0	0	2	0	0	0	0	8	3	0	1	0	0	0	14
Total	0	0	0	0	5	0	0	0	0	80	18	0	2	8	0	0	113
05:00 PM	0	0	0	0	0	0	0	0	0	9	4	0	0	0	0	0	13
05:15 PM	0	0	0	0	1	0	0	0	0	6	7	0	0	1	0	0	15
Grand Total	0	0	0	0	15	0	3	0	0	261	52	0	5	37	0	0	373
Apprch %	0	0	0	0	83.3	0	16.7	0	0	83.4	16.6	0	11.9	88.1	0	0	
Total %	0	0	0	0	4	0	0.8	0	0	70	13.9	0	1.3	9.9	0	0	

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File Name : PM_Ala Koolau - HSH Dwy
Site Code : 00000000
Start Date : 4/27/2016
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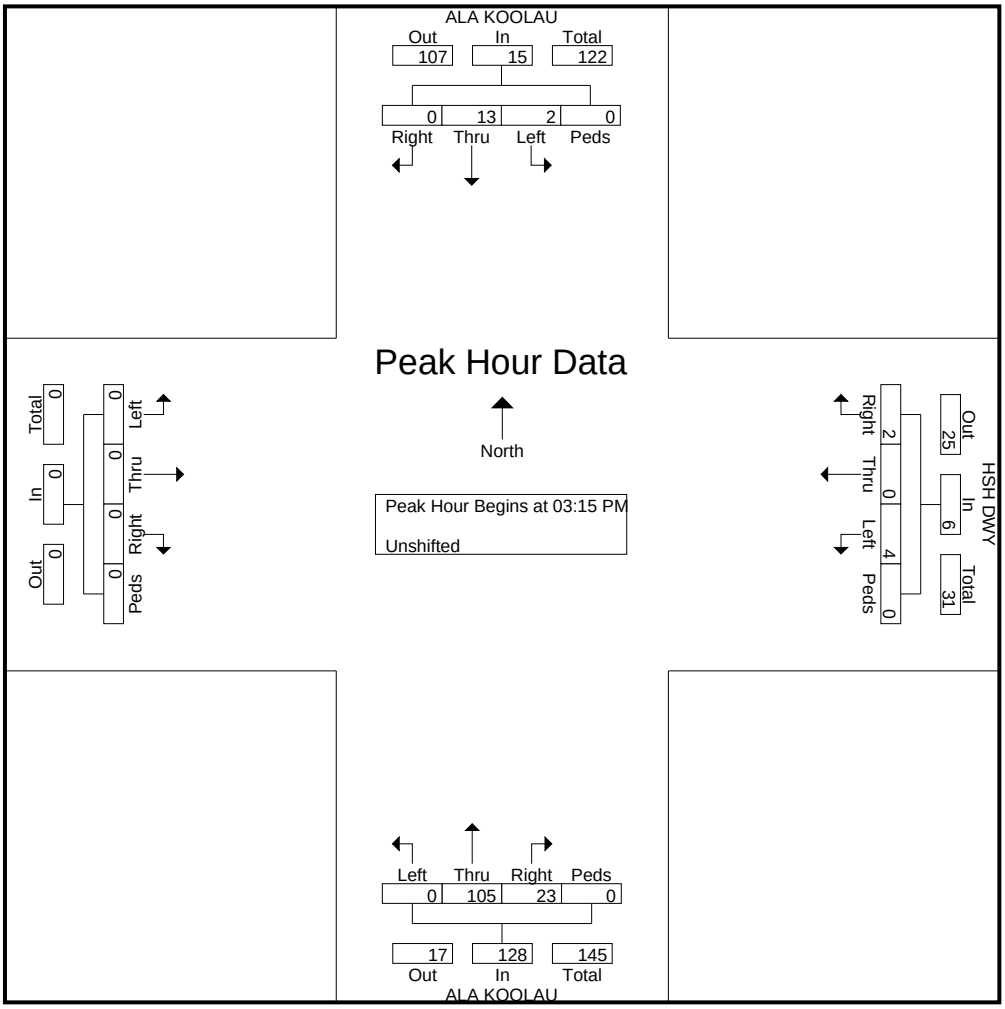
	Eastbound					HSH DWY Westbound					ALA KOOLAU Northbound					ALA KOOLAU Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:15 PM to 04:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	0	0	0	0	0	2	0	0	0	2	0	40	11	0	51	0	2	0	0	2	55
03:30 PM	0	0	0	0	0	1	0	1	0	2	0	22	2	0	24	1	4	0	0	5	31
03:45 PM	0	0	0	0	0	0	0	1	0	1	0	18	2	0	20	1	3	0	0	4	25
04:00 PM	0	0	0	0	0	1	0	0	0	1	0	25	8	0	33	0	4	0	0	4	38
Total Volume	0	0	0	0	0	4	0	2	0	6	0	105	23	0	128	2	13	0	0	15	149
% App. Total	0	0	0	0		66.7	0	33.3	0		0	82	18	0		13.3	86.7	0	0		
PHF	.000	.000	.000	.000	.000	.500	.000	.500	.000	.750	.000	.656	.523	.000	.627	.500	.813	.000	.000	.750	.677



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File Name : PM_Kahekili Hwy - Haiku Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	HAIKU RD Eastbound				HAIKU RD Westbound				KAHEKILI HWY Northbound				KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	0	9	22	2	62	13	72	1	16	212	80	2	46	145	2	0	684
02:45 PM	2	18	17	0	36	17	76	0	14	237	93	4	63	191	5	0	773
Total	2	27	39	2	98	30	148	1	30	449	173	6	109	336	7	0	1457
03:00 PM	1	21	12	0	51	26	68	1	19	246	71	1	36	173	7	0	733
03:15 PM	2	35	9	0	68	28	86	0	18	250	91	2	52	207	5	0	853
03:30 PM	7	14	18	1	60	19	78	0	16	250	81	3	50	200	6	0	803
03:45 PM	1	23	23	0	41	28	81	0	10	228	77	0	41	188	2	0	743
Total	11	93	62	1	220	101	313	1	63	974	320	6	179	768	20	0	3132
04:00 PM	7	15	16	0	57	29	68	0	14	262	64	0	48	170	3	0	753
04:15 PM	10	14	16	0	44	24	88	0	17	235	68	3	40	195	4	0	758
04:30 PM	8	20	10	0	45	22	69	0	15	223	74	0	36	163	8	0	693
04:45 PM	6	13	13	1	51	16	68	2	16	229	76	2	33	162	6	0	694
Total	31	62	55	1	197	91	293	2	62	949	282	5	157	690	21	0	2898
05:00 PM	5	15	10	0	56	23	74	0	14	255	86	1	41	171	4	0	755
05:15 PM	7	13	8	0	62	20	75	0	26	261	77	2	51	181	3	0	786
Grand Total	56	210	174	4	633	265	903	4	195	2888	938	20	537	2146	55	0	9028
Apprch %	12.6	47.3	39.2	0.9	35.1	14.7	50	0.2	4.8	71.5	23.2	0.5	19.6	78.4	2	0	
Total %	0.6	2.3	1.9	0	7	2.9	10	0	2.2	32	10.4	0.2	5.9	23.8	0.6	0	

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File Name : PM_Kahekili Hwy - Haiku Rd
Site Code : 00000000
Start Date : 4/27/2016
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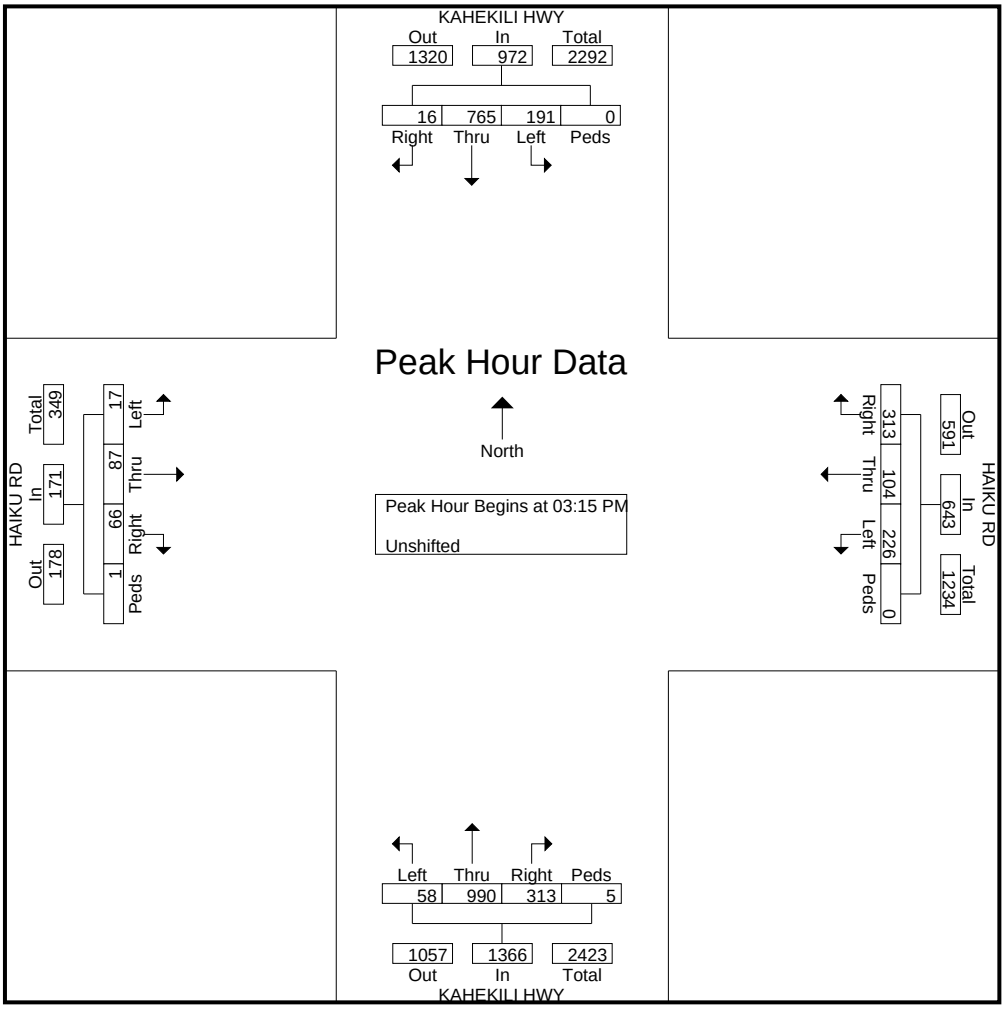
	HAIKU RD Eastbound					HAIKU RD Westbound					KAHEKILI HWY Northbound					KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:15 PM to 04:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	2	35	9	0	46	68	28	86	0	182	18	250	91	2	361	52	207	5	0	264	853
03:30 PM	7	14	18	1	40	60	19	78	0	157	16	250	81	3	350	50	200	6	0	256	803
03:45 PM	1	23	23	0	47	41	28	81	0	150	10	228	77	0	315	41	188	2	0	231	743
04:00 PM	7	15	16	0	38	57	29	68	0	154	14	262	64	0	340	48	170	3	0	221	753
Total Volume	17	87	66	1	171	226	104	313	0	643	58	990	313	5	1366	191	765	16	0	972	3152
% App. Total	9.9	50.9	38.6	0.6		35.1	16.2	48.7	0		4.2	72.5	22.9	0.4		19.7	78.7	1.6	0		
PHF	.607	.621	.717	.250	.910	.831	.897	.910	.000	.883	.806	.945	.860	.417	.946	.918	.924	.667	.000	.920	.924



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File Name : PM_Kahekili Hwy - Kahuhipa St
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KAHUHIPA ST Eastbound				KAHUHIPA ST Westbound				KAHEKILI HWY Northbound				KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	0	4	21	0	60	6	14	0	21	313	118	1	21	202	0	0	781
02:45 PM	2	11	21	0	58	9	17	0	28	298	137	3	19	230	1	0	834
Total	2	15	42	0	118	15	31	0	49	611	255	4	40	432	1	0	1615
03:00 PM	0	10	17	2	56	11	14	0	44	328	139	1	13	218	0	2	855
03:15 PM	0	12	27	0	71	11	15	0	46	319	142	1	14	278	1	0	937
03:30 PM	3	8	25	3	65	7	16	2	40	324	148	2	22	263	2	6	936
03:45 PM	2	15	20	0	52	3	9	2	39	340	138	1	11	249	0	1	882
Total	5	45	89	5	244	32	54	4	169	1311	567	5	60	1008	3	9	3610
04:00 PM	0	9	24	0	51	10	6	2	50	317	157	1	15	237	1	0	880
04:15 PM	0	8	22	0	66	9	14	0	53	302	145	2	22	239	3	1	886
04:30 PM	1	11	34	0	45	8	9	0	60	293	153	0	12	233	2	1	862
04:45 PM	2	10	18	3	52	9	8	0	68	300	179	2	17	222	2	5	897
Total	3	38	98	3	214	36	37	2	231	1212	634	5	66	931	8	7	3525
05:00 PM	1	7	17	0	72	13	9	2	70	329	193	2	11	221	2	6	955
05:15 PM	1	3	15	0	49	7	7	0	65	315	188	0	13	220	2	6	891
Grand Total	12	108	261	8	697	103	138	8	584	3778	1837	16	190	2812	16	28	10596
Apprch %	3.1	27.8	67.1	2.1	73.7	10.9	14.6	0.8	9.4	60.8	29.6	0.3	6.2	92.3	0.5	0.9	
Total %	0.1	1	2.5	0.1	6.6	1	1.3	0.1	5.5	35.7	17.3	0.2	1.8	26.5	0.2	0.3	

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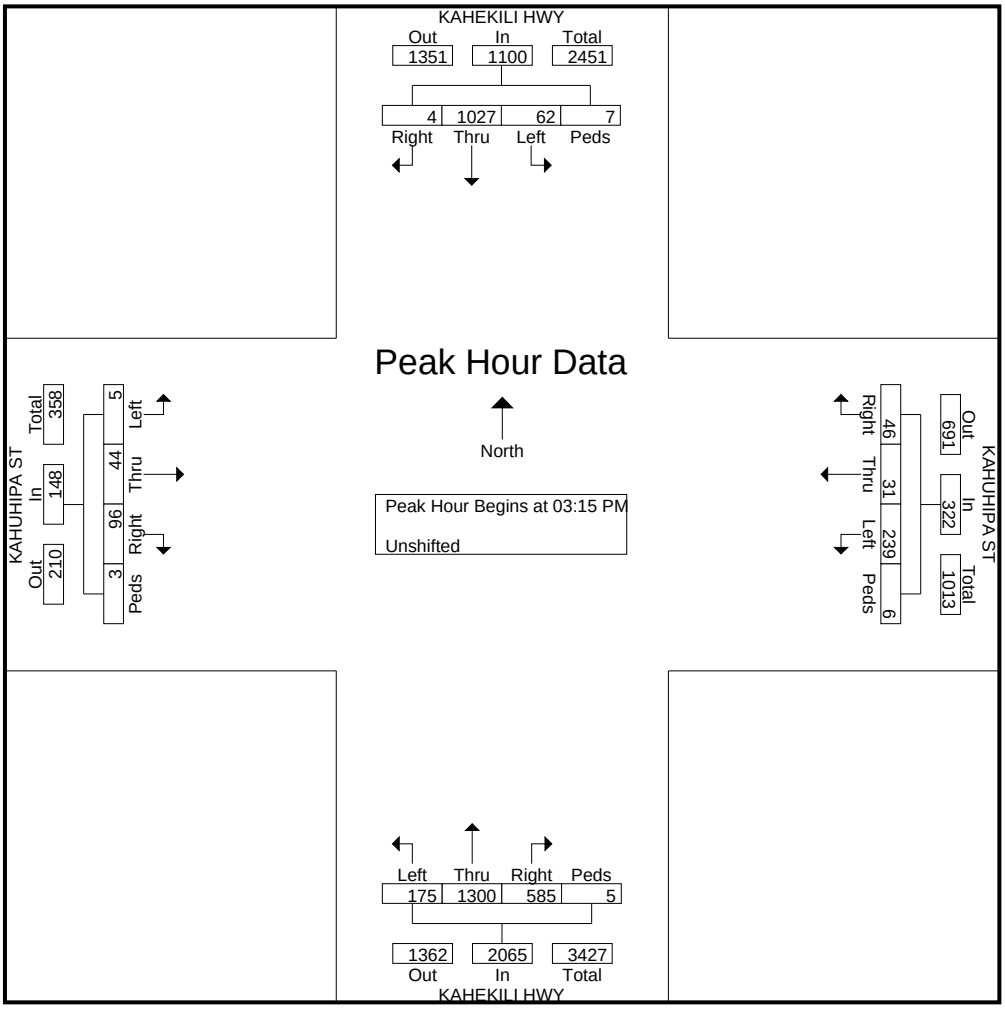
File Name : PM_Kahekili Hwy - Kahuhipa St
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KAHUHIPA ST Eastbound					KAHUHIPA ST Westbound					KAHEKILI HWY Northbound					KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	0	12	27	0	39	71	11	15	0	97	46	319	142	1	508	14	278	1	0	293	937
03:30 PM	3	8	25	3	39	65	7	16	2	90	40	324	148	2	514	22	263	2	6	293	936
03:45 PM	2	15	20	0	37	52	3	9	2	66	39	340	138	1	518	11	249	0	1	261	882
04:00 PM	0	9	24	0	33	51	10	6	2	69	50	317	157	1	525	15	237	1	0	253	880
Total Volume	5	44	96	3	148	239	31	46	6	322	175	1300	585	5	2065	62	1027	4	7	1100	3635
% App. Total	3.4	29.7	64.9	2		74.2	9.6	14.3	1.9		8.5	63	28.3	0.2		5.6	93.4	0.4	0.6		
PHF	.417	.733	.889	.250	.949	.842	.705	.719	.750	.830	.875	.956	.932	.625	.983	.705	.924	.500	.292	.939	.970



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File Name : PM_Kahekili Hwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				KAHEKILI HWY Northbound				KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	37	14	55	0	16	10	21	0	50	388	43	0	11	256	18	1	920
02:45 PM	30	10	47	1	15	14	30	0	17	470	37	0	16	283	17	3	990
Total	67	24	102	1	31	24	51	0	67	858	80	0	27	539	35	4	1910
03:00 PM	39	23	68	1	25	11	45	0	25	457	29	0	9	289	11	2	1034
03:15 PM	35	23	59	2	14	11	46	0	32	496	44	0	27	327	18	0	1134
03:30 PM	30	17	57	0	27	11	28	0	26	466	35	0	27	325	18	0	1067
03:45 PM	23	9	69	0	25	15	28	0	18	527	34	0	35	271	23	4	1081
Total	127	72	253	3	91	48	147	0	101	1946	142	0	98	1212	70	6	4316
04:00 PM	26	15	77	0	28	13	26	0	25	515	50	0	25	265	23	3	1091
04:15 PM	31	16	61	2	19	17	25	0	38	527	46	0	25	288	22	4	1121
04:30 PM	31	25	75	0	18	19	29	0	29	452	39	0	19	264	27	1	1028
04:45 PM	27	13	53	0	16	19	36	0	35	484	54	0	20	261	25	3	1046
Total	115	69	266	2	81	68	116	0	127	1978	189	0	89	1078	97	11	4286
05:00 PM	22	19	45	0	25	18	39	0	30	532	54	0	15	277	19	1	1096
05:15 PM	22	15	46	0	24	17	24	0	47	520	40	0	20	259	24	2	1060
Grand Total	353	199	712	6	252	175	377	0	372	5834	505	0	249	3365	245	24	12668
Apprch %	27.8	15.7	56.1	0.5	31.3	21.8	46.9	0	5.5	86.9	7.5	0	6.4	86.7	6.3	0.6	
Total %	2.8	1.6	5.6	0	2	1.4	3	0	2.9	46.1	4	0	2	26.6	1.9	0.2	

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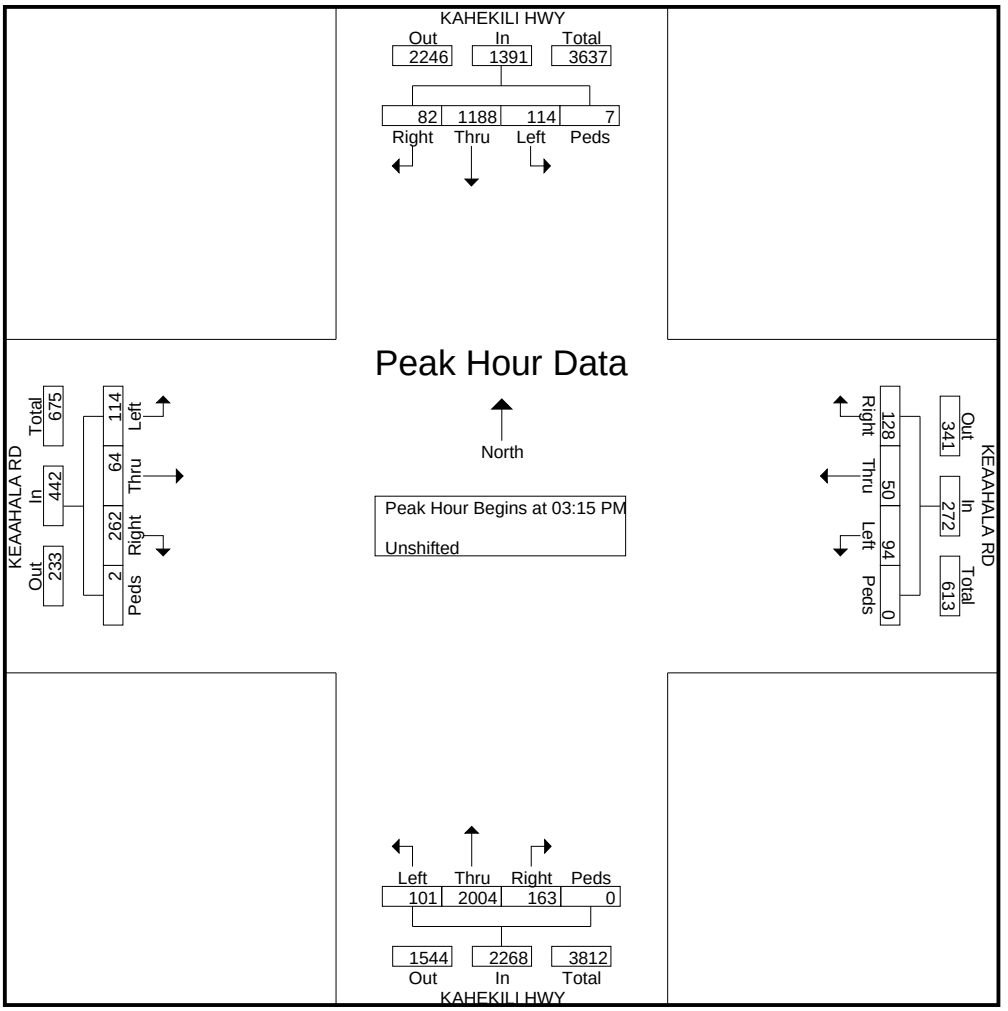
File Name : PM_Kahekili Hwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					KAHEKILI HWY Northbound					KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	**35**	**23**	59	**2**	**119**	14	11	**46**	0	**71**	**32**	496	44	0	572	27	**327**	18	0	**372**	**1134**
03:30 PM	30	17	57	0	104	27	11	28	0	66	26	466	35	0	527	27	325	18	0	370	1067
03:45 PM	23	9	69	0	101	25	**15**	28	0	68	18	**527**	34	0	579	**35**	271	**23**	**4**	333	1081
04:00 PM	26	15	**77**	0	118	**28**	13	26	0	67	25	515	**50**	0	**590**	25	265	23	3	316	1091
Total Volume	114	64	262	2	442	94	50	128	0	272	101	2004	163	0	2268	114	1188	82	7	1391	4373
% App. Total	25.8	14.5	59.3	0.5		34.6	18.4	47.1	0		4.5	88.4	7.2	0		8.2	85.4	5.9	0.5		
PHF	.814	.696	.851	.250	.929	.839	.833	.696	.000	.958	.789	.951	.815	.000	.961	.814	.908	.891	.438	.935	.964



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File Name : PM_Kahekili Hwy - Kulukeoe St
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KULUKEOE ST Eastbound				KULUKEOE ST Westbound				KAHEKILI HWY Northbound					KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	U-Turn	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	2	2	1	0	7	3	9	0	1	490	27	2	0	21	291	6	0	862
02:45 PM	3	0	2	0	6	4	15	0	3	491	18	2	0	23	314	3	0	884
Total	5	2	3	0	13	7	24	0	4	981	45	4	0	44	605	9	0	1746
03:00 PM	1	3	2	0	6	0	24	0	1	496	13	1	0	23	350	4	0	924
03:15 PM	3	1	4	0	5	2	12	0	5	522	20	0	0	23	341	3	0	941
03:30 PM	1	1	1	0	7	4	10	0	3	532	29	2	0	25	398	1	0	1014
03:45 PM	1	0	1	0	3	9	6	0	4	580	23	2	0	28	332	2	0	991
Total	6	5	8	0	21	15	52	0	13	2130	85	5	0	99	1421	10	0	3870
04:00 PM	1	1	3	0	4	3	12	0	4	592	25	1	0	25	332	3	0	1006
04:15 PM	3	2	1	0	5	2	10	0	5	571	23	1	0	20	342	4	0	989
04:30 PM	4	1	3	0	1	4	8	0	2	587	34	0	0	20	331	7	0	1002
04:45 PM	1	2	3	0	1	3	6	0	0	548	26	0	0	25	301	2	0	918
Total	9	6	10	0	11	12	36	0	11	2298	108	2	0	90	1306	16	0	3915
05:00 PM	5	3	2	1	6	3	6	0	4	566	21	0	0	28	306	7	0	958
05:15 PM	1	3	2	1	1	6	9	1	1	602	22	2	1	22	291	5	0	970
Grand Total	26	19	25	2	52	43	127	1	33	6577	281	13	1	283	3929	47	0	11459
Apprch %	36.1	26.4	34.7	2.8	23.3	19.3	57	0.4	0.5	95.2	4.1	0.2	0	6.6	92.3	1.1	0	
Total %	0.2	0.2	0.2	0	0.5	0.4	1.1	0	0.3	57.4	2.5	0.1	0	2.5	34.3	0.4	0	

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Site Code : 00000000
Start Date : 4/27/2016
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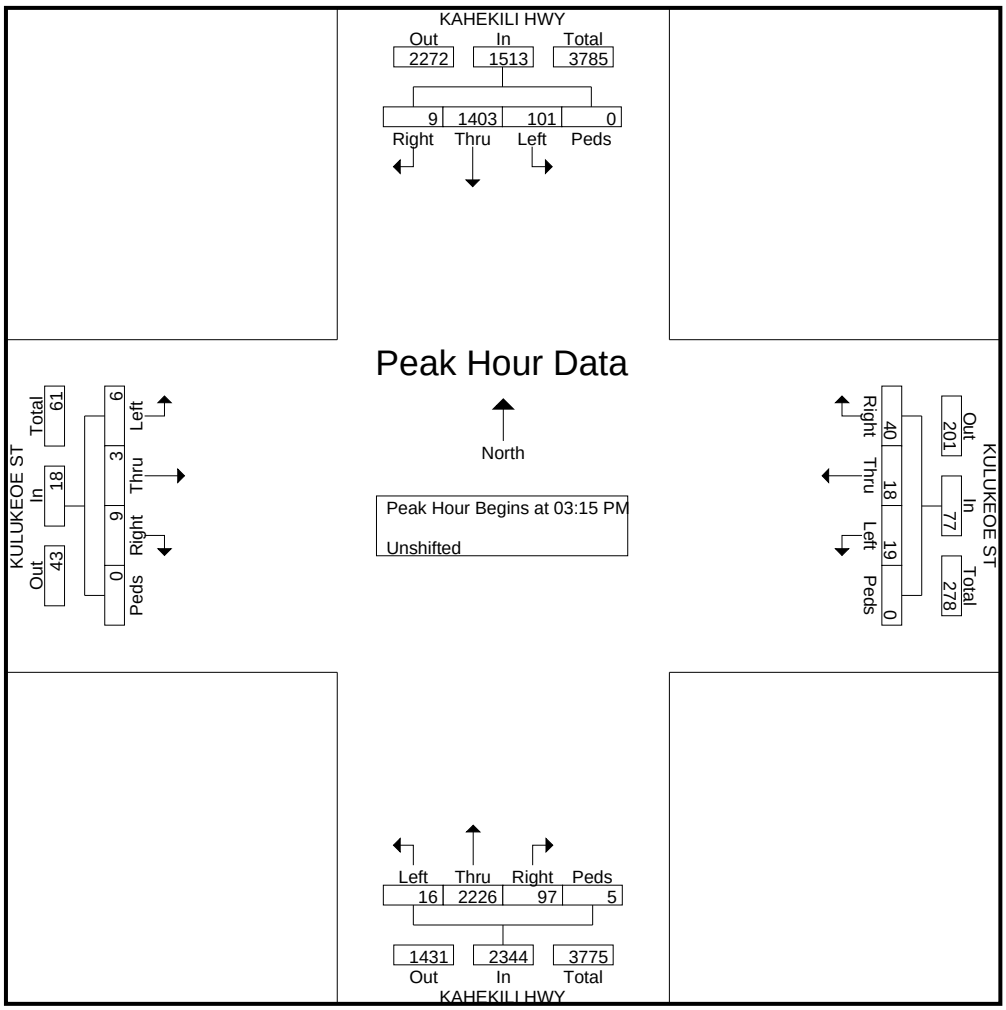
	KULUKEOE ST Eastbound					KULUKEOE ST Westbound					KAHEKILI HWY Northbound						KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:15 PM to 04:00 PM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 03:15 PM																						
03:15 PM	3	1	4	0	8	5	2	12	0	19	5	522	20	0	0	547	23	341	3	0	367	941
03:30 PM	1	1	1	0	3	7	4	10	0	21	3	532	29	2	0	566	25	398	1	0	424	1014
03:45 PM	1	0	1	0	2	3	9	6	0	18	4	580	23	2	0	609	28	332	2	0	362	991
04:00 PM	1	1	3	0	5	4	3	12	0	19	4	592	25	1	0	622	25	332	3	0	360	1006
Total Volume	6	3	9	0	18	19	18	40	0	77	16	2226	97	5	0	2344	101	1403	9	0	1513	3952
% App. Total	33.3	16.7				24.7	23.4	51.9										92.7				
PHF	.500	.750	.563	.000		.679	.500	.833	.000	.917	.800	.940	.836	.625	.000		.902	.881	.750	.000		



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File Name : PM_Kahekili Hwy - Likelike Hwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	LIKELIKE HWY Eastbound				LIKELIKE HWY Westbound				KAHEKILI HWY Northbound				KAHEKILI HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	0	251	0	0	0	105	131	0	0	391	0	0	0	96	228	0	1202
02:45 PM	0	295	0	0	0	129	134	0	0	350	0	0	0	96	206	0	1210
Total	0	546	0	0	0	234	265	0	0	741	0	0	0	192	434	0	2412
03:00 PM	0	301	0	0	0	101	160	0	0	369	0	0	0	103	276	0	1310
03:15 PM	0	308	0	0	0	133	132	0	0	435	0	0	0	122	228	0	1358
03:30 PM	0	397	0	0	0	121	128	0	0	410	0	0	0	136	292	0	1484
03:45 PM	0	392	0	0	0	108	126	0	0	480	0	0	0	118	210	0	1434
Total	0	1398	0	0	0	463	546	0	0	1694	0	0	0	479	1006	0	5586
04:00 PM	0	374	0	0	0	110	137	0	0	489	0	0	0	101	251	0	1462
04:15 PM	0	370	0	0	0	114	142	0	0	449	0	0	0	100	257	0	1432
04:30 PM	0	408	0	0	0	113	130	0	0	482	0	0	0	115	223	0	1471
04:45 PM	0	378	0	0	0	106	105	0	0	450	0	0	0	93	209	0	1341
Total	0	1530	0	0	0	443	514	0	0	1870	0	0	0	409	940	0	5706
05:00 PM	0	406	0	0	0	138	144	0	0	447	0	0	0	101	219	0	1455
05:15 PM	0	344	0	0	0	137	153	0	0	465	0	0	0	85	204	0	1388
Grand Total	0	4224	0	0	0	1415	1622	0	0	5217	0	0	0	1266	2803	0	16547
Apprch %	0	100	0	0	0	46.6	53.4	0	0	100	0	0	0	31.1	68.9	0	
Total %	0	25.5	0	0	0	8.6	9.8	0	0	31.5	0	0	0	7.7	16.9	0	

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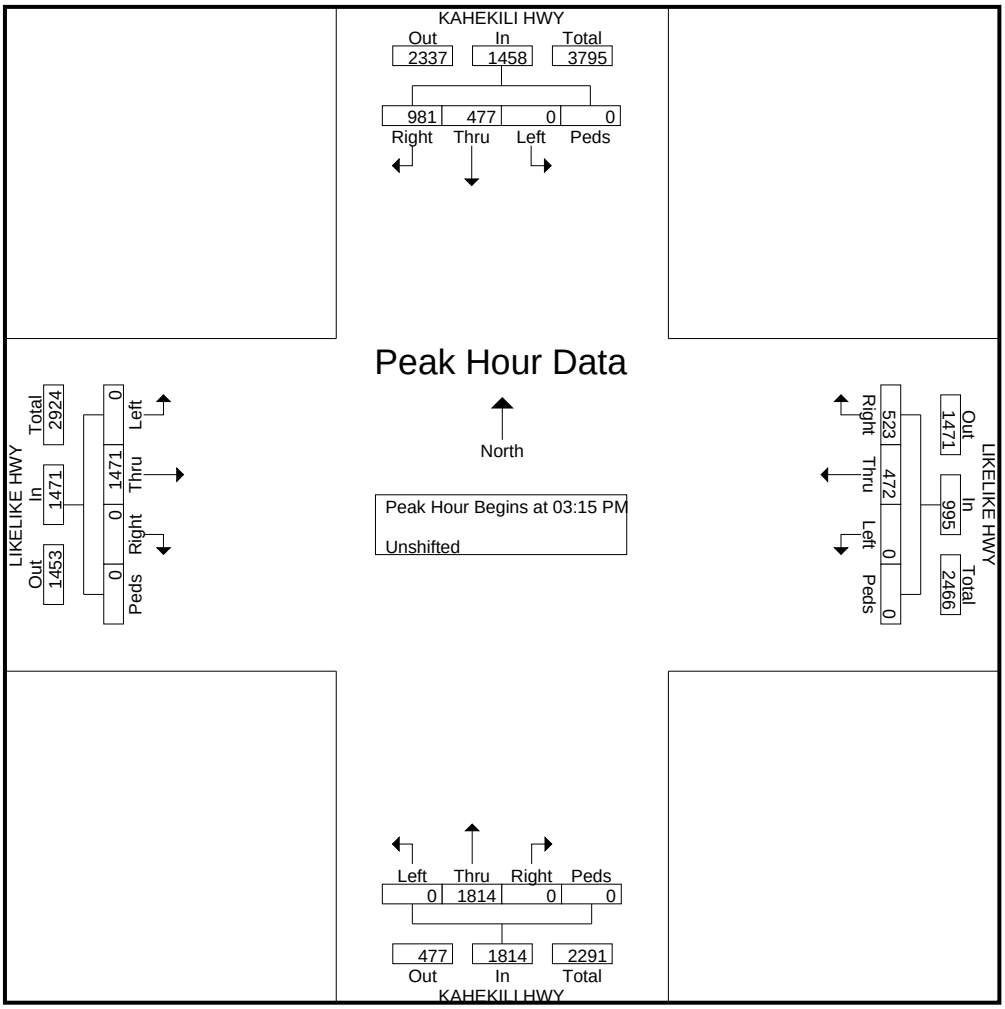
File Name : PM_Kahekili Hwy - Likelike Hwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	LIKELIKE HWY Eastbound					LIKELIKE HWY Westbound					KAHEKILI HWY Northbound					KAHEKILI HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:15 PM to 04:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	0	308	0	0	308	0	133	132	0	265	0	435	0	0	435	0	122	228	0	350	1358
03:30 PM	0	397	0	0	397	0	121	128	0	249	0	410	0	0	410	0	136	292	0	428	1484
03:45 PM	0	392	0	0	392	0	108	126	0	234	0	480	0	0	480	0	118	210	0	328	1434
04:00 PM	0	374	0	0	374	0	110	137	0	247	0	489	0	0	489	0	101	251	0	352	1462
Total Volume	0	1471	0	0	1471	0	472	523	0	995	0	1814	0	0	1814	0	477	981	0	1458	5738
% App. Total																					
PHF	.000	.926	.000	.000	.926	.000	.887	.954	.000	.939	.000	.927	.000	.000	.927	.000	.877	.840	.000	.852	.967



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File Name : PM_Kamehameha Hwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				KAMEHAMEHA HWY Northbound				KAMEHAMEHA HWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	21	14	14	1	21	8	10	2	10	261	29	3	12	273	27	1	707
02:45 PM	13	16	17	9	17	7	19	9	7	288	25	7	19	268	17	3	741
Total	34	30	31	10	38	15	29	11	17	549	54	10	31	541	44	4	1448
03:00 PM	22	20	12	1	29	12	19	5	11	248	20	13	10	314	21	5	762
03:15 PM	25	19	7	8	28	6	12	6	6	309	17	5	15	335	27	0	825
03:30 PM	12	26	11	4	32	14	24	3	13	305	18	6	17	297	21	4	807
03:45 PM	20	16	12	9	28	14	26	6	6	326	26	9	11	306	25	5	845
Total	79	81	42	22	117	46	81	20	36	1188	81	33	53	1252	94	14	3239
04:00 PM	22	16	23	2	15	13	14	4	13	351	15	5	19	329	26	5	872
04:15 PM	29	25	16	8	30	7	16	2	10	358	28	2	12	250	23	3	819
04:30 PM	30	16	16	4	19	10	11	4	12	313	21	8	21	288	20	1	794
04:45 PM	44	18	14	1	33	8	12	4	9	288	36	6	15	265	24	3	780
Total	125	75	69	15	97	38	53	14	44	1310	100	21	67	1132	93	12	3265
05:00 PM	31	22	17	3	20	13	18	4	11	343	29	5	16	272	28	4	836
05:15 PM	17	15	13	3	32	6	8	7	19	364	19	10	13	246	26	0	798
Grand Total	286	223	172	53	304	118	189	56	127	3754	283	79	180	3443	285	34	9586
Apprch %	39	30.4	23.4	7.2	45.6	17.7	28.3	8.4	3	88.5	6.7	1.9	4.6	87.3	7.2	0.9	
Total %	3	2.3	1.8	0.6	3.2	1.2	2	0.6	1.3	39.2	3	0.8	1.9	35.9	3	0.4	

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Site Code : 00000000
Start Date : 4/27/2016
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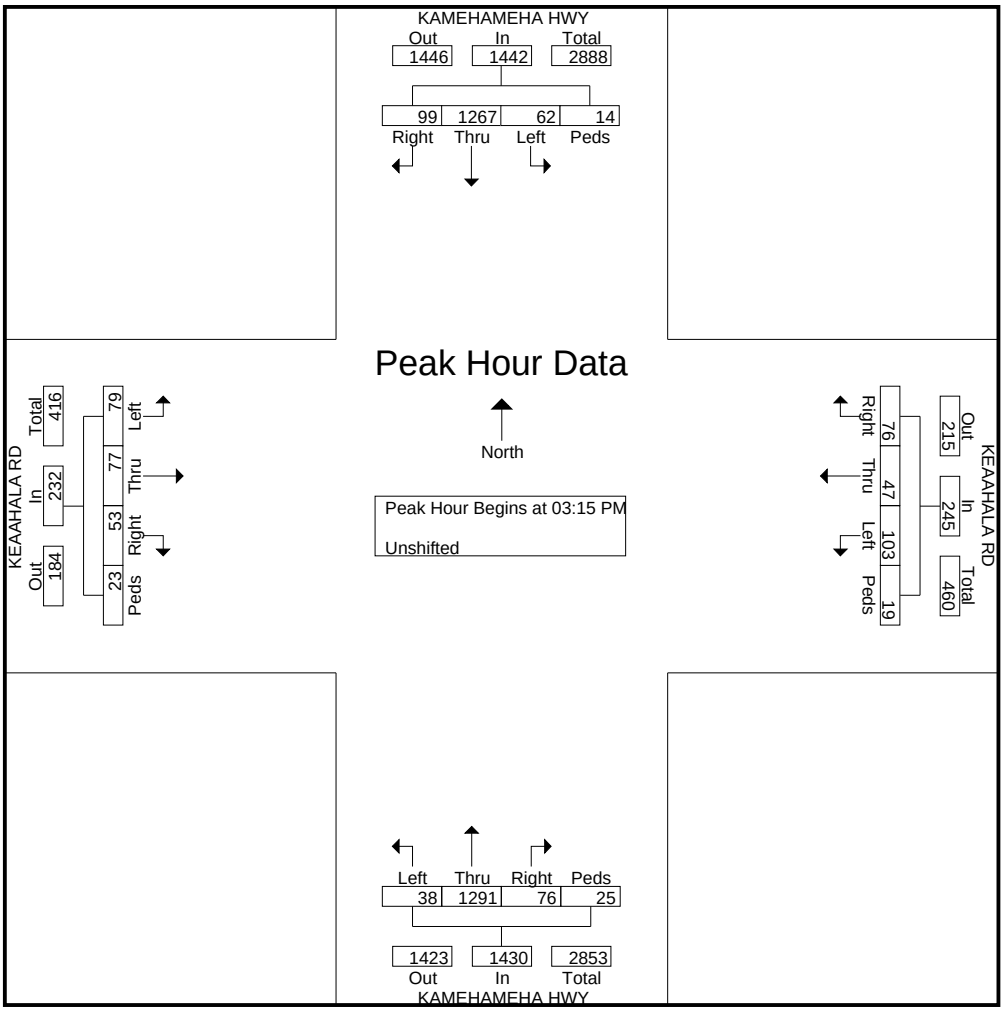
	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					KAMEHAMEHA HWY Northbound					KAMEHAMEHA HWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	**25**	19	7	8	59	28	6	12	**6**	52	6	309	17	5	337	15	**335**	**27**	0	377	825
03:30 PM	12	**26**	11	4	53	**32**	**14**	24	3	73	**13**	305	18	6	342	17	297	21	4	339	807
03:45 PM	20	16	12	**9**	57	28	14	**26**	6	**74**	6	326	**26**	**9**	367	11	306	25	**5**	347	845
04:00 PM	22	16	**23**	2	**63**	15	13	14	4	46	13	**351**	15	5	**384**	**19**	329	26	5	**379**	**872**
Total Volume	79	77	53	23	232	103	47	76	19	245	38	1291	76	25	1430	62	1267	99	14	1442	3349
% App. Total	34.1	33.2	22.8	9.9		42	19.2	31	7.8		2.7	90.3	5.3	1.7		4.3	87.9	6.9	1		
PHF	.790	.740	.576	.639	.921	.805	.839	.731	.792	.828	.731	.920	.731	.694	.931	.816	.946	.917	.700	.951	.960



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File Name : PM_Kaneohe District Park Dwy 1 - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				KANEOHE DISTRICT PARK DWY 1 Northbound				Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	0	100	0	0	4	74	0	0	0	0	0	0	0	0	0	0	178
02:45 PM	0	86	0	0	4	46	0	0	1	0	2	0	0	0	0	0	139
Total	0	186	0	0	8	120	0	0	1	0	2	0	0	0	0	0	317
03:00 PM	0	116	0	0	5	45	0	0	1	0	9	0	0	0	0	0	176
03:15 PM	0	110	1	0	13	48	0	0	0	0	4	0	0	0	0	0	176
03:30 PM	0	93	0	0	12	45	0	0	1	0	5	0	0	0	0	0	156
03:45 PM	0	94	1	0	7	46	0	0	0	0	7	0	0	0	0	0	155
Total	0	413	2	0	37	184	0	0	2	0	25	0	0	0	0	0	663
04:00 PM	0	111	0	0	10	51	0	0	0	0	6	0	0	0	0	0	178
04:15 PM	0	96	1	0	12	65	0	0	1	0	3	0	0	0	0	0	178
04:30 PM	0	120	0	0	18	54	0	0	0	0	10	0	0	0	0	0	202
04:45 PM	0	65	1	0	21	57	0	0	1	0	12	0	0	0	0	0	157
Total	0	392	2	0	61	227	0	0	2	0	31	0	0	0	0	0	715
05:00 PM	0	73	1	0	14	49	0	0	0	0	11	0	0	0	0	0	148
05:15 PM	0	70	2	0	6	86	0	0	0	0	8	0	0	0	0	0	172
Grand Total	0	1134	7	0	126	666	0	0	5	0	77	0	0	0	0	0	2015
Apprch %	0	99.4	0.6	0	15.9	84.1	0	0	6.1	0	93.9	0	0	0	0	0	
Total %	0	56.3	0.3	0	6.3	33.1	0	0	0.2	0	3.8	0	0	0	0	0	

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File Name : PM_Kaneohe District Park Dwy 1 - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
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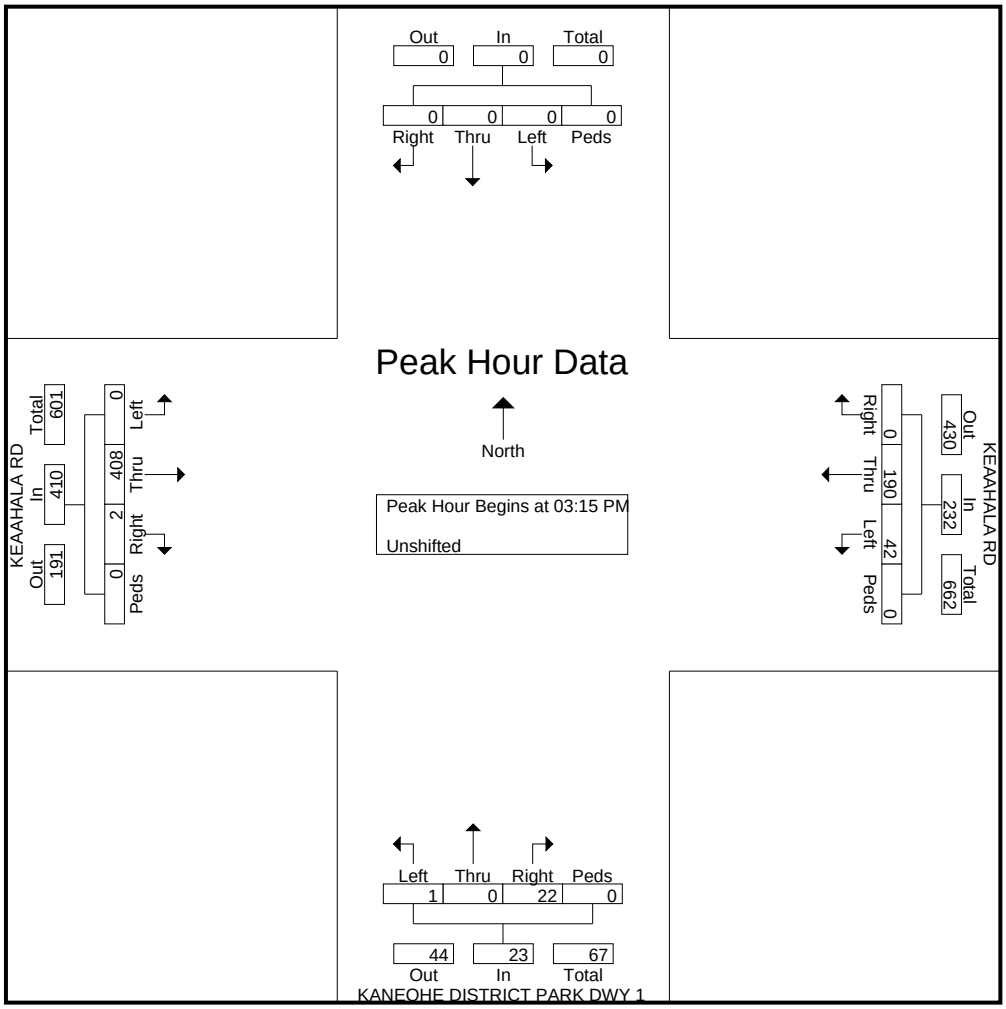
	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					KANEOHE DISTRICT PARK DWY 1 Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	0	110	1	0	111	13	48	0	0	61	0	0	4	0	4	0	0	0	0	0	176
03:30 PM	0	93	0	0	93	12	45	0	0	57	1	0	5	0	6	0	0	0	0	0	156
03:45 PM	0	94	1	0	95	7	46	0	0	53	0	0	7	0	7	0	0	0	0	0	155
04:00 PM	0	111	0	0	111	10	51	0	0	61	0	0	6	0	6	0	0	0	0	0	178
Total Volume	0	408	2	0	410	42	190	0	0	232	1	0	22	0	23	0	0	0	0	0	665
% App. Total	0	99.5	0.5	0		18.1	81.9	0	0		4.3	0	95.7	0		0	0	0	0		
PHF	.000	.919	.500	.000	.923	.808	.931	.000	.000	.951	.250	.000	.786	.000	.821	.000	.000	.000	.000	.000	.934



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File Name : PM_Kaneohe District Park Dwy 2 - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				Northbound				KANEOHE DISTRICT PARK DWY 2 Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	0	82	0	0	0	48	2	0	0	0	0	0	0	0	0	0	132
02:45 PM	1	80	0	0	0	51	1	0	0	0	0	0	1	0	2	0	136
Total	1	162	0	0	0	99	3	0	0	0	0	0	1	0	2	0	268
03:00 PM	2	95	0	0	0	35	4	0	0	0	0	0	6	0	0	0	142
03:15 PM	0	93	0	0	0	30	11	0	0	0	0	0	1	0	0	0	135
03:30 PM	0	83	0	0	0	44	1	0	0	0	0	0	9	0	0	0	137
03:45 PM	0	94	0	0	0	40	4	0	0	0	0	0	5	0	1	0	144
Total	2	365	0	0	0	149	20	0	0	0	0	0	21	0	1	0	558
04:00 PM	0	96	0	0	0	37	13	0	0	0	0	0	15	0	0	0	161
04:15 PM	1	86	0	0	0	41	19	0	0	0	0	0	12	0	1	0	160
04:30 PM	0	119	0	0	0	32	14	0	0	0	0	0	6	0	0	0	171
04:45 PM	1	67	0	0	0	48	5	0	0	0	0	0	4	0	1	0	126
Total	2	368	0	0	0	158	51	0	0	0	0	0	37	0	2	0	618
05:00 PM	0	69	0	0	0	45	8	0	0	0	0	0	3	0	1	0	126
05:15 PM	0	67	0	0	0	80	10	0	0	0	0	0	5	0	0	0	162
Grand Total	5	1031	0	0	0	531	92	0	0	0	0	0	67	0	6	0	1732
Apprch %	0.5	99.5	0	0	0	85.2	14.8	0	0	0	0	0	91.8	0	8.2	0	
Total %	0.3	59.5	0	0	0	30.7	5.3	0	0	0	0	0	3.9	0	0.3	0	

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Site Code : 00000000
Start Date : 4/27/2016
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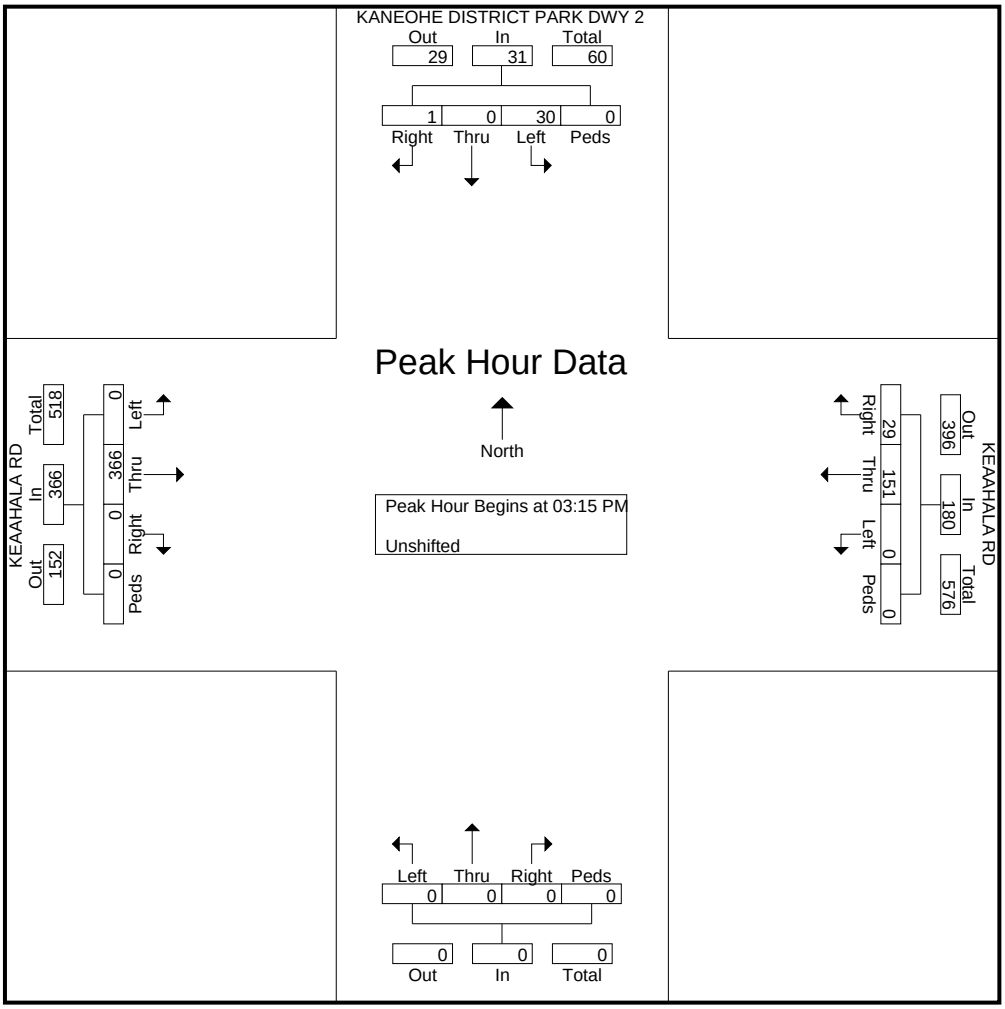
	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					Northbound					KANEOHE DISTRICT PARK DWY 2 Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:15 PM to 04:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	0	93	0	0	93	0	30	11	0	41	0	0	0	0	0	1	0	0	0	1	135
03:30 PM	0	83	0	0	83	0	44	1	0	45	0	0	0	0	0	9	0	0	0	9	137
03:45 PM	0	94	0	0	94	0	40	4	0	44	0	0	0	0	0	5	0	1	0	6	144
04:00 PM	0	96	0	0	96	0	37	13	0	50	0	0	0	0	0	15	0	0	0	15	161
Total Volume	0	366	0	0	366	0	151	29	0	180	0	0	0	0	0	30	0	1	0	31	577
% App. Total	0	100	0	0		0	83.9	16.1	0		0	0	0	0		96.8	0	3.2	0		
PHF	.000	.953	.000	.000	.953	.000	.858	.558	.000	.900	.000	.000	.000	.000	.000	.500	.000	.250	.000	.517	.896



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File Name : PM_Pookela St - HSH Dwy
Site Code : 00000000
Start Date : 4/27/2016
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Groups Printed- Unshifted

	HSH DWY Eastbound				Westbound				POOKELA ST Northbound				POOKELA ST Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	2	0	0	0	0	0	0	0	2	6	0	0	0	9	12	0	31
02:45 PM	2	0	0	0	0	0	0	0	0	7	0	0	0	9	4	0	22
Total	4	0	0	0	0	0	0	0	2	13	0	0	0	18	16	0	53
03:00 PM	6	0	1	0	0	0	0	0	0	10	0	0	0	9	3	0	29
03:15 PM	10	0	1	0	0	0	0	0	0	10	0	0	0	11	1	0	33
03:30 PM	3	0	0	0	0	0	0	0	0	13	0	0	0	17	0	0	33
03:45 PM	3	0	0	0	0	0	0	0	0	13	0	0	0	10	4	0	30
Total	22	0	2	0	0	0	0	0	0	46	0	0	0	47	8	0	125
04:00 PM	7	0	0	0	0	0	0	0	0	12	0	0	0	14	2	0	35
04:15 PM	3	0	0	0	0	0	0	0	0	10	0	0	0	12	0	0	25
04:30 PM	2	0	1	0	0	0	0	0	0	11	0	0	0	5	1	0	20
04:45 PM	2	0	2	0	0	0	0	0	1	9	0	0	0	19	2	0	35
Total	14	0	3	0	0	0	0	0	1	42	0	0	0	50	5	0	115
05:00 PM	4	0	0	0	0	0	0	0	1	6	0	0	0	24	1	0	36
05:15 PM	7	0	0	0	0	0	0	0	0	17	0	0	0	38	6	0	68
Grand Total	51	0	5	0	0	0	0	0	4	124	0	0	0	177	36	0	397
Apprch %	91.1	0	8.9	0	0	0	0	0	3.1	96.9	0	0	0	83.1	16.9	0	
Total %	12.8	0	1.3	0	0	0	0	0	1	31.2	0	0	0	44.6	9.1	0	

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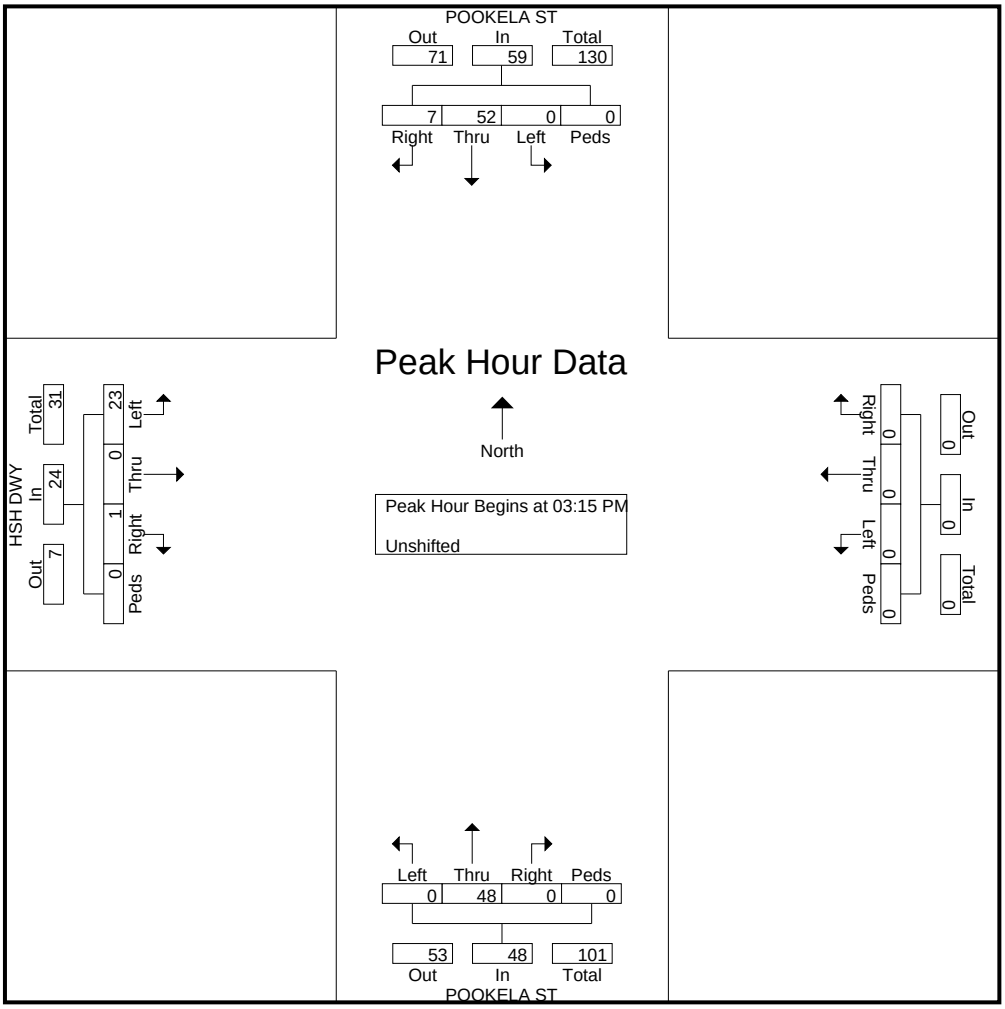
File Name : PM_Pookela St - HSH Dwy
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	HSH DWY Eastbound					Westbound					POOKELA ST Northbound					POOKELA ST Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:15 PM to 04:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	10	0	1	0	11	0	0	0	0	0	0	10	0	0	10	0	11	1	0	12	33
03:30 PM	3	0	0	0	3	0	0	0	0	0	0	13	0	0	13	0	17	0	0	17	33
03:45 PM	3	0	0	0	3	0	0	0	0	0	0	13	0	0	13	0	10	4	0	14	30
04:00 PM	7	0	0	0	7	0	0	0	0	0	0	12	0	0	12	0	14	2	0	16	35
Total Volume	23	0	1	0	24	0	0	0	0	0	0	48	0	0	48	0	52	7	0	59	131
% App. Total	95.8	0	4.2	0		0	0	0	0		0	100	0	0		0	88.1	11.9	0		
PHF	.575	.000	.250	.000	.545	.000	.000	.000	.000	.000	.000	.923	.000	.000	.923	.000	.765	.438	.000	.868	.936



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File Name : PM_WCC Parking Lot Dwy - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
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Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				Northbound				WCC PARKING LOT DWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	1	51	0	0	0	36	5	0	0	0	0	0	22	0	0	8	123
02:45 PM	0	52	0	0	0	33	6	0	0	0	0	0	13	0	0	9	113
Total	1	103	0	0	0	69	11	0	0	0	0	0	35	0	0	17	236
03:00 PM	0	83	0	0	0	21	4	0	0	0	0	0	8	0	1	1	118
03:15 PM	0	69	0	0	0	16	9	0	0	0	0	0	8	0	0	1	103
03:30 PM	0	50	0	0	0	22	1	0	0	0	0	0	7	0	0	3	83
03:45 PM	0	42	0	0	0	23	7	0	0	0	0	0	16	0	3	3	94
Total	0	244	0	0	0	82	21	0	0	0	0	0	39	0	4	8	398
04:00 PM	2	51	0	0	0	20	4	0	0	0	0	0	8	0	2	1	88
04:15 PM	0	46	0	0	0	24	2	0	0	0	0	0	9	0	1	4	86
04:30 PM	1	57	0	0	0	18	5	0	0	0	0	0	8	0	1	3	93
04:45 PM	0	33	0	0	0	20	6	0	0	0	0	0	8	0	0	2	69
Total	3	187	0	0	0	82	17	0	0	0	0	0	33	0	4	10	336
05:00 PM	0	34	0	0	0	9	2	0	0	0	0	0	21	0	1	2	69
05:15 PM	0	32	0	0	0	32	4	0	0	0	0	0	14	0	1	2	85
Grand Total	4	600	0	0	0	274	55	0	0	0	0	0	142	0	10	39	1124
Apprch %	0.7	99.3	0	0	0	83.3	16.7	0	0	0	0	0	74.3	0	5.2	20.4	
Total %	0.4	53.4	0	0	0	24.4	4.9	0	0	0	0	0	12.6	0	0.9	3.5	

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Site Code : 00000000
Start Date : 4/27/2016
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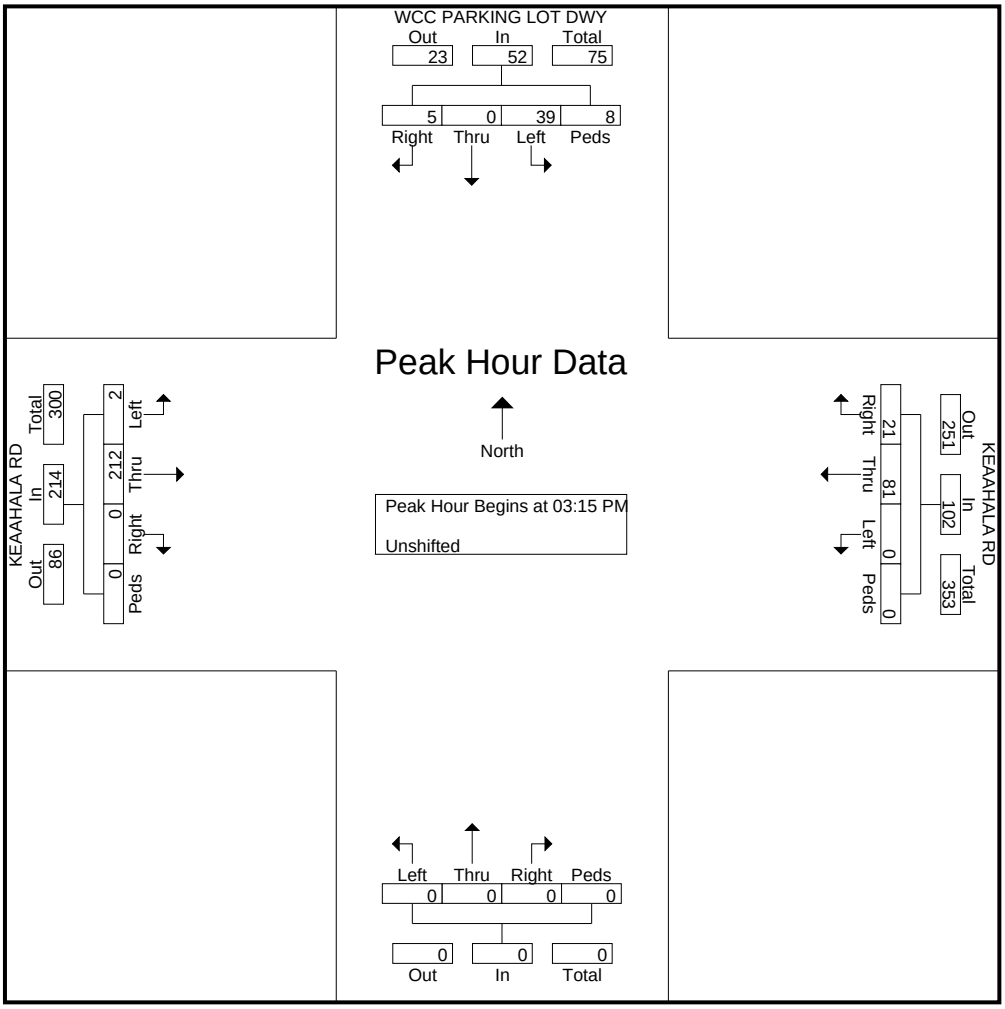
	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					Northbound					WCC PARKING LOT DWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:15 PM to 04:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	0	69	0	0	69	0	16	9	0	25	0	0	0	0	0	8	0	0	1	9	103
03:30 PM	0	50	0	0	50	0	22	1	0	23	0	0	0	0	0	7	0	0	3	10	83
03:45 PM	0	42	0	0	42	0	23	7	0	30	0	0	0	0	0	16	0	3	3	22	94
04:00 PM	2	51	0	0	53	0	20	4	0	24	0	0	0	0	0	8	0	2	1	11	88
Total Volume	2	212	0	0	214	0	81	21	0	102	0	0	0	0	0	39	0	5	8	52	368
% App. Total	0.9	99.1	0	0		0	79.4	20.6	0		0	0	0	0		75	0	9.6	15.4		
PHF	.250	.768	.000	.000	.775	.000	.880	.583	.000	.850	.000	.000	.000	.000	.000	.609	.000	.417	.667	.591	.893



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File Name : PM_WCHC Dwy_Pookela St - Keaahala Rd
Site Code : 00000000
Start Date : 4/27/2016
Page No : 1

Groups Printed- Unshifted

	KEAAHALA RD Eastbound				KEAAHALA RD Westbound				POOKELA ST Northbound				WCHC DWY Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
02:30 PM	0	74	2	0	24	43	3	0	0	0	14	0	2	0	0	0	162
02:45 PM	0	70	0	0	10	36	2	0	0	0	10	0	2	0	0	0	130
Total	0	144	2	0	34	79	5	0	0	0	24	0	4	0	0	0	292
03:00 PM	1	84	0	0	10	27	2	0	0	0	16	0	3	1	2	0	146
03:15 PM	0	81	0	0	18	23	3	0	1	0	31	0	3	0	0	0	160
03:30 PM	0	67	1	0	15	27	2	0	0	0	18	0	2	0	0	0	132
03:45 PM	1	68	3	0	11	29	4	0	0	0	15	0	6	0	0	0	137
Total	2	300	4	0	54	106	11	0	1	0	80	0	14	1	2	0	575
04:00 PM	0	65	1	0	14	22	1	0	1	0	28	0	6	0	1	0	139
04:15 PM	1	52	1	0	16	28	0	0	0	0	18	0	15	0	2	0	133
04:30 PM	0	66	0	0	13	23	0	0	0	0	28	0	22	0	0	0	152
04:45 PM	0	44	0	0	26	30	0	0	0	0	16	0	4	0	0	0	120
Total	1	227	2	0	69	103	1	0	1	0	90	0	47	0	3	0	544
05:00 PM	0	58	0	0	32	11	0	0	0	0	13	0	3	0	0	0	117
05:15 PM	0	46	1	0	39	41	0	0	0	0	22	0	0	0	0	0	149
Grand Total	3	775	9	0	228	340	17	0	2	0	229	0	68	1	5	0	1677
Apprch %	0.4	98.5	1.1	0	39	58.1	2.9	0	0.9	0	99.1	0	91.9	1.4	6.8	0	
Total %	0.2	46.2	0.5	0	13.6	20.3	1	0	0.1	0	13.7	0	4.1	0.1	0.3	0	

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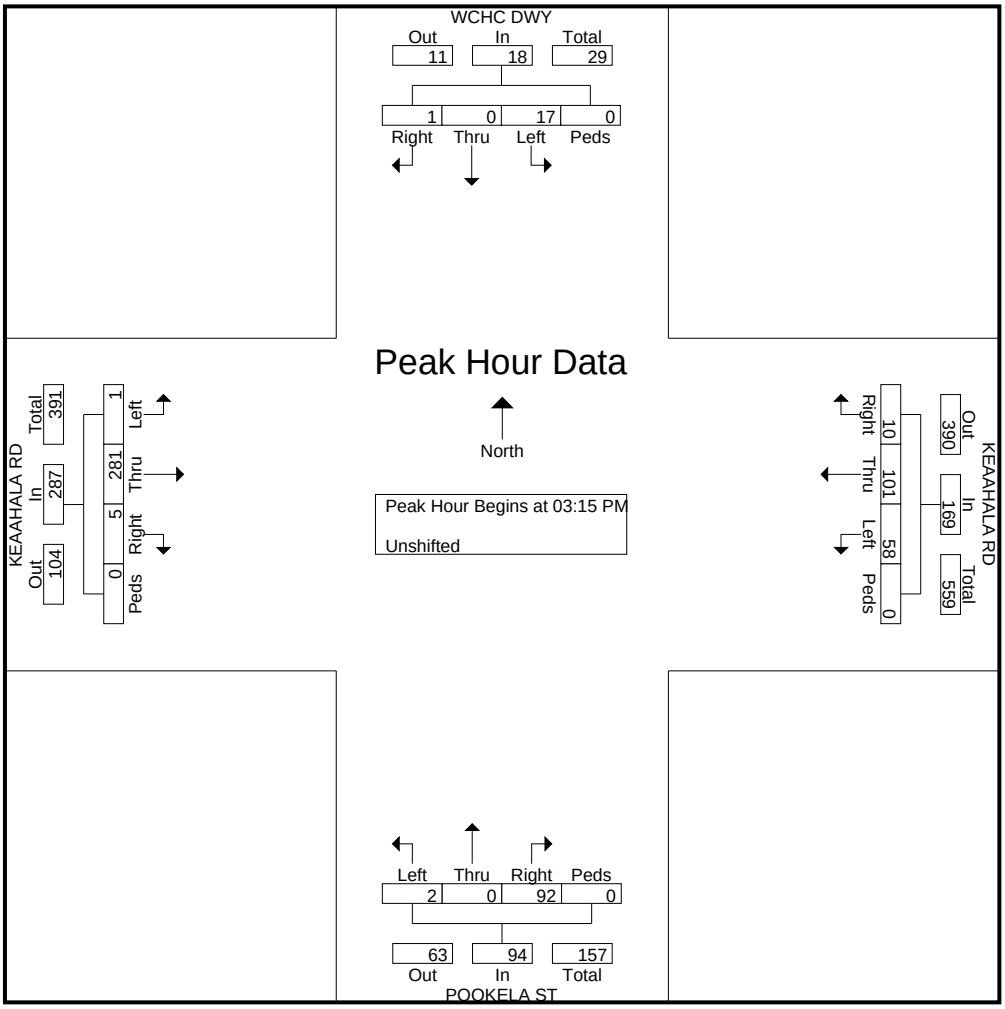
Site Code : 00000000
Start Date : 4/27/2016
Page No : 2

	KEAAHALA RD Eastbound					KEAAHALA RD Westbound					POOKELA ST Northbound					WCHC DWY Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:15 PM to 04:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	0	81	0	0	81	18	23	3	0	44	1	0	31	0	32	3	0	0	0	3	160
03:30 PM	0	67	1	0	68	15	27	2	0	44	0	0	18	0	18	2	0	0	0	2	132
03:45 PM	1	68	3	0	72	11	29	4	0	44	0	0	15	0	15	6	0	0	0	6	137
04:00 PM	0	65	1	0	66	14	22	1	0	37	1	0	28	0	29	6	0	1	0	7	139
Total Volume	1	281	5	0	287	58	101	10	0	169	2	0	92	0	94	17	0	1	0	18	568
% App. Total	0.3	97.9	1.7	0		34.3	59.8	5.9	0		2.1	0	97.9	0		94.4	0	5.6	0		
PHF	.250	.867	.417	.000	.886	.806	.871	.625	.000	.960	.500	.000	.742	.000	.734	.708	.000	.250	.000	.643	.888



APPENDIX B

LEVEL OF SERVICE CRITERIA

APPENDIX B – LEVEL OF SERVICE (LOS) CRITERIA

VEHICULAR LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS (HCM 2010)

Level of service for vehicles at signalized intersections is directly related to delay values and is assigned on that basis. Level of Service is a measure of the acceptability of delay values to motorists at a given intersection. The criteria are given in the table below.

Level-of Service Criteria for Signalized Intersections

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

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

VEHICULAR LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM 2010)

The level of service criteria for vehicles at unsignalized intersections is defined as the average control delay, in seconds per vehicle.

LOS delay threshold values are lower for two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections than those of signalized intersections. This is because more vehicles pass through signalized intersections, and therefore, drivers expect and tolerate greater delays. While the criteria for level of service for TWSC and AWSC intersections are the same, procedures to calculate the average total delay may differ.

Level of Service Criteria for Two-Way Stop-Controlled Intersections

Level of Service	Average Control Delay (sec/veh)
A	≤ 10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	> 50

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	921	0	0	933	584	0	877	0	0	494	1519
Future Volume (veh/h)	0	921	0	0	933	584	0	877	0	0	494	1519
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	0	1863	0	0	1863	1863	0	1863	0	0	1863	1863
Adj Flow Rate, veh/h	0	1001	0	0	1014	0	0	953	0	0	537	0
Adj No. of Lanes	0	3	0	0	2	1	0	2	0	0	1	2
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, %	0	2	0	0	2	2	0	2	0	0	2	2
Cap, veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
Arrive On Green	0.00	0.45	0.00	0.00	0.45	0.00	0.00	0.47	0.00	0.00	0.47	0.00
Sat Flow, veh/h	0	5421	0	0	3632	1583	0	3725	0	0	1863	2787
Grp Volume(v), veh/h	0	1001	0	0	1014	0	0	953	0	0	537	0
Grp Sat Flow(s),veh/h/ln	0	1695	0	0	1770	1583	0	1770	0	0	1863	1393
Q Serve(g_s), s	0.0	20.1	0.0	0.0	32.9	0.0	0.0	29.5	0.0	0.0	32.4	0.0
Cycle Q Clear(g_c), s	0.0	20.1	0.0	0.0	32.9	0.0	0.0	29.5	0.0	0.0	32.4	0.0
Prop In Lane	0.00		0.00	0.00		1.00	0.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
V/C Ratio(X)	0.00	0.43	0.00	0.00	0.63	0.00	0.00	0.58	0.00	0.00	0.62	0.00
Avail Cap(c_a), veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
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)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	27.9	0.0	0.0	31.4	0.0	0.0	29.2	0.0	0.0	30.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.0	0.0	1.9	0.0	0.0	1.5	0.0	0.0	3.3	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	0.0	9.5	0.0	0.0	16.5	0.0	0.0	14.8	0.0	0.0	17.4	0.0
LnGrp Delay(d),s/veh	0.0	28.5	0.0	0.0	33.3	0.0	0.0	30.7	0.0	0.0	33.3	0.0
LnGrp LOS		C			C			C			C	
Approach Vol, veh/h		1001			1014			953			537	
Approach Delay, s/veh		28.5			33.3			30.7			33.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		74.0		76.0		74.0		76.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		68.0		70.0		68.0		70.0
Max Q Clear Time (g_c+I1), s		22.1		34.4		34.9		31.5
Green Ext Time (p_c), s		23.7		14.0		19.8		14.4

Intersection Summary	
HCM 2010 Ctrl Delay	31.2
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	12	13	54	6	70	5	1401	39	112	1903	4
Future Volume (veh/h)	14	12	13	54	6	70	5	1401	39	112	1903	4
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900
Adj Flow Rate, veh/h	15	13	14	59	7	76	5	1523	42	122	2068	4
Adj No. of Lanes	0	1	1	0	1	1	1	3	0	1	3	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	200	163	336	303	33	443	22	3121	86	142	3569	7
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.01	0.61	0.61	0.08	0.68	0.68
Sat Flow, veh/h	814	814	1583	1288	168	1583	1774	5088	140	1774	5241	10
Grp Volume(v), veh/h	28	0	14	66	0	76	5	1015	550	122	1338	734
Grp Sat Flow(s),veh/h/ln	1628	0	1583	1455	0	1583	1774	1695	1838	1774	1695	1861
Q Serve(g_s), s	0.0	0.0	1.1	3.5	0.0	5.4	0.4	24.8	24.8	10.2	31.2	31.2
Cycle Q Clear(g_c), s	1.8	0.0	1.1	5.3	0.0	5.4	0.4	24.8	24.8	10.2	31.2	31.2
Prop In Lane	0.54		1.00	0.89		1.00	1.00		0.08	1.00		0.01
Lane Grp Cap(c), veh/h	362	0	336	336	0	443	22	2080	1127	142	2308	1267
V/C Ratio(X)	0.08	0.00	0.04	0.20	0.00	0.17	0.22	0.49	0.49	0.86	0.58	0.58
Avail Cap(c_a), veh/h	489	0	463	451	0	570	118	2080	1127	142	2308	1267
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.7	0.0	46.9	50.0	0.0	40.9	73.3	16.0	16.0	68.2	12.6	12.6
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.3	0.0	0.2	5.0	0.8	1.5	37.9	1.1	1.9
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	1.0	0.0	0.5	2.3	0.0	2.4	0.2	11.8	13.0	6.5	14.8	16.6
LnGrp Delay(d),s/veh	48.8	0.0	47.0	50.3	0.0	41.0	78.3	16.8	17.5	106.0	13.7	14.6
LnGrp LOS	D		D	D		D	E	B	B	F	B	B
Approach Vol, veh/h		42			142			1570			2194	
Approach Delay, s/veh		48.2			45.3			17.3			19.1	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	108.1		35.0	17.0	98.0		35.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	10.0	82.0		42.0	12.0	80.0		42.0
Max Q Clear Time (g_c+I1), s	2.4	33.2		7.4	12.2	26.8		3.8
Green Ext Time (p_c), s	0.0	48.3		0.8	0.0	52.6		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	19.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	37	66	145	94	45	326	1124	55	85	1676	157
Future Volume (veh/h)	36	37	66	145	94	45	326	1124	55	85	1676	157
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	39	40	72	158	102	49	354	1222	60	92	1822	171
Adj No. of Lanes	1	1	1	1	1	0	1	3	0	1	3	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	144	293	618	237	187	90	414	3339	164	113	2379	222
Arrive On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.23	0.67	0.67	0.06	0.50	0.50
Sat Flow, veh/h	1231	1863	1583	1362	1190	572	1774	4966	244	1774	4732	442
Grp Volume(v), veh/h	39	40	72	158	0	151	354	834	448	92	1303	690
Grp Sat Flow(s),veh/h/ln	1231	1863	1583	1362	0	1762	1774	1695	1820	1774	1695	1785
Q Serve(g_s), s	4.5	2.8	4.4	17.0	0.0	11.8	28.7	16.0	16.0	7.7	46.6	47.0
Cycle Q Clear(g_c), s	16.4	2.8	4.4	19.7	0.0	11.8	28.7	16.0	16.0	7.7	46.6	47.0
Prop In Lane	1.00		1.00	1.00		0.32	1.00		0.13	1.00		0.25
Lane Grp Cap(c), veh/h	144	293	618	237	0	277	414	2280	1224	113	1704	897
V/C Ratio(X)	0.27	0.14	0.12	0.67	0.00	0.54	0.86	0.37	0.37	0.81	0.76	0.77
Avail Cap(c_a), veh/h	287	509	802	395	0	482	414	2280	1224	177	1704	897
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	1.00	0.68	0.68	0.68
Uniform Delay (d), s/veh	65.8	54.4	29.2	62.9	0.0	58.3	55.1	10.7	10.7	69.4	30.1	30.2
Incr Delay (d2), s/veh	1.0	0.2	0.1	3.2	0.0	1.7	15.9	0.5	0.8	10.4	2.3	4.4
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	1.6	1.5	1.9	6.6	0.0	5.9	15.9	7.6	8.3	4.1	22.3	24.1
LnGrp Delay(d),s/veh	66.8	54.6	29.3	66.1	0.0	59.9	71.0	11.1	11.5	79.8	32.4	34.6
LnGrp LOS	E	D	C	E		E	E	B	B	E	C	C
Approach Vol, veh/h		151			309			1636			2085	
Approach Delay, s/veh		45.7			63.1			24.2			35.2	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	40.0	81.4		28.6	14.5	106.9		28.6
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	35.0	58.0		41.0	15.0	78.0		41.0
Max Q Clear Time (g_c+I1), s	30.7	49.0		21.7	9.7	18.0		18.4
Green Ext Time (p_c), s	0.5	8.9		1.9	0.1	58.3		1.9

Intersection Summary	
HCM 2010 Ctrl Delay	33.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	47	221	274	27	16	138	719	310	56	1448	8
Future Volume (veh/h)	13	47	221	274	27	16	138	719	310	56	1448	8
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1863	1863	1900	1863	1863	1900	1863	1618	1650
Adj Flow Rate, veh/h	14	51	240	298	29	17	150	782	337	61	1574	9
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	1	3	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	130	458	659	369	353	207	170	1849	791	78	2162	12
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.19	1.00	1.00	0.04	0.48	0.48
Sat Flow, veh/h	315	1429	1583	1084	1102	646	1774	3494	1495	1774	4531	26
Grp Volume(v), veh/h	65	0	240	298	0	46	150	758	361	61	1023	560
Grp Sat Flow(s),veh/h/ln	1744	0	1583	1084	0	1749	1774	1695	1599	1774	1472	1613
Q Serve(g_s), s	0.0	0.0	15.6	40.1	0.0	2.8	12.3	0.0	0.0	5.1	41.7	41.7
Cycle Q Clear(g_c), s	3.7	0.0	15.6	43.7	0.0	2.8	12.3	0.0	0.0	5.1	41.7	41.7
Prop In Lane	0.22		1.00	1.00		0.37	1.00		0.93	1.00		0.02
Lane Grp Cap(c), veh/h	588	0	659	369	0	560	170	1793	846	78	1405	770
V/C Ratio(X)	0.11	0.00	0.36	0.81	0.00	0.08	0.88	0.42	0.43	0.79	0.73	0.73
Avail Cap(c_a), veh/h	702	0	764	440	0	676	177	1793	846	118	1405	770
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.9	0.0	30.1	51.3	0.0	35.6	59.9	0.0	0.0	71.0	31.4	31.4
Incr Delay (d2), s/veh	0.1	0.0	0.3	9.2	0.0	0.1	34.0	0.7	1.4	17.3	3.3	6.0
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	1.9	0.0	6.9	12.9	0.0	1.3	7.6	0.2	0.3	2.9	17.6	19.8
LnGrp Delay(d),s/veh	36.0	0.0	30.5	60.4	0.0	35.6	93.9	0.7	1.4	88.3	34.7	37.4
LnGrp LOS	D		C	E		D	F	A	A	F	C	D
Approach Vol, veh/h		305			344			1269			1644	
Approach Delay, s/veh		31.6			57.1			11.9			37.6	
Approach LOS		C			E			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	19.3	77.6		53.1	11.6	85.4		53.1
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	15.0	61.0		58.0	10.0	66.0		58.0
Max Q Clear Time (g_c+I1), s	14.3	43.7		45.7	7.1	2.0		17.6
Green Ext Time (p_c), s	0.0	16.8		2.3	0.0	58.3		3.0

Intersection Summary	
HCM 2010 Ctrl Delay	29.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	80	95	381	77	160	47	554	199	177	1009	32
Future Volume (veh/h)	26	80	95	381	77	160	47	554	199	177	1009	32
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1863	1863	1863	1863	1863	1900	1863	1569	1600
Adj Flow Rate, veh/h	28	87	103	414	84	174	51	602	216	192	1097	35
Adj No. of Lanes	0	1	1	1	1	1	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	154	463	764	426	671	628	65	1016	364	217	1424	45
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.04	0.40	0.40	0.12	0.48	0.48
Sat Flow, veh/h	345	1287	1583	1188	1863	1583	1774	2555	915	1774	2948	94
Grp Volume(v), veh/h	115	0	103	414	84	174	51	417	401	192	554	578
Grp Sat Flow(s),veh/h/ln	1632	0	1583	1188	1863	1583	1774	1770	1701	1774	1490	1552
Q Serve(g_s), s	0.1	0.0	5.4	47.7	4.5	11.2	4.3	27.8	27.9	16.0	45.9	46.0
Cycle Q Clear(g_c), s	6.3	0.0	5.4	54.0	4.5	11.2	4.3	27.8	27.9	16.0	45.9	46.0
Prop In Lane	0.24		1.00	1.00		1.00	1.00		0.54	1.00		0.06
Lane Grp Cap(c), veh/h	617	0	764	426	671	628	65	704	676	217	720	750
V/C Ratio(X)	0.19	0.00	0.13	0.97	0.13	0.28	0.78	0.59	0.59	0.88	0.77	0.77
Avail Cap(c_a), veh/h	617	0	764	426	671	628	83	704	676	260	720	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	0.00	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	32.7	0.0	21.5	53.3	32.2	30.7	71.6	35.6	35.6	64.8	31.9	31.9
Incr Delay (d2), s/veh	0.3	0.0	0.2	36.7	0.2	0.5	23.2	3.6	3.8	29.1	7.8	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	3.3	0.0	2.4	21.5	2.4	5.0	2.5	14.3	13.9	9.6	20.3	21.3
LnGrp Delay(d),s/veh	33.0	0.0	21.7	89.9	32.3	31.2	94.8	39.2	39.4	93.9	39.7	39.4
LnGrp LOS	C		C	F	C	C	F	D	D	F	D	D
Approach Vol, veh/h		218			672			869			1324	
Approach Delay, s/veh		27.7			67.5			42.6			47.4	
Approach LOS		C			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.5	78.5		60.0	24.4	65.6		60.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	71.0		54.0	22.0	56.0		54.0
Max Q Clear Time (g_c+I1), s	6.3	48.0		8.3	18.0	29.9		56.0
Green Ext Time (p_c), s	0.0	20.0		10.4	0.4	22.3		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.0
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	50	55	99	98	37	76	932	93	27	1004	139
Future Volume (veh/h)	62	50	55	99	98	37	76	932	93	27	1004	139
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	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	67	54	60	108	107	40	83	1013	101	29	1091	151
Adj No. of Lanes	0	1	0	1	1	0	1	2	1	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	100	81	74	205	252	94	103	2447	1095	37	2045	283
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.06	0.69	0.69	0.02	0.65	0.65
Sat Flow, veh/h	347	416	378	1273	1294	484	1774	3539	1583	1774	3124	432
Grp Volume(v), veh/h	181	0	0	108	0	147	83	1013	101	29	617	625
Grp Sat Flow(s),veh/h/ln	1141	0	0	1273	0	1777	1774	1770	1583	1774	1770	1787
Q Serve(g_s), s	13.6	0.0	0.0	0.0	0.0	10.9	6.9	18.6	3.2	2.4	27.8	27.9
Cycle Q Clear(g_c), s	24.5	0.0	0.0	21.3	0.0	10.9	6.9	18.6	3.2	2.4	27.8	27.9
Prop In Lane	0.37		0.33	1.00		0.27	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	255	0	0	205	0	346	103	2447	1095	37	1158	1169
V/C Ratio(X)	0.71	0.00	0.00	0.53	0.00	0.43	0.81	0.41	0.09	0.79	0.53	0.53
Avail Cap(c_a), veh/h	413	0	0	340	0	533	248	2447	1095	189	1158	1169
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.3	0.0	0.0	57.3	0.0	53.1	69.9	10.0	7.6	73.1	13.7	13.8
Incr Delay (d2), s/veh	4.4	0.0	0.0	2.5	0.0	1.0	5.6	0.5	0.2	12.7	1.8	1.8
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	7.6	0.0	0.0	4.4	0.0	5.4	3.6	9.2	1.4	1.3	14.1	14.3
LnGrp Delay(d),s/veh	64.7	0.0	0.0	59.8	0.0	54.1	75.5	10.5	7.8	85.8	15.5	15.5
LnGrp LOS	E			E		D	E	B	A	F	B	B
Approach Vol, veh/h		181			255			1197			1271	
Approach Delay, s/veh		64.7			56.5			14.8			17.1	
Approach LOS		E			E			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.1	108.7		34.2	12.7	103.2		34.2
Change Period (Y+Rc), s	4.0	5.0		5.0	4.0	5.0		5.0
Max Green Setting (Gmax), s	16.0	75.0		45.0	21.0	70.0		45.0
Max Q Clear Time (g_c+I1), s	14.4	20.6		26.5	8.9	29.9		23.3
Green Ext Time (p_c), s	0.0	36.1		2.7	0.0	29.2		2.8

Intersection Summary	
HCM 2010 Ctrl Delay	22.6
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	57	366	67	5	1
Future Vol, veh/h	1	57	366	67	5	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	62	398	73	5	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	471	0	-	0	498	434
Stage 1	-	-	-	-	434	-
Stage 2	-	-	-	-	64	-
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	1091	-	-	-	532	622
Stage 1	-	-	-	-	653	-
Stage 2	-	-	-	-	959	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1091	-	-	-	532	622
Mov Cap-2 Maneuver	-	-	-	-	532	-
Stage 1	-	-	-	-	653	-
Stage 2	-	-	-	-	958	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1091	-	-	-	545
HCM Lane V/C Ratio	0.001	-	-	-	0.012
HCM Control Delay (s)	8.3	-	-	-	11.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	64	4	129	413	46	2	3	56	10	0	2
Future Vol, veh/h	5	64	4	129	413	46	2	3	56	10	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	70	4	140	449	50	2	3	61	11	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	499	0	0	74	0	0	838	862	72	869	839	474
Stage 1	-	-	-	-	-	-	83	83	-	754	754	-
Stage 2	-	-	-	-	-	-	755	779	-	115	85	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1065	-	-	1526	-	-	286	293	990	272	302	590
Stage 1	-	-	-	-	-	-	925	826	-	401	417	-
Stage 2	-	-	-	-	-	-	401	406	-	890	824	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1065	-	-	1526	-	-	264	265	990	234	273	590
Mov Cap-2 Maneuver	-	-	-	-	-	-	264	265	-	234	273	-
Stage 1	-	-	-	-	-	-	921	822	-	399	379	-
Stage 2	-	-	-	-	-	-	363	369	-	828	820	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	1.7	9.9	19.6
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	808	1065	-	-	1526	-	-	260
HCM Lane V/C Ratio	0.082	0.005	-	-	0.092	-	-	0.05
HCM Control Delay (s)	9.9	8.4	-	-	7.6	-	-	19.6
HCM Lane LOS	A	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.3	-	-	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	116	581	15	9	6
Future Volume (veh/h)	2	116	581	15	9	6
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	1900
Adj Flow Rate, veh/h	2	126	632	16	10	7
Adj No. of Lanes	1	1	1	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	205	784	761	19	375	262
Arrive On Green	0.42	0.42	0.42	0.42	0.40	0.40
Sat Flow, veh/h	780	1863	1809	46	944	661
Grp Volume(v), veh/h	2	126	0	648	18	0
Grp Sat Flow(s),veh/h/ln	780	1863	0	1855	1699	0
Q Serve(g_s), s	0.1	2.5	0.0	18.8	0.4	0.0
Cycle Q Clear(g_c), s	18.9	2.5	0.0	18.8	0.4	0.0
Prop In Lane	1.00			0.02	0.56	0.39
Lane Grp Cap(c), veh/h	205	784	0	780	675	0
V/C Ratio(X)	0.01	0.16	0.00	0.83	0.03	0.00
Avail Cap(c_a), veh/h	328	1079	0	1090	675	0
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	24.0	10.9	0.0	15.6	11.1	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	3.9	0.1	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	0.0	1.3	0.0	10.4	0.2	0.0
LnGrp Delay(d),s/veh	24.0	11.0	0.0	19.5	11.2	0.0
LnGrp LOS	C	B		B	B	
Approach Vol, veh/h		128	648		18	
Approach Delay, s/veh		11.2	19.5		11.2	
Approach LOS		B	B		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		30.4		30.0		30.4		
Change Period (Y+Rc), s		5.0		6.0		* 5		
Max Green Setting (Gmax), s		35.0		24.0		* 36		
Max Q Clear Time (g_c+I1), s		20.9		2.4		20.8		
Green Ext Time (p_c), s		4.5		0.0		4.6		

Intersection Summary	
HCM 2010 Ctrl Delay	18.0
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	131	0	43	583	0	0
Future Vol, veh/h	131	0	43	583	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	142	0	47	634	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	142	0	-	142
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	1441	-	0	906
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1441	-	-	906
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1441	-
HCM Lane V/C Ratio	-	-	-	0.032	-
HCM Control Delay (s)	0	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	⚒	
Traffic Vol, veh/h	131	0	0	626	4	24
Future Vol, veh/h	131	0	0	626	4	24
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	142	0	0	680	4	26

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	822	142
Stage 1	-	-	-	-	142	-
Stage 2	-	-	-	-	680	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	344	906
Stage 1	-	0	0	-	885	-
Stage 2	-	0	0	-	503	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	344	906
Mov Cap-2 Maneuver	-	-	-	-	344	-
Stage 1	-	-	-	-	885	-
Stage 2	-	-	-	-	503	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	735	-	-
HCM Lane V/C Ratio	0.041	-	-
HCM Control Delay (s)	10.1	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	3	2	51	44	50
Future Vol, veh/h	2	3	2	51	44	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	3	2	55	48	54

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	135	75	102	0	-	0
Stage 1	75	-	-	-	-	-
Stage 2	60	-	-	-	-	-
Critical Hdwy	7.12	6.22	4.12	-	-	-
Critical Hdwy Stg 1	6.12	-	-	-	-	-
Critical Hdwy Stg 2	6.12	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	836	986	1490	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	951	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	835	986	1490	-	-	-
Mov Cap-2 Maneuver	835	-	-	-	-	-
Stage 1	933	-	-	-	-	-
Stage 2	950	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1490	-	919	-	-
HCM Lane V/C Ratio	0.001	-	0.006	-	-
HCM Control Delay (s)	7.4	0	8.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	41	2	24	3	0	82
Future Vol, veh/h	41	2	24	3	0	82
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	2	26	3	0	89

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	117	28	0	0	29	0
Stage 1	28	-	-	-	-	-
Stage 2	89	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	879	1047	-	-	1584	-
Stage 1	995	-	-	-	-	-
Stage 2	934	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	879	1047	-	-	1584	-
Mov Cap-2 Maneuver	879	-	-	-	-	-
Stage 1	995	-	-	-	-	-
Stage 2	934	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	886	1584	-
HCM Lane V/C Ratio	-	-	0.053	-	-
HCM Control Delay (s)	-	-	9.3	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1471	0	0	472	523	0	1814	0	0	477	981
Future Volume (veh/h)	0	1471	0	0	472	523	0	1814	0	0	477	981
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	0	1863	0	0	1863	1863	0	1674	0	0	1863	1863
Adj Flow Rate, veh/h	0	1599	0	0	513	0	0	1972	0	0	518	0
Adj No. of Lanes	0	3	0	0	2	1	0	2	0	0	1	2
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, %	0	2	0	0	2	2	0	2	0	0	2	2
Cap, veh/h	0	1689	0	0	1175	526	0	1848	0	0	1083	1620
Arrive On Green	0.00	0.33	0.00	0.00	0.33	0.00	0.00	0.58	0.00	0.00	0.97	0.00
Sat Flow, veh/h	0	5421	0	0	3632	1583	0	3347	0	0	1863	2787
Grp Volume(v), veh/h	0	1599	0	0	513	0	0	1972	0	0	518	0
Grp Sat Flow(s),veh/h/ln	0	1695	0	0	1770	1583	0	1590	0	0	1863	1393
Q Serve(g_s), s	0.0	46.0	0.0	0.0	17.0	0.0	0.0	87.2	0.0	0.0	2.3	0.0
Cycle Q Clear(g_c), s	0.0	46.0	0.0	0.0	17.0	0.0	0.0	87.2	0.0	0.0	2.3	0.0
Prop In Lane	0.00		0.00	0.00		1.00	0.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	1689	0	0	1175	526	0	1848	0	0	1083	1620
V/C Ratio(X)	0.00	0.95	0.00	0.00	0.44	0.00	0.00	1.07	0.00	0.00	0.48	0.00
Avail Cap(c_a), veh/h	0	1695	0	0	1180	528	0	1848	0	0	1083	1620
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67
Upstream Filter(I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.91	0.00
Uniform Delay (d), s/veh	0.0	48.8	0.0	0.0	39.1	0.0	0.0	31.4	0.0	0.0	1.0	0.0
Incr Delay (d2), s/veh	0.0	11.6	0.0	0.0	0.3	0.0	0.0	41.4	0.0	0.0	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	0.0	23.3	0.0	0.0	8.4	0.0	0.0	48.6	0.0	0.0	1.3	0.0
LnGrp Delay(d),s/veh	0.0	60.4	0.0	0.0	39.4	0.0	0.0	72.8	0.0	0.0	2.3	0.0
LnGrp LOS		E			D			F			A	
Approach Vol, veh/h		1599			513			1972			518	
Approach Delay, s/veh		60.4			39.4			72.8			2.3	
Approach LOS		E			D			E			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		93.2		56.8		93.2		56.8
Change Period (Y+Rc), s		6.0		7.0		6.0		7.0
Max Green Setting (Gmax), s		87.0		50.0		87.0		50.0
Max Q Clear Time (g_c+I1), s		89.2		48.0		4.3		19.0
Green Ext Time (p_c), s		0.0		1.9		51.0		19.6

Intersection Summary	
HCM 2010 Ctrl Delay	56.9
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	3	9	19	18	40	16	2226	97	101	1403	9
Future Volume (veh/h)	6	3	9	19	18	40	16	2226	97	101	1403	9
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900
Adj Flow Rate, veh/h	7	3	10	21	20	43	17	2420	105	110	1525	10
Adj No. of Lanes	0	1	1	0	1	1	1	3	0	1	3	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	245	98	366	187	168	418	60	3146	136	118	3451	23
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.07	1.00	1.00	0.07	0.66	0.66
Sat Flow, veh/h	1035	497	1583	766	849	1583	1774	5000	215	1774	5213	34
Grp Volume(v), veh/h	10	0	10	41	0	43	17	1635	890	110	992	543
Grp Sat Flow(s),veh/h/ln	1532	0	1583	1615	0	1583	1774	1695	1825	1774	1695	1857
Q Serve(g_s), s	0.0	0.0	0.7	0.9	0.0	3.1	1.4	0.0	0.0	9.3	21.0	21.0
Cycle Q Clear(g_c), s	0.6	0.0	0.7	2.8	0.0	3.1	1.4	0.0	0.0	9.3	21.0	21.0
Prop In Lane	0.70		1.00	0.51		1.00	1.00		0.12	1.00		0.02
Lane Grp Cap(c), veh/h	343	0	366	355	0	418	60	2133	1148	118	2245	1229
V/C Ratio(X)	0.03	0.00	0.03	0.12	0.00	0.10	0.28	0.77	0.77	0.93	0.44	0.44
Avail Cap(c_a), veh/h	467	0	497	487	0	549	118	2133	1148	118	2245	1229
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.29	0.29	0.29	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.6	0.0	44.6	49.4	0.0	41.8	68.2	0.0	0.0	69.7	12.1	12.1
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.1	0.0	0.1	0.7	0.8	1.6	61.2	0.6	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	0.3	0.0	0.3	1.4	0.0	1.4	0.7	0.2	0.5	6.6	10.0	11.1
LnGrp Delay(d),s/veh	48.6	0.0	44.6	49.6	0.0	41.9	68.9	0.8	1.6	130.9	12.7	13.3
LnGrp LOS	D		D	D		D	E	A	A	F	B	B
Approach Vol, veh/h		20			84			2542			1645	
Approach Delay, s/veh		46.6			45.6			1.5			20.8	
Approach LOS		D			D			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.1	105.3		34.6	15.0	100.4		34.6
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	10.0	82.0		42.0	10.0	82.0		42.0
Max Q Clear Time (g_c+I1), s	3.4	23.0		5.1	11.3	2.0		2.7
Green Ext Time (p_c), s	0.0	58.8		0.4	0.0	79.5		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	10.0
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	64	262	94	50	128	101	2004	163	114	1188	82
Future Volume (veh/h)	114	64	262	94	50	128	101	2004	163	114	1188	82
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	124	70	285	102	54	139	110	2178	177	124	1291	89
Adj No. of Lanes	1	1	1	1	1	0	1	3	0	1	3	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	249	497	631	291	123	317	234	2608	210	148	2404	166
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.13	0.54	0.54	0.08	0.49	0.49
Sat Flow, veh/h	1185	1863	1583	1022	462	1190	1774	4799	386	1774	4859	335
Grp Volume(v), veh/h	124	70	285	102	0	193	110	1532	823	124	901	479
Grp Sat Flow(s),veh/h/ln	1185	1863	1583	1022	0	1653	1774	1695	1795	1774	1695	1804
Q Serve(g_s), s	14.6	4.3	19.8	12.7	0.0	14.5	8.6	56.5	58.0	10.3	27.4	27.4
Cycle Q Clear(g_c), s	29.1	4.3	19.8	17.0	0.0	14.5	8.6	56.5	58.0	10.3	27.4	27.4
Prop In Lane	1.00		1.00	1.00		0.72	1.00		0.22	1.00		0.19
Lane Grp Cap(c), veh/h	249	497	631	291	0	441	234	1842	975	148	1677	892
V/C Ratio(X)	0.50	0.14	0.45	0.35	0.00	0.44	0.47	0.83	0.84	0.84	0.54	0.54
Avail Cap(c_a), veh/h	289	559	684	325	0	496	378	1842	975	296	1677	892
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	1.00	0.87	0.87	0.87
Uniform Delay (d), s/veh	57.7	41.9	33.1	48.4	0.0	45.7	60.2	28.5	28.9	67.8	26.1	26.1
Incr Delay (d2), s/veh	1.5	0.1	0.5	0.7	0.0	0.7	1.5	4.6	8.8	10.5	1.1	2.0
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	4.9	2.2	8.7	3.6	0.0	6.7	4.3	27.6	31.0	5.5	13.0	14.1
LnGrp Delay(d),s/veh	59.3	42.0	33.6	49.1	0.0	46.4	61.7	33.1	37.7	78.2	27.2	28.1
LnGrp LOS	E	D	C	D		D	E	C	D	E	C	C
Approach Vol, veh/h		479			295			2465			1504	
Approach Delay, s/veh		41.5			47.3			35.9			31.7	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	24.8	80.2		45.0	17.5	87.5		45.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	32.0	57.0		45.0	25.0	64.0		45.0
Max Q Clear Time (g_c+I1), s	10.6	29.4		19.0	12.3	60.0		31.1
Green Ext Time (p_c), s	0.3	27.4		3.7	0.2	4.0		3.1

Intersection Summary	
HCM 2010 Ctrl Delay	35.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	44	96	239	31	46	175	1300	585	62	1027	4
Future Volume (veh/h)	5	44	96	239	31	46	175	1300	585	62	1027	4
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1863	1863	1900	1863	1618	1650	1863	1863	1900
Adj Flow Rate, veh/h	5	48	104	260	34	50	190	1413	636	67	1116	4
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	1	3	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	50	428	604	326	169	249	236	1820	800	71	2679	10
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.27	1.00	1.00	0.04	0.51	0.51
Sat Flow, veh/h	96	1727	1583	1230	682	1003	1774	3006	1322	1774	5231	19
Grp Volume(v), veh/h	53	0	104	260	0	84	190	1383	666	67	723	397
Grp Sat Flow(s),veh/h/ln	1822	0	1583	1230	0	1686	1774	1472	1384	1774	1695	1859
Q Serve(g_s), s	0.0	0.0	6.5	31.1	0.0	5.9	15.0	0.0	0.0	5.7	19.8	19.9
Cycle Q Clear(g_c), s	3.3	0.0	6.5	34.4	0.0	5.9	15.0	0.0	0.0	5.7	19.8	19.9
Prop In Lane	0.09		1.00	1.00		0.60	1.00		0.95	1.00		0.01
Lane Grp Cap(c), veh/h	478	0	604	326	0	418	236	1782	838	71	1736	952
V/C Ratio(X)	0.11	0.00	0.17	0.80	0.00	0.20	0.80	0.78	0.79	0.94	0.42	0.42
Avail Cap(c_a), veh/h	512	0	633	349	0	450	308	1782	838	71	1736	952
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.38	0.38	0.38	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.7	0.0	30.7	57.0	0.0	44.6	53.2	0.0	0.0	71.8	22.7	22.7
Incr Delay (d2), s/veh	0.1	0.0	0.1	11.6	0.0	0.2	4.5	1.3	3.0	87.4	0.7	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	1.7	0.0	2.9	11.7	0.0	2.8	7.6	0.3	0.7	4.5	9.4	10.5
LnGrp Delay(d),s/veh	43.8	0.0	30.9	68.6	0.0	44.9	57.7	1.3	3.0	159.2	23.4	24.0
LnGrp LOS	D		C	E		D	E	A	A	F	C	C
Approach Vol, veh/h		157			344			2239			1187	
Approach Delay, s/veh		35.2			62.8			6.6			31.3	
Approach LOS		D			E			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	25.0	82.8		42.2	11.0	96.8		42.2
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	20.0	68.0		40.0	6.0	88.0		40.0
Max Q Clear Time (g_c+I1), s	17.0	21.9		36.4	7.7	2.0		8.5
Green Ext Time (p_c), s	0.3	45.0		0.8	0.0	82.2		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	20.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	87	66	226	104	313	58	990	313	191	765	16
Future Volume (veh/h)	17	87	66	226	104	313	58	990	313	191	765	16
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	18	95	72	246	113	340	63	1076	340	208	832	17
Adj No. of Lanes	0	1	1	1	1	1	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	73	365	595	351	456	459	80	1339	419	232	2093	43
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.05	0.50	0.50	0.13	0.59	0.59
Sat Flow, veh/h	186	1493	1583	1295	1863	1583	1774	2656	830	1774	3547	72
Grp Volume(v), veh/h	113	0	72	246	113	340	63	713	703	208	415	434
Grp Sat Flow(s),veh/h/ln	1678	0	1583	1295	1863	1583	1774	1770	1716	1774	1770	1850
Q Serve(g_s), s	0.0	0.0	4.5	21.3	7.3	29.1	5.3	50.2	51.6	17.3	18.8	18.8
Cycle Q Clear(g_c), s	7.3	0.0	4.5	28.6	7.3	29.1	5.3	50.2	51.6	17.3	18.8	18.8
Prop In Lane	0.16		1.00	1.00		1.00	1.00		0.48	1.00		0.04
Lane Grp Cap(c), veh/h	439	0	595	351	456	459	80	893	866	232	1044	1092
V/C Ratio(X)	0.26	0.00	0.12	0.70	0.25	0.74	0.79	0.80	0.81	0.90	0.40	0.40
Avail Cap(c_a), veh/h	506	0	661	405	534	525	130	893	866	260	1044	1092
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	0.00	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	45.5	0.0	30.6	54.2	45.5	48.2	70.9	30.9	31.2	64.2	16.5	16.5
Incr Delay (d2), s/veh	0.7	0.0	0.2	6.6	0.6	6.6	6.3	7.4	8.2	31.4	1.1	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	3.8	0.0	2.0	10.3	3.8	13.5	2.7	26.2	26.4	10.5	9.6	10.0
LnGrp Delay(d),s/veh	46.2	0.0	30.8	60.9	46.1	54.7	77.2	38.3	39.4	95.6	17.6	17.5
LnGrp LOS	D		C	E	D	D	E	D	D	F	B	B
Approach Vol, veh/h		185			699			1479			1057	
Approach Delay, s/veh		40.2			55.5			40.5			32.9	
Approach LOS		D			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.8	94.5		42.7	25.6	81.7		42.7
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	11.0	78.0		43.0	22.0	67.0		43.0
Max Q Clear Time (g_c+I1), s	7.3	20.8		9.3	19.3	53.6		31.1
Green Ext Time (p_c), s	0.0	48.6		9.3	0.3	12.8		5.6

Intersection Summary	
HCM 2010 Ctrl Delay	41.2
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	77	53	103	47	76	38	1291	76	62	1267	99
Future Volume (veh/h)	79	77	53	103	47	76	38	1291	76	62	1267	99
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	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	86	84	58	112	51	83	41	1403	83	67	1377	108
Adj No. of Lanes	0	1	0	1	1	0	1	2	1	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	121	112	68	224	142	231	53	2255	1009	85	2179	170
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.03	0.64	0.64	0.05	0.65	0.65
Sat Flow, veh/h	398	504	308	1241	639	1040	1774	3539	1583	1774	3327	260
Grp Volume(v), veh/h	228	0	0	112	0	134	41	1403	83	67	730	755
Grp Sat Flow(s),veh/h/ln	1209	0	0	1241	0	1679	1774	1770	1583	1774	1770	1817
Q Serve(g_s), s	18.5	0.0	0.0	0.0	0.0	10.1	3.4	35.8	3.0	5.6	36.4	36.8
Cycle Q Clear(g_c), s	28.6	0.0	0.0	21.5	0.0	10.1	3.4	35.8	3.0	5.6	36.4	36.8
Prop In Lane	0.38		0.25	1.00		0.62	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	301	0	0	224	0	373	53	2255	1009	85	1159	1190
V/C Ratio(X)	0.76	0.00	0.00	0.50	0.00	0.36	0.78	0.62	0.08	0.79	0.63	0.63
Avail Cap(c_a), veh/h	420	0	0	321	0	504	248	2255	1009	189	1159	1190
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.7	0.0	0.0	53.8	0.0	49.3	72.3	16.4	10.4	70.7	15.2	15.3
Incr Delay (d2), s/veh	5.7	0.0	0.0	2.1	0.0	0.7	8.7	1.3	0.2	6.1	2.6	2.6
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	9.7	0.0	0.0	4.4	0.0	4.8	1.8	17.8	1.4	2.9	18.5	19.1
LnGrp Delay(d),s/veh	64.5	0.0	0.0	55.8	0.0	50.0	81.0	17.7	10.6	76.8	17.8	17.9
LnGrp LOS	E			E		D	F	B	B	E	B	B
Approach Vol, veh/h		228			246			1527			1552	
Approach Delay, s/veh		64.5			52.7			19.0			20.4	
Approach LOS		E			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.1	100.6		38.3	8.5	103.2		38.3
Change Period (Y+Rc), s	4.0	5.0		5.0	4.0	5.0		5.0
Max Green Setting (Gmax), s	16.0	75.0		45.0	21.0	70.0		45.0
Max Q Clear Time (g_c+I1), s	7.6	37.8		30.6	5.4	38.8		23.5
Green Ext Time (p_c), s	0.0	33.2		2.7	0.0	28.3		3.2

Intersection Summary	
HCM 2010 Ctrl Delay	24.8
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	212	81	21	39	5
Future Vol, veh/h	2	212	81	21	39	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	230	88	23	42	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	111	0	-	0	334	99
Stage 1	-	-	-	-	99	-
Stage 2	-	-	-	-	235	-
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	1479	-	-	-	661	957
Stage 1	-	-	-	-	925	-
Stage 2	-	-	-	-	804	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1479	-	-	-	660	957
Mov Cap-2 Maneuver	-	-	-	-	660	-
Stage 1	-	-	-	-	925	-
Stage 2	-	-	-	-	803	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1479	-	-	-	684
HCM Lane V/C Ratio	0.001	-	-	-	0.07
HCM Control Delay (s)	7.4	-	-	-	10.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	281	5	58	101	10	2	0	92	17	0	1
Future Vol, veh/h	1	281	5	58	101	10	2	0	92	17	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	305	5	63	110	11	2	0	100	18	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	121	0	0	311	0	0	552	557	308	601	554	115
Stage 1	-	-	-	-	-	-	310	310	-	241	241	-
Stage 2	-	-	-	-	-	-	242	247	-	360	313	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1467	-	-	1249	-	-	444	439	732	412	440	937
Stage 1	-	-	-	-	-	-	700	659	-	762	706	-
Stage 2	-	-	-	-	-	-	762	702	-	658	657	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1467	-	-	1249	-	-	426	417	732	342	418	937
Mov Cap-2 Maneuver	-	-	-	-	-	-	426	417	-	342	418	-
Stage 1	-	-	-	-	-	-	700	659	-	761	670	-
Stage 2	-	-	-	-	-	-	723	667	-	568	657	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.8	10.8	15.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	721	1467	-	-	1249	-	-	355
HCM Lane V/C Ratio	0.142	0.001	-	-	0.05	-	-	0.055
HCM Control Delay (s)	10.8	7.5	-	-	8	-	-	15.7
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.5	0	-	-	0.2	-	-	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	366	151	29	30	1
Future Volume (veh/h)	0	366	151	29	30	1
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	1900
Adj Flow Rate, veh/h	0	398	164	32	33	1
Adj No. of Lanes	1	1	1	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	159	586	477	93	738	22
Arrive On Green	0.00	0.31	0.31	0.31	0.44	0.44
Sat Flow, veh/h	1182	1863	1515	296	1669	51
Grp Volume(v), veh/h	0	398	0	196	35	0
Grp Sat Flow(s),veh/h/ln	1182	1863	0	1811	1770	0
Q Serve(g_s), s	0.0	8.4	0.0	3.8	0.5	0.0
Cycle Q Clear(g_c), s	0.0	8.4	0.0	3.8	0.5	0.0
Prop In Lane	1.00			0.16	0.94	0.03
Lane Grp Cap(c), veh/h	159	586	0	570	783	0
V/C Ratio(X)	0.00	0.68	0.00	0.34	0.04	0.00
Avail Cap(c_a), veh/h	701	1441	0	1421	783	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	13.5	0.0	11.9	7.2	0.0
Incr Delay (d2), s/veh	0.0	1.4	0.0	0.4	0.1	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	0.0	4.5	0.0	1.9	0.3	0.0
LnGrp Delay(d),s/veh	0.0	14.9	0.0	12.3	7.3	0.0
LnGrp LOS		B		B	A	
Approach Vol, veh/h		398	196		35	
Approach Delay, s/veh		14.9	12.3		7.3	
Approach LOS		B	B		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		19.2		26.0		19.2		
Change Period (Y+Rc), s		5.0		6.0		* 5		
Max Green Setting (Gmax), s		35.0		20.0		* 36		
Max Q Clear Time (g_c+I1), s		10.4		2.5		5.8		
Green Ext Time (p_c), s		3.8		0.1		4.0		

Intersection Summary	
HCM 2010 Ctrl Delay	13.7
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	408	2	42	190	0	0
Future Vol, veh/h	408	2	42	190	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	443	2	46	207	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	446	0	-	445
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	1114	-	0	613
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1114	-	-	613
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1114	-
HCM Lane V/C Ratio	-	-	-	0.041	-
HCM Control Delay (s)	0	-	-	8.4	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	⚒	
Traffic Vol, veh/h	408	0	0	232	1	22
Future Vol, veh/h	408	0	0	232	1	22
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	443	0	0	252	1	24

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	695	443
Stage 1	-	-	-	-	443	-
Stage 2	-	-	-	-	252	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	408	615
Stage 1	-	0	0	-	647	-
Stage 2	-	0	0	-	790	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	408	615
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	790	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	602	-	-
HCM Lane V/C Ratio	0.042	-	-
HCM Control Delay (s)	11.2	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	1	0	48	52	7
Future Vol, veh/h	23	1	0	48	52	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	1	0	52	57	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	112	60	64	0	-	0
Stage 1	60	-	-	-	-	-
Stage 2	52	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	885	1005	1538	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	970	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	885	1005	1538	-	-	-
Mov Cap-2 Maneuver	885	-	-	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	970	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1538	-	889	-	-
HCM Lane V/C Ratio	-	-	0.029	-	-
HCM Control Delay (s)	0	-	9.2	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	2	105	23	2	13
Future Vol, veh/h	4	2	105	23	2	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	2	114	25	2	14

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	145	127	0	0	139	0
Stage 1	127	-	-	-	-	-
Stage 2	18	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	847	923	-	-	1445	-
Stage 1	899	-	-	-	-	-
Stage 2	1005	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	846	923	-	-	1445	-
Mov Cap-2 Maneuver	846	-	-	-	-	-
Stage 1	899	-	-	-	-	-
Stage 2	1004	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	870	1445	-
HCM Lane V/C Ratio	-	-	0.007	0.002	-
HCM Control Delay (s)	-	-	9.2	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2021 AM Peak

HCM 2010 Signalized Intersection Summary
1: Kahekili Hwy & Likelike Hwy

10/10/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	980	0	0	990	620	0	945	0	0	525	1620
Future Volume (veh/h)	0	980	0	0	990	620	0	945	0	0	525	1620
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	0	1863	0	0	1863	1863	0	1863	0	0	1863	1863
Adj Flow Rate, veh/h	0	1065	0	0	1076	0	0	1027	0	0	571	0
Adj No. of Lanes	0	3	0	0	2	1	0	2	0	0	1	2
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, %	0	2	0	0	2	2	0	2	0	0	2	2
Cap, veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
Arrive On Green	0.00	0.45	0.00	0.00	0.45	0.00	0.00	0.47	0.00	0.00	0.47	0.00
Sat Flow, veh/h	0	5421	0	0	3632	1583	0	3725	0	0	1863	2787
Grp Volume(v), veh/h	0	1065	0	0	1076	0	0	1027	0	0	571	0
Grp Sat Flow(s),veh/h/ln	0	1695	0	0	1770	1583	0	1770	0	0	1863	1393
Q Serve(g_s), s	0.0	21.7	0.0	0.0	35.8	0.0	0.0	32.7	0.0	0.0	35.4	0.0
Cycle Q Clear(g_c), s	0.0	21.7	0.0	0.0	35.8	0.0	0.0	32.7	0.0	0.0	35.4	0.0
Prop In Lane	0.00		0.00	0.00		1.00	0.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
V/C Ratio(X)	0.00	0.46	0.00	0.00	0.67	0.00	0.00	0.62	0.00	0.00	0.66	0.00
Avail Cap(c_a), veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
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)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	28.4	0.0	0.0	32.2	0.0	0.0	30.1	0.0	0.0	30.8	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	2.3	0.0	0.0	1.8	0.0	0.0	3.9	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	0.0	10.3	0.0	0.0	18.0	0.0	0.0	16.4	0.0	0.0	19.0	0.0
LnGrp Delay(d),s/veh	0.0	29.0	0.0	0.0	34.5	0.0	0.0	31.8	0.0	0.0	34.6	0.0
LnGrp LOS		C			C			C			C	
Approach Vol, veh/h		1065			1076			1027			571	
Approach Delay, s/veh		29.0			34.5			31.8			34.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		74.0		76.0		74.0		76.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		68.0		70.0		68.0		70.0
Max Q Clear Time (g_c+I1), s		23.7		37.4		37.8		34.7
Green Ext Time (p_c), s		25.3		14.9		20.0		15.4

Intersection Summary	
HCM 2010 Ctrl Delay	32.2
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	15	15	60	10	75	5	1500	45	120	2025	5
Future Volume (veh/h)	15	15	15	60	10	75	5	1500	45	120	2025	5
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900
Adj Flow Rate, veh/h	16	16	16	65	11	82	5	1630	49	130	2201	5
Adj No. of Lanes	0	1	1	0	1	1	1	3	0	1	3	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	152	141	336	283	45	443	22	3112	94	142	3567	8
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.01	0.61	0.61	0.08	0.68	0.68
Sat Flow, veh/h	581	705	1583	1195	223	1583	1774	5074	152	1774	5239	12
Grp Volume(v), veh/h	32	0	16	76	0	82	5	1089	590	130	1424	782
Grp Sat Flow(s),veh/h/ln	1286	0	1583	1418	0	1583	1774	1695	1836	1774	1695	1861
Q Serve(g_s), s	0.2	0.0	1.2	0.0	0.0	5.9	0.4	27.4	27.5	10.9	34.7	34.7
Cycle Q Clear(g_c), s	7.5	0.0	1.2	7.2	0.0	5.9	0.4	27.4	27.5	10.9	34.7	34.7
Prop In Lane	0.50		1.00	0.86		1.00	1.00		0.08	1.00		0.01
Lane Grp Cap(c), veh/h	293	0	336	328	0	443	22	2079	1126	142	2308	1267
V/C Ratio(X)	0.11	0.00	0.05	0.23	0.00	0.18	0.22	0.52	0.52	0.92	0.62	0.62
Avail Cap(c_a), veh/h	416	0	463	444	0	570	118	2079	1126	142	2308	1267
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.1	0.0	47.0	50.8	0.0	41.0	73.3	16.5	16.5	68.5	13.2	13.2
Incr Delay (d2), s/veh	0.2	0.0	0.1	0.4	0.0	0.2	5.0	0.9	1.7	51.1	1.2	2.3
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	1.1	0.0	0.5	2.7	0.0	2.6	0.2	13.0	14.3	7.4	16.4	18.4
LnGrp Delay(d),s/veh	49.3	0.0	47.0	51.2	0.0	41.2	78.3	17.5	18.3	119.6	14.4	15.4
LnGrp LOS	D		D	D		D	E	B	B	F	B	B
Approach Vol, veh/h		48			158			1684			2336	
Approach Delay, s/veh		48.5			46.0			17.9			20.6	
Approach LOS		D			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	108.1		35.0	17.0	98.0		35.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	10.0	82.0		42.0	12.0	80.0		42.0
Max Q Clear Time (g_c+I1), s	2.4	36.7		9.2	12.9	29.5		9.5
Green Ext Time (p_c), s	0.0	45.0		0.9	0.0	50.2		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	20.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	45	75	155	105	50	360	1195	60	90	1780	175
Future Volume (veh/h)	40	45	75	155	105	50	360	1195	60	90	1780	175
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	0.90	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	43	49	82	168	114	54	391	1299	65	98	1935	190
Adj No. of Lanes	1	1	1	1	1	0	1	3	0	1	3	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	148	335	685	245	193	92	449	3053	153	174	2169	212
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.25	0.62	0.62	0.10	0.46	0.46
Sat Flow, veh/h	1212	1863	1583	1254	1077	510	1774	4961	248	1774	4712	460
Grp Volume(v), veh/h	43	49	82	168	0	168	391	888	476	98	1389	736
Grp Sat Flow(s),veh/h/ln	1212	1863	1583	1254	0	1586	1774	1695	1819	1774	1695	1782
Q Serve(g_s), s	5.1	3.3	4.6	19.6	0.0	14.6	31.7	20.5	20.5	7.9	56.2	57.0
Cycle Q Clear(g_c), s	19.6	3.3	4.6	22.9	0.0	14.6	31.7	20.5	20.5	7.9	56.2	57.0
Prop In Lane	1.00		1.00	1.00		0.32	1.00		0.14	1.00		0.26
Lane Grp Cap(c), veh/h	148	335	685	245	0	285	449	2086	1119	174	1561	820
V/C Ratio(X)	0.29	0.15	0.12	0.68	0.00	0.59	0.87	0.43	0.43	0.56	0.89	0.90
Avail Cap(c_a), veh/h	262	509	834	363	0	434	449	2086	1119	177	1561	820
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	1.00	0.60	0.60	0.60
Uniform Delay (d), s/veh	65.5	51.8	25.4	61.5	0.0	56.5	53.6	15.0	15.0	64.5	37.0	37.2
Incr Delay (d2), s/veh	1.1	0.2	0.1	3.4	0.0	1.9	16.6	0.6	1.2	2.4	5.1	9.6
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	1.7	1.7	2.0	7.0	0.0	6.5	17.6	9.7	10.6	4.0	27.3	30.2
LnGrp Delay(d),s/veh	66.5	52.0	25.5	64.8	0.0	58.4	70.3	15.7	16.2	66.9	42.1	46.8
LnGrp LOS	E	D	C	E		E	E	B	B	E	D	D
Approach Vol, veh/h		174			336			1755			2223	
Approach Delay, s/veh		43.1			61.6			28.0			44.7	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	43.0	75.1		31.9	19.7	98.3		31.9
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	38.0	55.0		41.0	15.0	78.0		41.0
Max Q Clear Time (g_c+I1), s	21.7	59.0		24.9	9.9	22.5		21.6
Green Ext Time (p_c), s	0.5	0.0		2.1	0.1	54.6		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	39.4
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	50	235	295	30	20	150	765	330	60	1545	10
Future Volume (veh/h)	15	50	235	295	30	20	150	765	330	60	1545	10
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1863	1863	1900	1863	1863	1900	1863	1618	1650
Adj Flow Rate, veh/h	16	54	255	321	33	22	163	832	359	65	1679	11
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	1	3	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	147	481	706	389	361	241	177	1749	751	82	2026	13
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.20	1.00	1.00	0.05	0.45	0.45
Sat Flow, veh/h	340	1391	1583	1066	1044	696	1774	3490	1499	1774	4527	30
Grp Volume(v), veh/h	70	0	255	321	0	55	163	808	383	65	1092	598
Grp Sat Flow(s),veh/h/ln	1731	0	1583	1066	0	1740	1774	1695	1598	1774	1472	1612
Q Serve(g_s), s	0.0	0.0	16.0	43.9	0.0	3.2	13.5	0.0	0.0	5.4	48.9	48.9
Cycle Q Clear(g_c), s	3.8	0.0	16.0	47.8	0.0	3.2	13.5	0.0	0.0	5.4	48.9	48.9
Prop In Lane	0.23		1.00	1.00		0.40	1.00		0.94	1.00		0.02
Lane Grp Cap(c), veh/h	628	0	706	389	0	602	177	1699	801	82	1318	722
V/C Ratio(X)	0.11	0.00	0.36	0.82	0.00	0.09	0.92	0.48	0.48	0.79	0.83	0.83
Avail Cap(c_a), veh/h	698	0	771	433	0	673	177	1699	801	118	1318	722
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	27.5	49.6	0.0	33.1	59.4	0.0	0.0	70.8	36.4	36.4
Incr Delay (d2), s/veh	0.1	0.0	0.3	11.3	0.0	0.1	42.0	0.9	1.8	19.8	6.1	10.6
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	2.0	0.0	7.0	14.2	0.0	1.6	8.7	0.2	0.4	3.1	21.0	23.9
LnGrp Delay(d),s/veh	33.4	0.0	27.8	60.9	0.0	33.2	101.4	0.9	1.8	90.6	42.5	47.0
LnGrp LOS	C		C	E		C	F	A	A	F	D	D
Approach Vol, veh/h		325			376			1354			1755	
Approach Delay, s/veh		29.0			56.8			13.2			45.8	
Approach LOS		C			E			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	20.0	73.1		56.9	12.0	81.2		56.9
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	15.0	61.0		58.0	10.0	66.0		58.0
Max Q Clear Time (g_c+I1), s	15.5	50.9		49.8	7.4	2.0		18.0
Green Ext Time (p_c), s	0.0	10.0		2.1	0.0	59.9		3.4

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)	30	85	105	405	85	170	50	590	215	190	1080	35
Future Volume (veh/h)	30	85	105	405	85	170	50	590	215	190	1080	35
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1863	1863	1863	1863	1863	1900	1863	1569	1600
Adj Flow Rate, veh/h	33	92	114	440	92	185	54	641	234	207	1174	38
Adj No. of Lanes	0	1	1	1	1	1	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	164	443	776	414	671	632	69	990	361	231	1418	46
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.04	0.39	0.39	0.13	0.48	0.48
Sat Flow, veh/h	372	1231	1583	1171	1863	1583	1774	2542	927	1774	2947	95
Grp Volume(v), veh/h	125	0	114	440	92	185	54	446	429	207	594	618
Grp Sat Flow(s),veh/h/ln	1603	0	1583	1171	1863	1583	1774	1770	1699	1774	1490	1552
Q Serve(g_s), s	1.6	0.0	5.9	46.8	5.0	11.9	4.5	30.9	30.9	17.2	51.5	51.6
Cycle Q Clear(g_c), s	7.2	0.0	5.9	54.0	5.0	11.9	4.5	30.9	30.9	17.2	51.5	51.6
Prop In Lane	0.26		1.00	1.00		1.00	1.00		0.55	1.00		0.06
Lane Grp Cap(c), veh/h	607	0	776	414	671	632	69	690	662	231	717	747
V/C Ratio(X)	0.21	0.00	0.15	1.06	0.14	0.29	0.78	0.65	0.65	0.90	0.83	0.83
Avail Cap(c_a), veh/h	607	0	776	414	671	632	71	690	662	260	717	747
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	0.00	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	32.9	0.0	21.0	54.3	32.3	30.7	71.5	37.4	37.4	64.2	33.6	33.6
Incr Delay (d2), s/veh	0.4	0.0	0.2	62.2	0.2	0.5	37.8	4.6	4.8	31.3	10.6	10.3
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	3.6	0.0	2.6	24.3	2.6	5.3	2.9	16.0	15.4	10.5	23.2	24.1
LnGrp Delay(d),s/veh	33.3	0.0	21.2	116.5	32.5	31.2	109.3	42.0	42.2	95.5	44.2	43.9
LnGrp LOS	C		C	F	C	C	F	D	D	F	D	D
Approach Vol, veh/h		239			717			929			1419	
Approach Delay, s/veh		27.5			83.7			46.0			51.5	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.8	78.2		60.0	25.5	64.5		60.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	6.0	72.0		54.0	22.0	56.0		54.0
Max Q Clear Time (g_c+I1), s	9.5	53.6		9.2	19.2	32.9		56.0
Green Ext Time (p_c), s	0.0	16.8		11.5	0.3	20.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.2
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	55	60	105	110	40	85	990	100	30	1070	150
Future Volume (veh/h)	70	55	60	105	110	40	85	990	100	30	1070	150
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	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	76	60	65	114	120	43	92	1076	109	33	1163	163
Adj No. of Lanes	0	1	0	1	1	0	1	2	1	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	110	87	78	221	283	101	112	2360	1056	42	1957	273
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.06	0.67	0.67	0.02	0.63	0.63
Sat Flow, veh/h	355	401	362	1261	1310	470	1774	3539	1583	1774	3120	436
Grp Volume(v), veh/h	201	0	0	114	0	163	92	1076	109	33	658	668
Grp Sat Flow(s),veh/h/ln	1119	0	0	1261	0	1780	1774	1770	1583	1774	1770	1786
Q Serve(g_s), s	15.8	0.0	0.0	0.0	0.0	11.9	7.7	21.8	3.7	2.8	33.1	33.4
Cycle Q Clear(g_c), s	27.6	0.0	0.0	22.0	0.0	11.9	7.7	21.8	3.7	2.8	33.1	33.4
Prop In Lane	0.38		0.32	1.00		0.26	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	275	0	0	221	0	385	112	2360	1056	42	1110	1120
V/C Ratio(X)	0.73	0.00	0.00	0.51	0.00	0.42	0.82	0.46	0.10	0.78	0.59	0.60
Avail Cap(c_a), veh/h	399	0	0	327	0	534	248	2360	1056	189	1110	1120
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.2	0.0	0.0	54.7	0.0	50.7	69.4	12.0	8.9	72.8	16.6	16.6
Incr Delay (d2), s/veh	4.6	0.0	0.0	2.2	0.0	0.9	5.5	0.6	0.2	11.0	2.3	2.3
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	8.4	0.0	0.0	4.5	0.0	5.9	4.0	10.8	1.7	1.5	16.8	17.1
LnGrp Delay(d),s/veh	63.8	0.0	0.0	56.9	0.0	51.6	74.9	12.6	9.1	83.8	18.9	19.0
LnGrp LOS	E			E		D	E	B	A	F	B	B
Approach Vol, veh/h		201			277			1277			1359	
Approach Delay, s/veh		63.8			53.8			16.8			20.5	
Approach LOS		E			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.6	105.0		37.4	13.5	99.1		37.4
Change Period (Y+Rc), s	4.0	5.0		5.0	4.0	5.0		5.0
Max Green Setting (Gmax), s	16.0	75.0		45.0	21.0	70.0		45.0
Max Q Clear Time (g_c+I1), s	14.8	23.8		29.6	9.7	35.4		24.0
Green Ext Time (p_c), s	0.0	37.4		2.8	0.0	27.7		3.1

Intersection Summary	
HCM 2010 Ctrl Delay	24.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	65	390	75	5	5
Future Vol, veh/h	5	65	390	75	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	71	424	82	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	505	0	-	0	547	465
Stage 1	-	-	-	-	465	-
Stage 2	-	-	-	-	82	-
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	1060	-	-	-	498	597
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	941	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1060	-	-	-	496	597
Mov Cap-2 Maneuver	-	-	-	-	496	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	937	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1060	-	-	-	542
HCM Lane V/C Ratio	0.005	-	-	-	0.02
HCM Control Delay (s)	8.4	-	-	-	11.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	70	5	160	440	50	5	5	70	15	0	5
Future Vol, veh/h	5	70	5	160	440	50	5	5	70	15	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	76	5	174	478	54	5	5	76	16	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	533	0	0	82	0	0	946	970	79	983	945	505
Stage 1	-	-	-	-	-	-	90	90	-	853	853	-
Stage 2	-	-	-	-	-	-	856	880	-	130	92	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1035	-	-	1515	-	-	241	253	981	228	262	567
Stage 1	-	-	-	-	-	-	917	820	-	354	376	-
Stage 2	-	-	-	-	-	-	352	365	-	874	819	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1035	-	-	1515	-	-	217	223	981	188	231	567
Mov Cap-2 Maneuver	-	-	-	-	-	-	217	223	-	188	231	-
Stage 1	-	-	-	-	-	-	913	816	-	352	333	-
Stage 2	-	-	-	-	-	-	309	323	-	797	815	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.9	11	22.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	685	1035	-	-	1515	-	-	226
HCM Lane V/C Ratio	0.127	0.005	-	-	0.115	-	-	0.096
HCM Control Delay (s)	11	8.5	-	-	7.7	-	-	22.6
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.4	0	-	-	0.4	-	-	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	135	640	20	10	10
Future Volume (veh/h)	5	135	640	20	10	10
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	1900
Adj Flow Rate, veh/h	5	147	696	22	11	11
Adj No. of Lanes	1	1	1	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	216	865	834	26	278	278
Arrive On Green	0.46	0.46	0.46	0.46	0.35	0.35
Sat Flow, veh/h	731	1863	1796	57	804	804
Grp Volume(v), veh/h	5	147	0	718	23	0
Grp Sat Flow(s),veh/h/ln	731	1863	0	1853	1681	0
Q Serve(g_s), s	0.3	2.7	0.0	19.6	0.5	0.0
Cycle Q Clear(g_c), s	20.0	2.7	0.0	19.6	0.5	0.0
Prop In Lane	1.00			0.03	0.48	0.48
Lane Grp Cap(c), veh/h	216	865	0	861	581	0
V/C Ratio(X)	0.02	0.17	0.00	0.83	0.04	0.00
Avail Cap(c_a), veh/h	319	1126	0	1136	581	0
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	22.3	9.0	0.0	13.5	12.6	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	4.2	0.1	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	0.1	1.4	0.0	10.8	0.3	0.0
LnGrp Delay(d),s/veh	22.3	9.1	0.0	17.8	12.7	0.0
LnGrp LOS	C	A		B	B	
Approach Vol, veh/h		152	718		23	
Approach Delay, s/veh		9.5	17.8		12.7	
Approach LOS		A	B		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		31.9		26.0		31.9		
Change Period (Y+Rc), s		5.0		6.0		* 5		
Max Green Setting (Gmax), s		35.0		20.0		* 36		
Max Q Clear Time (g_c+I1), s		22.0		2.5		21.6		
Green Ext Time (p_c), s		4.9		0.1		5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	16.2
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	150	5	50	655	0	0
Future Vol, veh/h	150	5	50	655	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	5	54	712	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	168	0	-	166
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	1410	-	0	878
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1410	-	-	878
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1410	-
HCM Lane V/C Ratio	-	-	-	0.039	-
HCM Control Delay (s)	0	-	-	7.7	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	⚒	
Traffic Vol, veh/h	150	0	0	685	5	25
Future Vol, veh/h	150	0	0	685	5	25
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	0	0	745	5	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	908	163
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	745	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	306	882
Stage 1	-	0	0	-	866	-
Stage 2	-	0	0	-	469	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	306	882
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	469	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	671	-	-
HCM Lane V/C Ratio	0.049	-	-
HCM Control Delay (s)	10.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	5	5	55	50	75
Future Vol, veh/h	15	5	5	55	50	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	5	5	60	54	82

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	166	95	136	0	-	0
Stage 1	95	-	-	-	-	-
Stage 2	71	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	824	962	1448	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	821	962	1448	-	-	-
Mov Cap-2 Maneuver	821	-	-	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	948	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	0.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1448	-	852	-	-
HCM Lane V/C Ratio	0.004	-	0.026	-	-
HCM Control Delay (s)	7.5	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	5	25	15	5	90
Future Vol, veh/h	65	5	25	15	5	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	5	27	16	5	98

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	144	35	0	0	43	0
Stage 1	35	-	-	-	-	-
Stage 2	109	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	849	1038	-	-	1566	-
Stage 1	987	-	-	-	-	-
Stage 2	916	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	846	1038	-	-	1566	-
Mov Cap-2 Maneuver	846	-	-	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	913	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	857	1566	-
HCM Lane V/C Ratio	-	-	0.089	0.003	-
HCM Control Delay (s)	-	-	9.6	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2021 PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1565	0	0	505	555	0	1935	0	0	510	1060
Future Volume (veh/h)	0	1565	0	0	505	555	0	1935	0	0	510	1060
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	0	1863	0	0	1863	1863	0	1674	0	0	1863	1863
Adj Flow Rate, veh/h	0	1701	0	0	549	0	0	2103	0	0	554	0
Adj No. of Lanes	0	3	0	0	2	1	0	2	0	0	1	2
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, %	0	2	0	0	2	2	0	2	0	0	2	2
Cap, veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
Arrive On Green	0.00	0.34	0.00	0.00	0.34	0.00	0.00	0.57	0.00	0.00	0.96	0.00
Sat Flow, veh/h	0	5421	0	0	3632	1583	0	3347	0	0	1863	2787
Grp Volume(v), veh/h	0	1701	0	0	549	0	0	2103	0	0	554	0
Grp Sat Flow(s),veh/h/ln	0	1695	0	0	1770	1583	0	1590	0	0	1863	1393
Q Serve(g_s), s	0.0	49.8	0.0	0.0	18.2	0.0	0.0	86.0	0.0	0.0	3.8	0.0
Cycle Q Clear(g_c), s	0.0	49.8	0.0	0.0	18.2	0.0	0.0	86.0	0.0	0.0	3.8	0.0
Prop In Lane	0.00		0.00	0.00		1.00	0.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
V/C Ratio(X)	0.00	0.98	0.00	0.00	0.46	0.00	0.00	1.15	0.00	0.00	0.52	0.00
Avail Cap(c_a), veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67
Upstream Filter(I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.90	0.00
Uniform Delay (d), s/veh	0.0	49.1	0.0	0.0	38.7	0.0	0.0	32.0	0.0	0.0	1.4	0.0
Incr Delay (d2), s/veh	0.0	17.9	0.0	0.0	0.3	0.0	0.0	75.9	0.0	0.0	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	0.0	26.2	0.0	0.0	8.9	0.0	0.0	56.7	0.0	0.0	2.0	0.0
LnGrp Delay(d),s/veh	0.0	67.0	0.0	0.0	38.9	0.0	0.0	107.9	0.0	0.0	3.1	0.0
LnGrp LOS		E			D			F			A	
Approach Vol, veh/h		1701			549			2103			554	
Approach Delay, s/veh		67.0			38.9			107.9			3.1	
Approach LOS		E			D			F			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		92.0		58.0		92.0		58.0
Change Period (Y+Rc), s		6.0		7.0		6.0		7.0
Max Green Setting (Gmax), s		86.0		51.0		86.0		51.0
Max Q Clear Time (g_c+I1), s		88.0		51.8		5.8		20.2
Green Ext Time (p_c), s		0.0		0.0		55.8		20.9

Intersection Summary	
HCM 2010 Ctrl Delay	74.1
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	5	10	20	20	45	20	2375	105	110	1510	10
Future Volume (veh/h)	10	5	10	20	20	45	20	2375	105	110	1510	10
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	5	11	22	22	49	22	2582	114	120	1641	11
Adj No. of Lanes	0	1	1	0	1	1	1	3	0	1	3	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	243	103	346	184	173	431	35	3104	136	130	3516	24
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.04	1.00	1.00	0.07	0.67	0.67
Sat Flow, veh/h	1018	519	1583	747	872	1583	1774	4996	218	1774	5212	35
Grp Volume(v), veh/h	16	0	11	44	0	49	22	1744	952	120	1067	585
Grp Sat Flow(s),veh/h/ln	1537	0	1583	1620	0	1583	1774	1695	1824	1774	1695	1857
Q Serve(g_s), s	0.0	0.0	0.8	1.1	0.0	3.5	1.8	0.0	0.0	10.1	22.4	22.4
Cycle Q Clear(g_c), s	1.0	0.0	0.8	3.1	0.0	3.5	1.8	0.0	0.0	10.1	22.4	22.4
Prop In Lane	0.69		1.00	0.50		1.00	1.00		0.12	1.00		0.02
Lane Grp Cap(c), veh/h	346	0	346	358	0	431	35	2106	1133	130	2287	1253
V/C Ratio(X)	0.05	0.00	0.03	0.12	0.00	0.11	0.62	0.83	0.84	0.92	0.47	0.47
Avail Cap(c_a), veh/h	458	0	464	477	0	549	71	2106	1133	130	2287	1253
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.13	0.13	0.13	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.6	0.0	46.1	49.3	0.0	41.0	71.4	0.0	0.0	69.1	11.6	11.6
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.2	0.0	0.1	2.4	0.5	1.1	55.7	0.7	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	0.5	0.0	0.4	1.5	0.0	1.5	0.9	0.2	0.3	7.0	10.6	11.8
LnGrp Delay(d),s/veh	48.6	0.0	46.1	49.5	0.0	41.1	73.8	0.5	1.1	124.8	12.3	12.8
LnGrp LOS	D		D	D		D	E	A	A	F	B	B
Approach Vol, veh/h		27			93			2718			1772	
Approach Delay, s/veh		47.6			45.1			1.3			20.1	
Approach LOS		D			D			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.0	107.2		34.8	16.0	99.2		34.8
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	6.0	87.0		41.0	11.0	82.0		41.0
Max Q Clear Time (g_c+I1), s	3.8	24.4		5.5	12.1	2.0		3.0
Green Ext Time (p_c), s	0.0	62.3		0.5	0.0	79.6		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	9.7
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	75	300	100	60	140	120	2130	175	125	1265	95
Future Volume (veh/h)	130	75	300	100	60	140	120	2130	175	125	1265	95
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	141	82	326	109	65	152	130	2315	190	136	1375	103
Adj No. of Lanes	1	1	1	1	1	0	1	3	0	1	3	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	229	497	580	353	132	310	177	2528	205	177	2545	191
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.10	0.53	0.53	0.10	0.53	0.53
Sat Flow, veh/h	1160	1863	1583	1311	497	1161	1774	4796	388	1774	4828	362
Grp Volume(v), veh/h	141	82	326	109	0	217	130	1627	878	136	966	512
Grp Sat Flow(s),veh/h/ln	1160	1863	1583	1311	0	1658	1774	1695	1794	1774	1695	1799
Q Serve(g_s), s	17.5	5.1	24.6	10.4	0.0	16.6	10.7	65.5	68.0	11.2	28.2	28.3
Cycle Q Clear(g_c), s	34.1	5.1	24.6	15.5	0.0	16.6	10.7	65.5	68.0	11.2	28.2	28.3
Prop In Lane	1.00		1.00	1.00		0.70	1.00		0.22	1.00		0.20
Lane Grp Cap(c), veh/h	229	497	580	353	0	442	177	1787	946	177	1787	948
V/C Ratio(X)	0.62	0.17	0.56	0.31	0.00	0.49	0.74	0.91	0.93	0.77	0.54	0.54
Avail Cap(c_a), veh/h	237	509	590	362	0	453	237	1787	946	237	1787	948
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	1.00	0.85	0.85	0.85
Uniform Delay (d), s/veh	60.8	42.2	37.9	48.1	0.0	46.4	65.6	32.3	32.8	65.8	23.5	23.5
Incr Delay (d2), s/veh	4.5	0.2	1.2	0.5	0.0	0.8	7.8	8.5	16.4	8.8	1.0	1.9
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	5.9	2.6	11.0	3.8	0.0	7.7	5.6	32.6	37.9	5.9	13.4	14.4
LnGrp Delay(d),s/veh	65.3	42.3	39.1	48.6	0.0	47.3	73.5	40.8	49.2	74.7	24.4	25.3
LnGrp LOS	E	D	D	D		D	E	D	D	E	C	C
Approach Vol, veh/h		549			326			2635			1614	
Approach Delay, s/veh		46.3			47.7			45.2			29.0	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	19.9	85.1		45.0	19.9	85.1		45.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	20.0	73.0		41.0	20.0	73.0		41.0
Max Q Clear Time (g_c+I1), s	12.7	30.3		18.6	13.2	70.0		36.1
Green Ext Time (p_c), s	0.2	42.6		4.0	0.2	3.0		1.9

Intersection Summary	
HCM 2010 Ctrl Delay	40.4
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	50	105	255	35	50	190	1390	625	70	1100	5
Future Volume (veh/h)	5	50	105	255	35	50	190	1390	625	70	1100	5
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1863	1863	1900	1863	1618	1650	1863	1863	1900
Adj Flow Rate, veh/h	5	54	114	277	38	54	207	1511	679	76	1196	5
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	1	3	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	42	381	547	350	151	215	229	1882	816	95	2862	12
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.26	1.00	1.00	0.05	0.55	0.55
Sat Flow, veh/h	75	1755	1583	1345	697	991	1774	3021	1310	1774	5227	22
Grp Volume(v), veh/h	59	0	114	277	0	92	207	1471	719	76	776	425
Grp Sat Flow(s),veh/h/ln	1830	0	1583	1345	0	1688	1774	1472	1386	1774	1695	1859
Q Serve(g_s), s	0.0	0.0	7.6	25.2	0.0	6.8	16.9	0.0	0.0	6.4	20.1	20.1
Cycle Q Clear(g_c), s	3.8	0.0	7.6	29.0	0.0	6.8	16.9	0.0	0.0	6.4	20.1	20.1
Prop In Lane	0.08		1.00	1.00		0.59	1.00		0.94	1.00		0.01
Lane Grp Cap(c), veh/h	423	0	547	350	0	366	229	1834	864	95	1856	1018
V/C Ratio(X)	0.14	0.00	0.21	0.79	0.00	0.25	0.91	0.80	0.83	0.80	0.42	0.42
Avail Cap(c_a), veh/h	512	0	626	417	0	450	331	1834	864	106	1856	1018
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.22	0.22	0.22	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.5	0.0	34.6	56.9	0.0	48.6	54.8	0.0	0.0	70.2	19.9	19.9
Incr Delay (d2), s/veh	0.1	0.0	0.2	8.5	0.0	0.4	6.0	0.9	2.2	31.4	0.7	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	2.0	0.0	3.4	12.1	0.0	3.2	8.7	0.2	0.5	4.0	9.6	10.6
LnGrp Delay(d),s/veh	47.6	0.0	34.8	65.3	0.0	49.0	60.8	0.9	2.2	101.6	20.6	21.2
LnGrp LOS	D		C	E		D	E	A	A	F	C	C
Approach Vol, veh/h		173			369			2397			1277	
Approach Delay, s/veh		39.2			61.3			6.4			25.6	
Approach LOS		D			E			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	24.3	88.1		37.5	13.0	99.4		37.5
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	28.0	66.0		40.0	9.0	85.0		40.0
Max Q Clear Time (g_c+I1), s	19.9	22.1		31.0	8.4	2.0		9.6
Green Ext Time (p_c), s	0.4	43.2		1.5	0.0	80.7		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	18.4
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	95	70	240	110	335	65	1060	335	205	820	20
Future Volume (veh/h)	20	95	70	240	110	335	65	1060	335	205	820	20
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	22	103	14	261	120	175	71	1152	344	223	891	22
Adj No. of Lanes	0	1	1	1	1	1	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	82	367	598	336	447	459	89	1356	399	244	2083	51
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.05	0.50	0.50	0.14	0.59	0.59
Sat Flow, veh/h	226	1530	1583	1286	1863	1583	1774	2698	794	1774	3530	87
Grp Volume(v), veh/h	125	0	14	261	120	175	71	750	746	223	447	466
Grp Sat Flow(s),veh/h/ln	1756	0	1583	1286	1863	1583	1774	1770	1723	1774	1770	1847
Q Serve(g_s), s	0.0	0.0	0.8	23.8	7.9	13.2	5.9	54.9	57.0	18.6	20.8	20.8
Cycle Q Clear(g_c), s	8.2	0.0	0.8	32.0	7.9	13.2	5.9	54.9	57.0	18.6	20.8	20.8
Prop In Lane	0.18		1.00	1.00		1.00	1.00		0.46	1.00		0.05
Lane Grp Cap(c), veh/h	449	0	598	336	447	459	89	889	866	244	1044	1090
V/C Ratio(X)	0.28	0.00	0.02	0.78	0.27	0.38	0.80	0.84	0.86	0.91	0.43	0.43
Avail Cap(c_a), veh/h	473	0	619	354	472	481	142	889	866	248	1044	1090
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	0.00	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	46.5	0.0	29.3	56.4	46.3	42.5	70.5	32.2	32.7	63.8	16.9	16.9
Incr Delay (d2), s/veh	0.7	0.0	0.0	11.9	0.7	1.1	5.9	9.6	11.0	35.9	1.3	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	4.3	0.0	0.4	11.6	4.1	6.0	3.1	29.0	29.8	11.5	10.5	11.0
LnGrp Delay(d),s/veh	47.2	0.0	29.4	68.3	47.0	43.6	76.4	41.8	43.7	99.7	18.1	18.1
LnGrp LOS	D		C	E	D	D	E	D	D	F	B	B
Approach Vol, veh/h		139			556			1567			1136	
Approach Delay, s/veh		45.4			56.0			44.3			34.1	
Approach LOS		D			E			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.5	94.5		42.0	26.7	81.4		42.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	12.0	82.0		38.0	21.0	73.0		38.0
Max Q Clear Time (g_c+I1), s	7.9	22.8		10.2	20.6	59.0		34.0
Green Ext Time (p_c), s	0.0	52.3		6.8	0.1	13.5		2.0

Intersection Summary	
HCM 2010 Ctrl Delay	42.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	85	60	110	55	85	40	1370	85	70	1345	110
Future Volume (veh/h)	90	85	60	110	55	85	40	1370	85	70	1345	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		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	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	98	92	65	120	60	92	43	1489	92	76	1462	120
Adj No. of Lanes	0	1	0	1	1	0	1	2	1	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	133	117	74	241	164	252	55	2145	959	95	2082	170
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.03	0.61	0.61	0.05	0.63	0.63
Sat Flow, veh/h	402	471	299	1225	664	1019	1774	3539	1583	1774	3314	271
Grp Volume(v), veh/h	255	0	0	120	0	152	43	1489	92	76	777	805
Grp Sat Flow(s),veh/h/ln	1172	0	0	1225	0	1683	1774	1770	1583	1774	1770	1815
Q Serve(g_s), s	21.7	0.0	0.0	0.0	0.0	11.2	3.6	42.9	3.6	6.4	43.7	44.5
Cycle Q Clear(g_c), s	32.9	0.0	0.0	22.4	0.0	11.2	3.6	42.9	3.6	6.4	43.7	44.5
Prop In Lane	0.38		0.25	1.00		0.61	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	323	0	0	241	0	416	55	2145	959	95	1112	1140
V/C Ratio(X)	0.79	0.00	0.00	0.50	0.00	0.37	0.78	0.69	0.10	0.80	0.70	0.71
Avail Cap(c_a), veh/h	382	0	0	289	0	482	106	2145	959	154	1112	1140
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.8	0.0	0.0	50.9	0.0	46.7	72.1	20.1	12.4	70.2	18.5	18.6
Incr Delay (d2), s/veh	9.6	0.0	0.0	1.9	0.0	0.6	8.4	1.9	0.2	5.8	3.7	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	11.1	0.0	0.0	4.6	0.0	5.3	1.9	21.4	1.6	3.3	22.3	23.3
LnGrp Delay(d),s/veh	67.4	0.0	0.0	52.8	0.0	47.4	80.5	22.0	12.6	76.0	22.1	22.3
LnGrp LOS	E			D		D	F	C	B	E	C	C
Approach Vol, veh/h		255			272			1624			1658	
Approach Delay, s/veh		67.4			49.8			23.0			24.7	
Approach LOS		E			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.0	95.9		42.1	8.7	99.2		42.1
Change Period (Y+Rc), s	4.0	5.0		5.0	4.0	5.0		5.0
Max Green Setting (Gmax), s	13.0	80.0		43.0	9.0	84.0		43.0
Max Q Clear Time (g_c+I1), s	9.4	44.9		34.9	5.6	46.5		24.4
Green Ext Time (p_c), s	0.0	32.4		2.2	0.0	34.5		3.4

Intersection Summary	
HCM 2010 Ctrl Delay	28.6
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	225	90	25	45	5
Future Vol, veh/h	5	225	90	25	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	245	98	27	49	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	125	0	-	0	366	111
Stage 1	-	-	-	-	111	-
Stage 2	-	-	-	-	255	-
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	1462	-	-	-	634	942
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1462	-	-	-	632	942
Mov Cap-2 Maneuver	-	-	-	-	632	-
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	785	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1462	-	-	-	654
HCM Lane V/C Ratio	0.004	-	-	-	0.083
HCM Control Delay (s)	7.5	-	-	-	11
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	300	5	85	110	15	5	0	135	20	0	5
Future Vol, veh/h	5	300	5	85	110	15	5	0	135	20	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	326	5	92	120	16	5	0	147	22	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	136	0	0	332	0	0	655	661	329	726	655	128
Stage 1	-	-	-	-	-	-	340	340	-	313	313	-
Stage 2	-	-	-	-	-	-	315	321	-	413	342	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1448	-	-	1227	-	-	379	383	712	340	386	922
Stage 1	-	-	-	-	-	-	675	639	-	698	657	-
Stage 2	-	-	-	-	-	-	696	652	-	616	638	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1448	-	-	1227	-	-	354	353	712	254	356	922
Mov Cap-2 Maneuver	-	-	-	-	-	-	354	353	-	254	356	-
Stage 1	-	-	-	-	-	-	673	637	-	696	608	-
Stage 2	-	-	-	-	-	-	640	603	-	487	636	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	3.3	11.7	18.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	687	1448	-	-	1227	-	-	297
HCM Lane V/C Ratio	0.222	0.004	-	-	0.075	-	-	0.091
HCM Control Delay (s)	11.7	7.5	-	-	8.2	-	-	18.3
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.8	0	-	-	0.2	-	-	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	425	185	35	35	5
Future Volume (veh/h)	0	425	185	35	35	5
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	1900
Adj Flow Rate, veh/h	0	462	201	38	38	5
Adj No. of Lanes	1	1	1	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	151	655	536	101	633	83
Arrive On Green	0.00	0.35	0.35	0.35	0.42	0.42
Sat Flow, veh/h	1136	1863	1524	288	1513	199
Grp Volume(v), veh/h	0	462	0	239	44	0
Grp Sat Flow(s),veh/h/ln	1136	1863	0	1812	1752	0
Q Serve(g_s), s	0.0	10.2	0.0	4.7	0.7	0.0
Cycle Q Clear(g_c), s	0.0	10.2	0.0	4.7	0.7	0.0
Prop In Lane	1.00			0.16	0.86	0.11
Lane Grp Cap(c), veh/h	151	655	0	637	733	0
V/C Ratio(X)	0.00	0.71	0.00	0.38	0.06	0.00
Avail Cap(c_a), veh/h	583	1364	0	1346	733	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	13.4	0.0	11.6	8.3	0.0
Incr Delay (d2), s/veh	0.0	1.4	0.0	0.4	0.2	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	0.0	5.4	0.0	2.4	0.4	0.0
LnGrp Delay(d),s/veh	0.0	14.8	0.0	11.9	8.4	0.0
LnGrp LOS		B		B	A	
Approach Vol, veh/h		462	239		44	
Approach Delay, s/veh		14.8	11.9		8.4	
Approach LOS		B	B		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		21.8		26.0		21.8		
Change Period (Y+Rc), s		5.0		6.0		* 5		
Max Green Setting (Gmax), s		35.0		20.0		* 36		
Max Q Clear Time (g_c+I1), s		12.2		2.7		6.7		
Green Ext Time (p_c), s		4.6		0.2		4.8		

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	470	5	45	225	0	0
Future Vol, veh/h	470	5	45	225	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	511	5	49	245	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	516	0	-	514
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	1050	-	0	560
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1050	-	-	560
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1050	-
HCM Lane V/C Ratio	-	-	-	0.047	-
HCM Control Delay (s)	0	-	-	8.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	⚒	
Traffic Vol, veh/h	470	0	0	270	5	25
Future Vol, veh/h	470	0	0	270	5	25
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	511	0	0	293	5	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	804	511
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	293	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	352	563
Stage 1	-	0	0	-	602	-
Stage 2	-	0	0	-	757	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	352	563
Mov Cap-2 Maneuver	-	-	-	-	352	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	757	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	512	-	-
HCM Lane V/C Ratio	0.064	-	-
HCM Control Delay (s)	12.5	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	5	5	55	55	30
Future Vol, veh/h	60	5	5	55	55	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	5	5	60	60	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	147	76	92	0	-	0
Stage 1	76	-	-	-	-	-
Stage 2	71	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	845	985	1503	-	-	-
Stage 1	947	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	842	985	1503	-	-	-
Mov Cap-2 Maneuver	842	-	-	-	-	-
Stage 1	947	-	-	-	-	-
Stage 2	949	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1503	-	852	-	-
HCM Lane V/C Ratio	0.004	-	0.083	-	-
HCM Control Delay (s)	7.4	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	5	115	60	5	15
Future Vol, veh/h	30	5	115	60	5	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	5	125	65	5	16

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	185	158	0	0	190	0
Stage 1	158	-	-	-	-	-
Stage 2	27	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	804	887	-	-	1384	-
Stage 1	871	-	-	-	-	-
Stage 2	996	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	801	887	-	-	1384	-
Mov Cap-2 Maneuver	801	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	992	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	1.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	812	1384	-
HCM Lane V/C Ratio	-	-	0.047	0.004	-
HCM Control Delay (s)	-	-	9.7	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2021 With Mitigation AM Peak

HCM 2010 Signalized Intersection Summary
1: Kahekili Hwy & Likelike Hwy

10/10/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	980	0	0	990	620	0	945	0	0	525	1620
Future Volume (veh/h)	0	980	0	0	990	620	0	945	0	0	525	1620
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	0	1863	0	0	1863	1863	0	1863	0	0	1863	1863
Adj Flow Rate, veh/h	0	1065	0	0	1076	0	0	1027	0	0	571	0
Adj No. of Lanes	0	3	0	0	2	1	0	2	0	0	1	2
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, %	0	2	0	0	2	2	0	2	0	0	2	2
Cap, veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
Arrive On Green	0.00	0.45	0.00	0.00	0.45	0.00	0.00	0.47	0.00	0.00	0.47	0.00
Sat Flow, veh/h	0	5421	0	0	3632	1583	0	3725	0	0	1863	2787
Grp Volume(v), veh/h	0	1065	0	0	1076	0	0	1027	0	0	571	0
Grp Sat Flow(s),veh/h/ln	0	1695	0	0	1770	1583	0	1770	0	0	1863	1393
Q Serve(g_s), s	0.0	21.7	0.0	0.0	35.8	0.0	0.0	32.7	0.0	0.0	35.4	0.0
Cycle Q Clear(g_c), s	0.0	21.7	0.0	0.0	35.8	0.0	0.0	32.7	0.0	0.0	35.4	0.0
Prop In Lane	0.00		0.00	0.00		1.00	0.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
V/C Ratio(X)	0.00	0.46	0.00	0.00	0.67	0.00	0.00	0.62	0.00	0.00	0.66	0.00
Avail Cap(c_a), veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
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)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	28.4	0.0	0.0	32.2	0.0	0.0	30.1	0.0	0.0	30.8	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	2.3	0.0	0.0	1.8	0.0	0.0	3.9	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	0.0	10.3	0.0	0.0	18.0	0.0	0.0	16.4	0.0	0.0	19.0	0.0
LnGrp Delay(d),s/veh	0.0	29.0	0.0	0.0	34.5	0.0	0.0	31.8	0.0	0.0	34.6	0.0
LnGrp LOS		C			C			C			C	
Approach Vol, veh/h		1065			1076			1027			571	
Approach Delay, s/veh		29.0			34.5			31.8			34.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		74.0		76.0		74.0		76.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		68.0		70.0		68.0		70.0
Max Q Clear Time (g_c+I1), s		23.7		37.4		37.8		34.7
Green Ext Time (p_c), s		25.3		14.9		20.0		15.4

Intersection Summary	
HCM 2010 Ctrl Delay	32.2
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	15	15	60	10	75	5	1500	45	120	2025	5
Future Volume (veh/h)	15	15	15	60	10	75	5	1500	45	120	2025	5
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900
Adj Flow Rate, veh/h	16	16	16	65	11	82	5	1630	49	130	2201	5
Adj No. of Lanes	0	1	1	0	1	1	1	3	0	1	3	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	188	177	336	292	46	443	22	3112	94	142	3567	8
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.01	0.61	0.61	0.08	0.68	0.68
Sat Flow, veh/h	760	885	1583	1239	231	1583	1774	5074	152	1774	5239	12
Grp Volume(v), veh/h	32	0	16	76	0	82	5	1089	590	130	1424	782
Grp Sat Flow(s),veh/h/ln	1645	0	1583	1469	0	1583	1774	1695	1836	1774	1695	1861
Q Serve(g_s), s	0.0	0.0	1.2	4.0	0.0	5.9	0.4	27.4	27.5	10.9	34.7	34.7
Cycle Q Clear(g_c), s	2.1	0.0	1.2	6.1	0.0	5.9	0.4	27.4	27.5	10.9	34.7	34.7
Prop In Lane	0.50		1.00	0.86		1.00	1.00		0.08	1.00		0.01
Lane Grp Cap(c), veh/h	365	0	336	338	0	443	22	2079	1126	142	2308	1267
V/C Ratio(X)	0.09	0.00	0.05	0.22	0.00	0.18	0.22	0.52	0.52	0.92	0.62	0.62
Avail Cap(c_a), veh/h	493	0	463	454	0	570	118	2079	1126	142	2308	1267
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	0.0	47.0	50.3	0.0	41.0	73.3	16.5	16.5	68.5	13.2	13.2
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.3	0.0	0.2	5.0	0.9	1.7	51.1	1.2	2.3
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	1.1	0.0	0.5	2.7	0.0	2.6	0.2	13.0	14.3	7.4	16.4	18.4
LnGrp Delay(d),s/veh	48.9	0.0	47.0	50.7	0.0	41.2	78.3	17.5	18.3	119.6	14.4	15.4
LnGrp LOS	D		D	D		D	E	B	B	F	B	B
Approach Vol, veh/h		48			158			1684			2336	
Approach Delay, s/veh		48.3			45.8			17.9			20.6	
Approach LOS		D			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	108.1		35.0	17.0	98.0		35.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	10.0	82.0		42.0	12.0	80.0		42.0
Max Q Clear Time (g_c+I1), s	2.4	36.7		8.1	12.9	29.5		4.1
Green Ext Time (p_c), s	0.0	45.0		0.9	0.0	50.2		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	20.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	45	75	155	105	50	360	1195	60	90	1780	175
Future Volume (veh/h)	40	45	75	155	105	50	360	1195	60	90	1780	175
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	43	49	82	168	114	54	391	1299	65	98	1935	190
Adj No. of Lanes	1	1	1	1	1	0	1	3	0	1	3	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	149	318	650	248	204	97	426	3098	155	174	2275	222
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.24	0.62	0.62	0.10	0.48	0.48
Sat Flow, veh/h	1212	1863	1583	1351	1196	567	1774	4961	248	1774	4712	460
Grp Volume(v), veh/h	43	49	82	168	0	168	391	888	476	98	1389	736
Grp Sat Flow(s),veh/h/ln	1212	1863	1583	1351	0	1763	1774	1695	1819	1774	1695	1782
Q Serve(g_s), s	5.1	3.4	4.8	18.2	0.0	13.1	32.2	20.0	20.0	7.9	53.8	54.7
Cycle Q Clear(g_c), s	18.2	3.4	4.8	21.5	0.0	13.1	32.2	20.0	20.0	7.9	53.8	54.7
Prop In Lane	1.00		1.00	1.00		0.32	1.00		0.14	1.00		0.26
Lane Grp Cap(c), veh/h	149	318	650	248	0	300	426	2117	1136	174	1637	860
V/C Ratio(X)	0.29	0.15	0.13	0.68	0.00	0.56	0.92	0.42	0.42	0.56	0.85	0.86
Avail Cap(c_a), veh/h	273	509	813	387	0	482	449	2117	1136	177	1637	860
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	1.00	0.60	0.60	0.60
Uniform Delay (d), s/veh	65.4	53.0	27.5	62.2	0.0	57.0	55.6	14.3	14.3	64.5	34.0	34.2
Incr Delay (d2), s/veh	1.1	0.2	0.1	3.2	0.0	1.6	23.2	0.6	1.1	2.4	3.5	6.8
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	1.7	1.7	2.1	7.0	0.0	6.5	18.5	9.6	10.4	4.0	25.9	28.4
LnGrp Delay(d),s/veh	66.4	53.2	27.6	65.4	0.0	58.7	78.8	14.9	15.5	66.9	37.5	41.0
LnGrp LOS	E	D	C	E		E	E	B	B	E	D	D
Approach Vol, veh/h		174			336			1755			2223	
Approach Delay, s/veh		44.4			62.0			29.3			39.9	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	41.0	78.4		30.6	19.7	99.7		30.6
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	36.0	55.0		41.0	15.0	78.0		41.0
Max Q Clear Time (g_c+I1), s	34.2	56.7		23.5	9.9	22.0		20.2
Green Ext Time (p_c), s	0.5	0.0		2.1	0.1	55.1		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	37.6
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	50	235	295	30	20	150	765	330	60	1545	10
Future Volume (veh/h)	15	50	235	295	30	20	150	765	330	60	1545	10
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1863	1863	1900	1863	1863	1900	1863	1618	1650
Adj Flow Rate, veh/h	16	54	255	321	33	22	163	832	359	65	1679	11
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	1	3	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	147	481	706	389	361	241	177	1749	751	82	2026	13
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.20	1.00	1.00	0.05	0.45	0.45
Sat Flow, veh/h	340	1391	1583	1066	1044	696	1774	3490	1499	1774	4527	30
Grp Volume(v), veh/h	70	0	255	321	0	55	163	808	383	65	1092	598
Grp Sat Flow(s),veh/h/ln	1731	0	1583	1066	0	1740	1774	1695	1598	1774	1472	1612
Q Serve(g_s), s	0.0	0.0	16.0	43.9	0.0	3.2	13.5	0.0	0.0	5.4	48.9	48.9
Cycle Q Clear(g_c), s	3.8	0.0	16.0	47.8	0.0	3.2	13.5	0.0	0.0	5.4	48.9	48.9
Prop In Lane	0.23		1.00	1.00		0.40	1.00		0.94	1.00		0.02
Lane Grp Cap(c), veh/h	628	0	706	389	0	602	177	1699	801	82	1318	722
V/C Ratio(X)	0.11	0.00	0.36	0.82	0.00	0.09	0.92	0.48	0.48	0.79	0.83	0.83
Avail Cap(c_a), veh/h	698	0	771	433	0	673	177	1699	801	118	1318	722
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	27.5	49.6	0.0	33.1	59.4	0.0	0.0	70.8	36.4	36.4
Incr Delay (d2), s/veh	0.1	0.0	0.3	11.3	0.0	0.1	42.0	0.9	1.8	19.8	6.1	10.6
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	2.0	0.0	7.0	14.2	0.0	1.6	8.7	0.2	0.4	3.1	21.0	23.9
LnGrp Delay(d),s/veh	33.4	0.0	27.8	60.9	0.0	33.2	101.4	0.9	1.8	90.6	42.5	47.0
LnGrp LOS	C		C	E		C	F	A	A	F	D	D
Approach Vol, veh/h		325			376			1354			1755	
Approach Delay, s/veh		29.0			56.8			13.2			45.8	
Approach LOS		C			E			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	20.0	73.1		56.9	12.0	81.2		56.9
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	15.0	61.0		58.0	10.0	66.0		58.0
Max Q Clear Time (g_c+I1), s	15.5	50.9		49.8	7.4	2.0		18.0
Green Ext Time (p_c), s	0.0	10.0		2.1	0.0	59.9		3.4

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)	30	85	105	405	100	170	50	590	215	190	1080	35
Future Volume (veh/h)	30	85	105	405	100	170	50	590	215	190	1080	35
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1863	1863	1863	1863	1863	1900	1863	1569	1600
Adj Flow Rate, veh/h	33	92	114	274	341	185	54	641	234	207	1174	38
Adj No. of Lanes	0	1	1	1	1	1	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	40	112	341	373	391	394	69	1054	384	236	1499	48
Arrive On Green	0.08	0.08	0.08	0.21	0.21	0.21	0.04	0.41	0.41	0.13	0.51	0.51
Sat Flow, veh/h	485	1353	1583	1774	1863	1583	1774	2542	927	1774	2947	95
Grp Volume(v), veh/h	125	0	114	274	341	185	54	446	429	207	594	618
Grp Sat Flow(s),veh/h/ln	1838	0	1583	1774	1863	1583	1774	1770	1699	1774	1490	1552
Q Serve(g_s), s	10.0	0.0	9.1	21.6	26.6	14.9	4.5	29.6	29.6	17.2	48.8	48.8
Cycle Q Clear(g_c), s	10.0	0.0	9.1	21.6	26.6	14.9	4.5	29.6	29.6	17.2	48.8	48.8
Prop In Lane	0.26		1.00	1.00		1.00	1.00		0.55	1.00		0.06
Lane Grp Cap(c), veh/h	152	0	341	373	391	394	69	734	704	236	758	789
V/C Ratio(X)	0.82	0.00	0.33	0.74	0.87	0.47	0.78	0.61	0.61	0.88	0.78	0.78
Avail Cap(c_a), veh/h	172	0	358	402	422	421	83	734	704	319	758	789
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	0.00	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	67.7	0.0	49.8	55.4	57.3	47.9	71.4	34.4	34.4	63.8	30.1	30.1
Incr Delay (d2), s/veh	28.8	0.0	1.2	8.3	18.7	1.9	26.5	3.7	3.9	23.9	7.9	7.7
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	6.3	0.0	4.1	11.5	15.7	6.7	2.7	15.3	14.7	10.0	21.6	22.6
LnGrp Delay(d),s/veh	96.5	0.0	51.0	63.6	76.0	49.8	98.0	38.1	38.3	87.7	38.0	37.8
LnGrp LOS	F		D	E	E	D	F	D	D	F	D	D
Approach Vol, veh/h		239			800			929			1419	
Approach Delay, s/veh		74.8			65.7			41.7			45.2	
Approach LOS		E			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.8	82.3		18.4	25.9	68.2		37.5
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	71.0		14.0	27.0	51.0		34.0
Max Q Clear Time (g_c+I1), s	12.5	50.8		12.0	19.2	31.6		28.6
Green Ext Time (p_c), s	0.0	18.3		0.3	0.8	17.6		2.9

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	55	60	105	110	40	85	990	100	30	1070	150
Future Volume (veh/h)	70	55	60	105	110	40	85	990	100	30	1070	150
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	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	76	60	65	114	120	43	92	1076	109	33	1163	163
Adj No. of Lanes	0	1	0	1	1	0	1	2	1	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	110	87	78	221	283	101	112	2360	1056	42	1957	273
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.06	0.67	0.67	0.02	0.63	0.63
Sat Flow, veh/h	355	401	362	1261	1310	470	1774	3539	1583	1774	3120	436
Grp Volume(v), veh/h	201	0	0	114	0	163	92	1076	109	33	658	668
Grp Sat Flow(s),veh/h/ln	1119	0	0	1261	0	1780	1774	1770	1583	1774	1770	1786
Q Serve(g_s), s	15.8	0.0	0.0	0.0	0.0	11.9	7.7	21.8	3.7	2.8	33.1	33.4
Cycle Q Clear(g_c), s	27.6	0.0	0.0	22.0	0.0	11.9	7.7	21.8	3.7	2.8	33.1	33.4
Prop In Lane	0.38		0.32	1.00		0.26	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	275	0	0	221	0	385	112	2360	1056	42	1110	1120
V/C Ratio(X)	0.73	0.00	0.00	0.51	0.00	0.42	0.82	0.46	0.10	0.78	0.59	0.60
Avail Cap(c_a), veh/h	399	0	0	327	0	534	248	2360	1056	189	1110	1120
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.2	0.0	0.0	54.7	0.0	50.7	69.4	12.0	8.9	72.8	16.6	16.6
Incr Delay (d2), s/veh	4.6	0.0	0.0	2.2	0.0	0.9	5.5	0.6	0.2	11.0	2.3	2.3
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	8.4	0.0	0.0	4.5	0.0	5.9	4.0	10.8	1.7	1.5	16.8	17.1
LnGrp Delay(d),s/veh	63.8	0.0	0.0	56.9	0.0	51.6	74.9	12.6	9.1	83.8	18.9	19.0
LnGrp LOS	E			E		D	E	B	A	F	B	B
Approach Vol, veh/h		201			277			1277			1359	
Approach Delay, s/veh		63.8			53.8			16.8			20.5	
Approach LOS		E			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.6	105.0		37.4	13.5	99.1		37.4
Change Period (Y+Rc), s	4.0	5.0		5.0	4.0	5.0		5.0
Max Green Setting (Gmax), s	16.0	75.0		45.0	21.0	70.0		45.0
Max Q Clear Time (g_c+I1), s	14.8	23.8		29.6	9.7	35.4		24.0
Green Ext Time (p_c), s	0.0	37.4		2.8	0.0	27.7		3.1

Intersection Summary	
HCM 2010 Ctrl Delay	24.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	65	390	75	5	5
Future Vol, veh/h	5	65	390	75	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	71	424	82	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	505	0	-	0	547	465
Stage 1	-	-	-	-	465	-
Stage 2	-	-	-	-	82	-
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	1060	-	-	-	498	597
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	941	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1060	-	-	-	496	597
Mov Cap-2 Maneuver	-	-	-	-	496	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	937	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1060	-	-	-	542
HCM Lane V/C Ratio	0.005	-	-	-	0.02
HCM Control Delay (s)	8.4	-	-	-	11.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	70	5	160	440	50	5	5	70	15	0	5
Future Vol, veh/h	5	70	5	160	440	50	5	5	70	15	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	76	5	174	478	54	5	5	76	16	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	533	0	0	82	0	0	946	970	79	983	945	505
Stage 1	-	-	-	-	-	-	90	90	-	853	853	-
Stage 2	-	-	-	-	-	-	856	880	-	130	92	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1035	-	-	1515	-	-	241	253	981	228	262	567
Stage 1	-	-	-	-	-	-	917	820	-	354	376	-
Stage 2	-	-	-	-	-	-	352	365	-	874	819	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1035	-	-	1515	-	-	217	223	981	188	231	567
Mov Cap-2 Maneuver	-	-	-	-	-	-	217	223	-	188	231	-
Stage 1	-	-	-	-	-	-	913	816	-	352	333	-
Stage 2	-	-	-	-	-	-	309	323	-	797	815	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.9	11	22.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	685	1035	-	-	1515	-	-	226
HCM Lane V/C Ratio	0.127	0.005	-	-	0.115	-	-	0.096
HCM Control Delay (s)	11	8.5	-	-	7.7	-	-	22.6
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.4	0	-	-	0.4	-	-	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	135	640	20	10	10
Future Volume (veh/h)	5	135	640	20	10	10
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	1900
Adj Flow Rate, veh/h	5	147	696	22	11	11
Adj No. of Lanes	1	1	1	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	216	865	834	26	278	278
Arrive On Green	0.46	0.46	0.46	0.46	0.35	0.35
Sat Flow, veh/h	731	1863	1796	57	804	804
Grp Volume(v), veh/h	5	147	0	718	23	0
Grp Sat Flow(s),veh/h/ln	731	1863	0	1853	1681	0
Q Serve(g_s), s	0.3	2.7	0.0	19.6	0.5	0.0
Cycle Q Clear(g_c), s	20.0	2.7	0.0	19.6	0.5	0.0
Prop In Lane	1.00			0.03	0.48	0.48
Lane Grp Cap(c), veh/h	216	865	0	861	581	0
V/C Ratio(X)	0.02	0.17	0.00	0.83	0.04	0.00
Avail Cap(c_a), veh/h	319	1126	0	1136	581	0
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	22.3	9.0	0.0	13.5	12.6	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	4.2	0.1	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	0.1	1.4	0.0	10.8	0.3	0.0
LnGrp Delay(d),s/veh	22.3	9.1	0.0	17.8	12.7	0.0
LnGrp LOS	C	A		B	B	
Approach Vol, veh/h		152	718		23	
Approach Delay, s/veh		9.5	17.8		12.7	
Approach LOS		A	B		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		31.9		26.0		31.9		
Change Period (Y+Rc), s		5.0		6.0		* 5		
Max Green Setting (Gmax), s		35.0		20.0		* 36		
Max Q Clear Time (g_c+I1), s		22.0		2.5		21.6		
Green Ext Time (p_c), s		4.9		0.1		5.1		

Intersection Summary	
HCM 2010 Ctrl Delay	16.2
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	150	5	50	655	0	0
Future Vol, veh/h	150	5	50	655	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	5	54	712	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	168	0	-	166
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	1410	-	0	878
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1410	-	-	878
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1410	-
HCM Lane V/C Ratio	-	-	-	0.039	-
HCM Control Delay (s)	0	-	-	7.7	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	⚒	
Traffic Vol, veh/h	150	0	0	685	5	25
Future Vol, veh/h	150	0	0	685	5	25
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	0	0	745	5	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	908	163
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	745	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	306	882
Stage 1	-	0	0	-	866	-
Stage 2	-	0	0	-	469	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	306	882
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	469	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	671	-	-
HCM Lane V/C Ratio	0.049	-	-
HCM Control Delay (s)	10.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	5	5	55	50	75
Future Vol, veh/h	15	5	5	55	50	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	5	5	60	54	82

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	166	95	136	0	-	0
Stage 1	95	-	-	-	-	-
Stage 2	71	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	824	962	1448	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	821	962	1448	-	-	-
Mov Cap-2 Maneuver	821	-	-	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	948	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	0.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1448	-	852	-	-
HCM Lane V/C Ratio	0.004	-	0.026	-	-
HCM Control Delay (s)	7.5	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	5	25	15	5	90
Future Vol, veh/h	65	5	25	15	5	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	5	27	16	5	98

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	144	35	0	0	43	0
Stage 1	35	-	-	-	-	-
Stage 2	109	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	849	1038	-	-	1566	-
Stage 1	987	-	-	-	-	-
Stage 2	916	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	846	1038	-	-	1566	-
Mov Cap-2 Maneuver	846	-	-	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	913	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	0.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	857	1566	-
HCM Lane V/C Ratio	-	-	0.089	0.003	-
HCM Control Delay (s)	-	-	9.6	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2021 With Mitigation PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1565	0	0	505	555	0	1935	0	0	510	1060
Future Volume (veh/h)	0	1565	0	0	505	555	0	1935	0	0	510	1060
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	0	1863	0	0	1863	1863	0	1674	0	0	1863	1863
Adj Flow Rate, veh/h	0	1701	0	0	549	0	0	2103	0	0	554	0
Adj No. of Lanes	0	3	0	0	2	1	0	2	0	0	1	2
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, %	0	2	0	0	2	2	0	2	0	0	2	2
Cap, veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
Arrive On Green	0.00	0.34	0.00	0.00	0.34	0.00	0.00	0.57	0.00	0.00	0.96	0.00
Sat Flow, veh/h	0	5421	0	0	3632	1583	0	3347	0	0	1863	2787
Grp Volume(v), veh/h	0	1701	0	0	549	0	0	2103	0	0	554	0
Grp Sat Flow(s),veh/h/ln	0	1695	0	0	1770	1583	0	1590	0	0	1863	1393
Q Serve(g_s), s	0.0	49.8	0.0	0.0	18.2	0.0	0.0	86.0	0.0	0.0	3.8	0.0
Cycle Q Clear(g_c), s	0.0	49.8	0.0	0.0	18.2	0.0	0.0	86.0	0.0	0.0	3.8	0.0
Prop In Lane	0.00		0.00	0.00		1.00	0.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
V/C Ratio(X)	0.00	0.98	0.00	0.00	0.46	0.00	0.00	1.15	0.00	0.00	0.52	0.00
Avail Cap(c_a), veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67
Upstream Filter(I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.90	0.00
Uniform Delay (d), s/veh	0.0	49.1	0.0	0.0	38.7	0.0	0.0	32.0	0.0	0.0	1.4	0.0
Incr Delay (d2), s/veh	0.0	17.9	0.0	0.0	0.3	0.0	0.0	75.9	0.0	0.0	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	0.0	26.2	0.0	0.0	8.9	0.0	0.0	56.7	0.0	0.0	2.0	0.0
LnGrp Delay(d),s/veh	0.0	67.0	0.0	0.0	38.9	0.0	0.0	107.9	0.0	0.0	3.1	0.0
LnGrp LOS		E			D			F			A	
Approach Vol, veh/h		1701			549			2103			554	
Approach Delay, s/veh		67.0			38.9			107.9			3.1	
Approach LOS		E			D			F			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		92.0		58.0		92.0		58.0
Change Period (Y+Rc), s		6.0		7.0		6.0		7.0
Max Green Setting (Gmax), s		86.0		51.0		86.0		51.0
Max Q Clear Time (g_c+I1), s		88.0		51.8		5.8		20.2
Green Ext Time (p_c), s		0.0		0.0		55.8		20.9

Intersection Summary	
HCM 2010 Ctrl Delay	74.1
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	5	10	20	20	45	20	2375	105	110	1510	10
Future Volume (veh/h)	10	5	10	20	20	45	20	2375	105	110	1510	10
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	5	11	22	22	49	22	2582	114	120	1641	11
Adj No. of Lanes	0	1	1	0	1	1	1	3	0	1	3	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	140	57	325	118	107	410	35	3170	139	130	3585	24
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.04	1.00	1.00	0.07	0.69	0.69
Sat Flow, veh/h	539	306	1583	445	579	1583	1774	4996	218	1774	5212	35
Grp Volume(v), veh/h	16	0	11	44	0	49	22	1744	952	120	1067	585
Grp Sat Flow(s),veh/h/ln	845	0	1583	1023	0	1583	1774	1695	1824	1774	1695	1857
Q Serve(g_s), s	0.3	0.0	0.8	1.4	0.0	3.6	1.8	0.0	0.0	10.1	21.5	21.5
Cycle Q Clear(g_c), s	13.1	0.0	0.8	13.7	0.0	3.6	1.8	0.0	0.0	10.1	21.5	21.5
Prop In Lane	0.69		1.00	0.50		1.00	1.00		0.12	1.00		0.02
Lane Grp Cap(c), veh/h	197	0	325	226	0	410	35	2151	1158	130	2332	1277
V/C Ratio(X)	0.08	0.00	0.03	0.19	0.00	0.12	0.62	0.81	0.82	0.92	0.46	0.46
Avail Cap(c_a), veh/h	325	0	464	366	0	549	71	2151	1158	130	2332	1277
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.13	0.13	0.13	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.1	0.0	47.7	54.1	0.0	42.5	71.4	0.0	0.0	69.1	10.7	10.7
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.4	0.0	0.1	2.4	0.5	1.0	55.7	0.6	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	0.6	0.0	0.4	1.7	0.0	1.6	0.9	0.1	0.3	7.0	10.1	11.3
LnGrp Delay(d),s/veh	52.2	0.0	47.7	54.6	0.0	42.7	73.8	0.5	1.0	124.8	11.3	11.8
LnGrp LOS	D		D	D		D	E	A	A	F	B	B
Approach Vol, veh/h		27			93			2718			1772	
Approach Delay, s/veh		50.4			48.3			1.2			19.2	
Approach LOS		D			D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.0	109.2		32.8	16.0	101.2		32.8
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	6.0	87.0		41.0	11.0	82.0		41.0
Max Q Clear Time (g_c+I1), s	3.8	23.5		15.7	12.1	2.0		15.1
Green Ext Time (p_c), s	0.0	63.2		0.5	0.0	79.6		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	9.4
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	75	300	100	60	140	120	2130	175	125	1265	95
Future Volume (veh/h)	130	75	300	100	60	140	120	2130	175	125	1265	95
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	141	82	326	109	65	152	130	2315	190	136	1375	103
Adj No. of Lanes	1	1	1	1	1	0	1	3	0	1	3	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	229	497	632	275	132	310	235	2528	205	177	2384	179
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.13	0.53	0.53	0.10	0.49	0.49
Sat Flow, veh/h	1160	1863	1583	974	497	1161	1774	4796	388	1774	4828	362
Grp Volume(v), veh/h	141	82	326	109	0	217	130	1627	878	136	966	512
Grp Sat Flow(s),veh/h/ln	1160	1863	1583	974	0	1658	1774	1695	1794	1774	1695	1799
Q Serve(g_s), s	17.5	5.1	23.4	14.5	0.0	16.6	10.3	65.5	68.0	11.2	30.2	30.2
Cycle Q Clear(g_c), s	34.1	5.1	23.4	19.6	0.0	16.6	10.3	65.5	68.0	11.2	30.2	30.2
Prop In Lane	1.00		1.00	1.00		0.70	1.00		0.22	1.00		0.20
Lane Grp Cap(c), veh/h	229	497	632	275	0	442	235	1787	946	177	1675	889
V/C Ratio(X)	0.62	0.17	0.52	0.40	0.00	0.49	0.55	0.91	0.93	0.77	0.58	0.58
Avail Cap(c_a), veh/h	276	571	696	314	0	508	237	1787	946	237	1675	889
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	1.00	0.85	0.85	0.85
Uniform Delay (d), s/veh	60.8	42.2	34.1	49.7	0.0	46.4	60.9	32.3	32.8	65.8	26.9	26.9
Incr Delay (d2), s/veh	2.9	0.2	0.7	0.9	0.0	0.8	2.7	8.5	16.4	8.8	1.2	2.3
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	5.8	2.6	10.4	4.0	0.0	7.7	5.2	32.6	37.9	5.9	14.4	15.5
LnGrp Delay(d),s/veh	63.7	42.3	34.7	50.6	0.0	47.3	63.6	40.8	49.2	74.7	28.1	29.2
LnGrp LOS	E	D	C	D		D	E	D	D	E	C	C
Approach Vol, veh/h		549			326			2635			1614	
Approach Delay, s/veh		43.3			48.4			44.7			32.4	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	24.9	80.1		45.0	19.9	85.1		45.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	20.0	68.0		46.0	20.0	68.0		46.0
Max Q Clear Time (g_c+I1), s	12.3	32.2		21.6	13.2	70.0		36.1
Green Ext Time (p_c), s	0.2	35.6		4.3	0.2	0.0		3.1

Intersection Summary	
HCM 2010 Ctrl Delay	40.9
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	50	105	255	35	50	190	1390	625	70	1100	5
Future Volume (veh/h)	5	50	105	255	35	50	190	1390	625	70	1100	5
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1863	1863	1900	1863	1618	1650	1863	1863	1900
Adj Flow Rate, veh/h	5	54	114	277	38	54	207	1511	679	76	1196	5
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	1	3	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	48	460	622	339	184	261	229	1709	741	113	2618	11
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.26	1.00	1.00	0.06	0.50	0.50
Sat Flow, veh/h	84	1743	1583	1212	697	991	1774	3021	1310	1774	5227	22
Grp Volume(v), veh/h	59	0	114	277	0	92	207	1471	719	76	776	425
Grp Sat Flow(s),veh/h/ln	1826	0	1583	1212	0	1688	1774	1472	1386	1774	1695	1859
Q Serve(g_s), s	0.0	0.0	7.1	33.8	0.0	6.4	16.9	0.0	0.0	6.3	22.2	22.2
Cycle Q Clear(g_c), s	3.6	0.0	7.1	37.4	0.0	6.4	16.9	0.0	0.0	6.3	22.2	22.2
Prop In Lane	0.08		1.00	1.00		0.59	1.00		0.94	1.00		0.01
Lane Grp Cap(c), veh/h	508	0	622	339	0	445	229	1666	784	113	1698	931
V/C Ratio(X)	0.12	0.00	0.18	0.82	0.00	0.21	0.91	0.88	0.92	0.67	0.46	0.46
Avail Cap(c_a), veh/h	513	0	626	342	0	450	331	1666	784	118	1698	931
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.22	0.22	0.22	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.0	0.0	29.8	56.2	0.0	43.0	54.8	0.0	0.0	68.7	24.2	24.2
Incr Delay (d2), s/veh	0.1	0.0	0.1	14.3	0.0	0.2	6.1	1.8	5.0	13.1	0.9	1.6
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	1.9	0.0	3.1	12.7	0.0	3.0	8.7	0.4	1.1	3.5	10.6	11.8
LnGrp Delay(d),s/veh	42.1	0.0	30.0	70.5	0.0	43.2	60.9	1.8	5.0	81.8	25.1	25.9
LnGrp LOS	D		C	E		D	E	A	A	F	C	C
Approach Vol, veh/h		173			369			2397			1277	
Approach Delay, s/veh		34.1			63.7			7.8			28.7	
Approach LOS		C			E			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	24.3	81.1		44.6	14.6	90.9		44.6
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	28.6	66.0		40.0	10.0	84.0		40.0
Max Q Clear Time (g_c+I1), s	19.9	24.2		39.4	8.3	2.0		9.1
Green Ext Time (p_c), s	0.4	41.2		0.2	0.0	79.8		2.4

Intersection Summary	
HCM 2010 Ctrl Delay	20.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	95	70	240	110	335	65	1060	335	205	820	20
Future Volume (veh/h)	20	95	70	240	110	335	65	1060	335	205	820	20
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	22	103	14	190	219	248	71	1152	344	223	891	22
Adj No. of Lanes	0	1	1	1	1	1	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	26	122	338	260	273	312	89	1295	381	237	1988	49
Arrive On Green	0.08	0.08	0.08	0.15	0.15	0.15	0.05	0.48	0.48	0.13	0.56	0.56
Sat Flow, veh/h	325	1522	1583	1774	1863	1583	1774	2698	794	1774	3530	87
Grp Volume(v), veh/h	125	0	14	190	219	248	71	750	746	223	447	466
Grp Sat Flow(s),veh/h/ln	1846	0	1583	1774	1863	1583	1774	1770	1723	1774	1770	1847
Q Serve(g_s), s	10.0	0.0	1.1	15.4	17.1	22.0	5.9	57.3	59.6	18.7	22.1	22.1
Cycle Q Clear(g_c), s	10.0	0.0	1.1	15.4	17.1	22.0	5.9	57.3	59.6	18.7	22.1	22.1
Prop In Lane	0.18		1.00	1.00		1.00	1.00		0.46	1.00		0.05
Lane Grp Cap(c), veh/h	148	0	338	260	273	312	89	850	827	237	996	1040
V/C Ratio(X)	0.85	0.00	0.04	0.73	0.80	0.80	0.80	0.88	0.90	0.94	0.45	0.45
Avail Cap(c_a), veh/h	148	0	338	260	273	312	142	850	827	237	996	1040
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	0.00	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	68.1	0.0	46.8	61.2	61.9	57.3	70.5	35.2	35.8	64.4	19.1	19.1
Incr Delay (d2), s/veh	36.8	0.0	0.1	12.1	17.5	15.0	5.9	12.8	15.0	43.7	1.5	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	6.6	0.0	0.5	8.4	10.1	11.1	3.1	30.9	31.6	12.0	11.2	11.7
LnGrp Delay(d),s/veh	104.9	0.0	46.9	73.3	79.4	72.4	76.4	48.0	50.7	108.1	20.6	20.5
LnGrp LOS	F		D	E	E	E	E	D	D	F	C	C
Approach Vol, veh/h		139			657			1567			1136	
Approach Delay, s/veh		99.1			75.0			50.6			37.8	
Approach LOS		F			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.5	90.5		18.0	26.0	78.0		28.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	12.0	80.0		12.0	20.0	72.0		22.0
Max Q Clear Time (g_c+I1), s	17.9	24.1		12.0	20.7	61.6		24.0
Green Ext Time (p_c), s	0.0	49.6		0.0	0.0	10.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	52.9
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	85	60	110	55	85	40	1370	85	70	1345	110
Future Volume (veh/h)	90	85	60	110	55	85	40	1370	85	70	1345	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		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	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	98	92	65	120	60	92	43	1489	92	76	1462	120
Adj No. of Lanes	0	1	0	1	1	0	1	2	1	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	134	118	75	243	165	254	55	2139	957	95	2077	170
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.03	0.60	0.60	0.05	0.63	0.63
Sat Flow, veh/h	403	473	300	1225	664	1019	1774	3539	1583	1774	3314	271
Grp Volume(v), veh/h	255	0	0	120	0	152	43	1489	92	76	777	805
Grp Sat Flow(s),veh/h/ln	1176	0	0	1225	0	1683	1774	1770	1583	1774	1770	1815
Q Serve(g_s), s	21.6	0.0	0.0	0.0	0.0	11.2	3.6	43.1	3.7	6.4	43.8	44.6
Cycle Q Clear(g_c), s	32.8	0.0	0.0	22.4	0.0	11.2	3.6	43.1	3.7	6.4	43.8	44.6
Prop In Lane	0.38		0.25	1.00		0.61	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	326	0	0	243	0	419	55	2139	957	95	1109	1137
V/C Ratio(X)	0.78	0.00	0.00	0.49	0.00	0.36	0.78	0.70	0.10	0.80	0.70	0.71
Avail Cap(c_a), veh/h	403	0	0	306	0	505	248	2139	957	189	1109	1137
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.5	0.0	0.0	50.7	0.0	46.5	72.1	20.3	12.5	70.2	18.6	18.8
Incr Delay (d2), s/veh	8.4	0.0	0.0	1.9	0.0	0.6	8.4	1.9	0.2	5.8	3.7	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	11.0	0.0	0.0	4.6	0.0	5.3	1.9	21.5	1.7	3.3	22.5	23.5
LnGrp Delay(d),s/veh	65.9	0.0	0.0	52.6	0.0	47.2	80.5	22.2	12.7	76.0	22.3	22.5
LnGrp LOS	E			D		D	F	C	B	E	C	C
Approach Vol, veh/h		255			272			1624			1658	
Approach Delay, s/veh		65.9			49.5			23.2			24.9	
Approach LOS		E			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.0	95.7		42.3	8.7	99.0		42.3
Change Period (Y+Rc), s	4.0	5.0		5.0	4.0	5.0		5.0
Max Green Setting (Gmax), s	16.0	75.0		45.0	21.0	70.0		45.0
Max Q Clear Time (g_c+I1), s	13.4	45.1		34.8	5.6	46.6		24.4
Green Ext Time (p_c), s	0.0	27.9		2.5	0.0	22.1		3.6

Intersection Summary	
HCM 2010 Ctrl Delay	28.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	225	90	25	45	5
Future Vol, veh/h	5	225	90	25	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	245	98	27	49	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	125	0	-	0	366	111
Stage 1	-	-	-	-	111	-
Stage 2	-	-	-	-	255	-
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	1462	-	-	-	634	942
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1462	-	-	-	632	942
Mov Cap-2 Maneuver	-	-	-	-	632	-
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	785	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1462	-	-	-	654
HCM Lane V/C Ratio	0.004	-	-	-	0.083
HCM Control Delay (s)	7.5	-	-	-	11
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	300	5	85	110	15	5	0	135	20	0	5
Future Vol, veh/h	5	300	5	85	110	15	5	0	135	20	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	326	5	92	120	16	5	0	147	22	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	136	0	0	332	0	0	655	661	329	726	655	128
Stage 1	-	-	-	-	-	-	340	340	-	313	313	-
Stage 2	-	-	-	-	-	-	315	321	-	413	342	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1448	-	-	1227	-	-	379	383	712	340	386	922
Stage 1	-	-	-	-	-	-	675	639	-	698	657	-
Stage 2	-	-	-	-	-	-	696	652	-	616	638	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1448	-	-	1227	-	-	354	353	712	254	356	922
Mov Cap-2 Maneuver	-	-	-	-	-	-	354	353	-	254	356	-
Stage 1	-	-	-	-	-	-	673	637	-	696	608	-
Stage 2	-	-	-	-	-	-	640	603	-	487	636	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	3.3	11.7	18.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	687	1448	-	-	1227	-	-	297
HCM Lane V/C Ratio	0.222	0.004	-	-	0.075	-	-	0.091
HCM Control Delay (s)	11.7	7.5	-	-	8.2	-	-	18.3
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.8	0	-	-	0.2	-	-	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	425	185	35	35	5
Future Volume (veh/h)	0	425	185	35	35	5
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	1900
Adj Flow Rate, veh/h	0	462	201	38	38	5
Adj No. of Lanes	1	1	1	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	151	655	536	101	633	83
Arrive On Green	0.00	0.35	0.35	0.35	0.42	0.42
Sat Flow, veh/h	1136	1863	1524	288	1513	199
Grp Volume(v), veh/h	0	462	0	239	44	0
Grp Sat Flow(s),veh/h/ln	1136	1863	0	1812	1752	0
Q Serve(g_s), s	0.0	10.2	0.0	4.7	0.7	0.0
Cycle Q Clear(g_c), s	0.0	10.2	0.0	4.7	0.7	0.0
Prop In Lane	1.00			0.16	0.86	0.11
Lane Grp Cap(c), veh/h	151	655	0	637	733	0
V/C Ratio(X)	0.00	0.71	0.00	0.38	0.06	0.00
Avail Cap(c_a), veh/h	583	1364	0	1346	733	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	13.4	0.0	11.6	8.3	0.0
Incr Delay (d2), s/veh	0.0	1.4	0.0	0.4	0.2	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	0.0	5.4	0.0	2.4	0.4	0.0
LnGrp Delay(d),s/veh	0.0	14.8	0.0	11.9	8.4	0.0
LnGrp LOS		B		B	A	
Approach Vol, veh/h		462	239		44	
Approach Delay, s/veh		14.8	11.9		8.4	
Approach LOS		B	B		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		21.8		26.0		21.8		
Change Period (Y+Rc), s		5.0		6.0		* 5		
Max Green Setting (Gmax), s		35.0		20.0		* 36		
Max Q Clear Time (g_c+I1), s		12.2		2.7		6.7		
Green Ext Time (p_c), s		4.6		0.2		4.8		

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	470	5	45	225	0	0
Future Vol, veh/h	470	5	45	225	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	511	5	49	245	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	516	0	-	514
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	1050	-	0	560
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1050	-	-	560
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1050	-
HCM Lane V/C Ratio	-	-	-	0.047	-
HCM Control Delay (s)	0	-	-	8.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	⚒	
Traffic Vol, veh/h	470	0	0	270	5	25
Future Vol, veh/h	470	0	0	270	5	25
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	511	0	0	293	5	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	804	511
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	293	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	352	563
Stage 1	-	0	0	-	602	-
Stage 2	-	0	0	-	757	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	352	563
Mov Cap-2 Maneuver	-	-	-	-	352	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	757	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	512	-	-
HCM Lane V/C Ratio	0.064	-	-
HCM Control Delay (s)	12.5	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	5	5	55	55	30
Future Vol, veh/h	60	5	5	55	55	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	5	5	60	60	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	147	76	92	0	-	0
Stage 1	76	-	-	-	-	-
Stage 2	71	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	845	985	1503	-	-	-
Stage 1	947	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	842	985	1503	-	-	-
Mov Cap-2 Maneuver	842	-	-	-	-	-
Stage 1	947	-	-	-	-	-
Stage 2	949	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1503	-	852	-	-
HCM Lane V/C Ratio	0.004	-	0.083	-	-
HCM Control Delay (s)	7.4	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	5	115	60	5	15
Future Vol, veh/h	30	5	115	60	5	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	5	125	65	5	16

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	185	158	0	0	190	0
Stage 1	158	-	-	-	-	-
Stage 2	27	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	804	887	-	-	1384	-
Stage 1	871	-	-	-	-	-
Stage 2	996	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	801	887	-	-	1384	-
Mov Cap-2 Maneuver	801	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	992	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	1.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	812	1384	-
HCM Lane V/C Ratio	-	-	0.047	0.004	-
HCM Control Delay (s)	-	-	9.7	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2021 AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	980	0	0	990	620	0	990	0	0	525	1625
Future Volume (veh/h)	0	980	0	0	990	620	0	990	0	0	525	1625
Number	5	2	12	1	6	16	3	8	18	7	4	14
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	0	1863	0	0	1863	1863	0	1863	0	0	1863	1863
Adj Flow Rate, veh/h	0	1065	0	0	1076	0	0	1076	0	0	571	0
Adj No. of Lanes	0	3	0	0	2	1	0	2	0	0	1	2
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, %	0	2	0	0	2	2	0	2	0	0	2	2
Cap, veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
Arrive On Green	0.00	0.45	0.00	0.00	0.45	0.00	0.00	0.47	0.00	0.00	0.47	0.00
Sat Flow, veh/h	0	5421	0	0	3632	1583	0	3725	0	0	1863	2787
Grp Volume(v), veh/h	0	1065	0	0	1076	0	0	1076	0	0	571	0
Grp Sat Flow(s),veh/h/ln	0	1695	0	0	1770	1583	0	1770	0	0	1863	1393
Q Serve(g_s), s	0.0	21.7	0.0	0.0	35.8	0.0	0.0	34.9	0.0	0.0	35.4	0.0
Cycle Q Clear(g_c), s	0.0	21.7	0.0	0.0	35.8	0.0	0.0	34.9	0.0	0.0	35.4	0.0
Prop In Lane	0.00		0.00	0.00		1.00	0.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
V/C Ratio(X)	0.00	0.46	0.00	0.00	0.67	0.00	0.00	0.65	0.00	0.00	0.66	0.00
Avail Cap(c_a), veh/h	0	2305	0	0	1604	718	0	1652	0	0	869	1300
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)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	28.4	0.0	0.0	32.2	0.0	0.0	30.7	0.0	0.0	30.8	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	2.3	0.0	0.0	2.0	0.0	0.0	3.9	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	0.0	10.3	0.0	0.0	18.0	0.0	0.0	17.5	0.0	0.0	19.0	0.0
LnGrp Delay(d),s/veh	0.0	29.0	0.0	0.0	34.5	0.0	0.0	32.7	0.0	0.0	34.6	0.0
LnGrp LOS		C			C			C			C	
Approach Vol, veh/h		1065			1076			1076			571	
Approach Delay, s/veh		29.0			34.5			32.7			34.6	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		74.0		76.0		74.0		76.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		68.0		70.0		68.0		70.0
Max Q Clear Time (g_c+I1), s		23.7		37.4		37.8		36.9
Green Ext Time (p_c), s		25.3		15.5		20.0		15.6

Intersection Summary	
HCM 2010 Ctrl Delay	32.4
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	15	15	60	10	75	5	1545	45	120	2035	5
Future Volume (veh/h)	15	15	15	60	10	75	5	1545	45	120	2035	5
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900
Adj Flow Rate, veh/h	16	16	16	65	11	82	5	1679	49	130	2212	5
Adj No. of Lanes	0	1	1	0	1	1	1	3	0	1	3	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	188	177	336	292	46	443	22	3115	91	142	3567	8
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.01	0.61	0.61	0.08	0.68	0.68
Sat Flow, veh/h	760	885	1583	1239	231	1583	1774	5079	148	1774	5239	12
Grp Volume(v), veh/h	32	0	16	76	0	82	5	1121	607	130	1431	786
Grp Sat Flow(s),veh/h/ln	1645	0	1583	1469	0	1583	1774	1695	1837	1774	1695	1861
Q Serve(g_s), s	0.0	0.0	1.2	4.0	0.0	5.9	0.4	28.6	28.7	10.9	35.0	35.0
Cycle Q Clear(g_c), s	2.1	0.0	1.2	6.1	0.0	5.9	0.4	28.6	28.7	10.9	35.0	35.0
Prop In Lane	0.50		1.00	0.86		1.00	1.00		0.08	1.00		0.01
Lane Grp Cap(c), veh/h	365	0	336	338	0	443	22	2079	1127	142	2308	1267
V/C Ratio(X)	0.09	0.00	0.05	0.22	0.00	0.18	0.22	0.54	0.54	0.92	0.62	0.62
Avail Cap(c_a), veh/h	493	0	463	454	0	570	118	2079	1127	142	2308	1267
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	0.0	47.0	50.3	0.0	41.0	73.3	16.7	16.8	68.5	13.2	13.2
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.3	0.0	0.2	5.0	1.0	1.9	51.1	1.3	2.3
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	1.1	0.0	0.5	2.7	0.0	2.6	0.2	13.7	15.1	7.4	16.7	18.7
LnGrp Delay(d),s/veh	48.9	0.0	47.0	50.7	0.0	41.2	78.3	17.8	18.6	119.6	14.5	15.5
LnGrp LOS	D		D	D		D	E	B	B	F	B	B
Approach Vol, veh/h		48			158			1733			2347	
Approach Delay, s/veh		48.3			45.8			18.2			20.7	
Approach LOS		D			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	108.1		35.0	17.0	98.0		35.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	10.0	82.0		42.0	12.0	80.0		42.0
Max Q Clear Time (g_c+I1), s	2.4	37.0		8.1	12.9	30.7		4.1
Green Ext Time (p_c), s	0.0	44.8		0.9	0.0	49.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	20.9
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	50	85	155	130	50	405	1195	60	90	1780	180
Future Volume (veh/h)	45	50	85	155	130	50	405	1195	60	90	1780	180
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	49	54	92	168	141	54	440	1299	65	98	1935	196
Adj No. of Lanes	1	1	1	1	1	0	1	3	0	1	3	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	134	326	699	250	225	86	473	3293	165	120	2185	220
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.27	0.66	0.66	0.07	0.47	0.47
Sat Flow, veh/h	1183	1863	1583	1345	1284	492	1774	4961	248	1774	4697	473
Grp Volume(v), veh/h	49	54	92	168	0	195	440	888	476	98	1393	738
Grp Sat Flow(s),veh/h/ln	1183	1863	1583	1345	0	1776	1774	1695	1819	1774	1695	1779
Q Serve(g_s), s	6.0	3.7	5.2	18.2	0.0	15.3	36.3	17.9	17.9	8.2	56.0	56.9
Cycle Q Clear(g_c), s	21.3	3.7	5.2	21.9	0.0	15.3	36.3	17.9	17.9	8.2	56.0	56.9
Prop In Lane	1.00		1.00	1.00		0.28	1.00		0.14	1.00		0.27
Lane Grp Cap(c), veh/h	134	326	699	250	0	311	473	2251	1208	120	1577	828
V/C Ratio(X)	0.36	0.17	0.13	0.67	0.00	0.63	0.93	0.39	0.39	0.81	0.88	0.89
Avail Cap(c_a), veh/h	259	522	866	391	0	497	485	2251	1208	308	1577	828
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	1.00	0.60	0.60	0.60
Uniform Delay (d), s/veh	67.2	52.6	24.8	61.9	0.0	57.4	53.6	11.5	11.5	69.0	36.4	36.7
Incr Delay (d2), s/veh	1.6	0.2	0.1	3.1	0.0	2.1	24.4	0.5	1.0	7.7	4.8	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	2.0	1.9	2.3	7.0	0.0	7.7	20.9	8.5	9.3	4.3	27.2	30.0
LnGrp Delay(d),s/veh	68.9	52.8	24.9	65.0	0.0	59.4	78.0	12.0	12.4	76.7	41.2	45.7
LnGrp LOS	E	D	C	E		E	E	B	B	E	D	D
Approach Vol, veh/h		195			363			1804			2229	
Approach Delay, s/veh		43.7			62.0			28.2			44.2	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	44.0	75.8		30.2	14.2	105.6		30.2
Change Period (Y+Rc), s	4.0	6.0		4.0	4.0	6.0		4.0
Max Green Setting (Gmax), s	41.0	53.0		42.0	26.0	68.0		42.0
Max Q Clear Time (g_c+I1), s	39.3	58.9		23.9	10.2	19.9		23.3
Green Ext Time (p_c), s	0.4	0.0		2.3	0.2	47.4		2.4

Intersection Summary	
HCM 2010 Ctrl Delay	39.3
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	50	235	295	30	20	150	770	330	60	1550	10
Future Volume (veh/h)	15	50	235	295	30	20	150	770	330	60	1550	10
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1863	1863	1900	1863	1863	1900	1863	1618	1650
Adj Flow Rate, veh/h	16	54	255	321	33	22	163	837	359	65	1685	11
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	1	3	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	147	481	706	389	361	241	177	1752	748	82	2026	13
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.20	1.00	1.00	0.05	0.45	0.45
Sat Flow, veh/h	340	1391	1583	1066	1044	696	1774	3496	1493	1774	4527	30
Grp Volume(v), veh/h	70	0	255	321	0	55	163	811	385	65	1096	600
Grp Sat Flow(s),veh/h/ln	1731	0	1583	1066	0	1740	1774	1695	1599	1774	1472	1612
Q Serve(g_s), s	0.0	0.0	16.0	43.9	0.0	3.2	13.5	0.0	0.0	5.4	49.1	49.1
Cycle Q Clear(g_c), s	3.8	0.0	16.0	47.8	0.0	3.2	13.5	0.0	0.0	5.4	49.1	49.1
Prop In Lane	0.23		1.00	1.00		0.40	1.00		0.93	1.00		0.02
Lane Grp Cap(c), veh/h	628	0	706	389	0	602	177	1699	801	82	1318	722
V/C Ratio(X)	0.11	0.00	0.36	0.82	0.00	0.09	0.92	0.48	0.48	0.79	0.83	0.83
Avail Cap(c_a), veh/h	698	0	771	433	0	673	177	1699	801	118	1318	722
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.91	0.91	0.91	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	27.5	49.6	0.0	33.1	59.4	0.0	0.0	70.8	36.5	36.5
Incr Delay (d2), s/veh	0.1	0.0	0.3	11.3	0.0	0.1	42.3	0.9	1.9	19.8	6.2	10.8
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	0.0	7.0	14.2	0.0	1.6	8.7	0.2	0.4	3.1	21.1	24.0
LnGrp Delay(d),s/veh	33.4	0.0	27.8	60.9	0.0	33.2	101.7	0.9	1.9	90.6	42.7	47.3
LnGrp LOS	C		C	E		C	F	A	A	F	D	D
Approach Vol, veh/h		325			376			1359			1761	
Approach Delay, s/veh		29.0			56.8			13.3			46.0	
Approach LOS		C			E			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	20.0	73.1		56.9	12.0	81.2		56.9
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	15.0	61.0		58.0	10.0	66.0		58.0
Max Q Clear Time (g_c+I1), s	15.5	51.1		49.8	7.4	2.0		18.0
Green Ext Time (p_c), s	0.0	9.7		2.1	0.0	60.0		3.4

Intersection Summary	
HCM 2010 Ctrl Delay	34.0
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	85	105	405	100	170	50	595	215	190	1085	35
Future Volume (veh/h)	30	85	105	405	100	170	50	595	215	190	1085	35
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1863	1863	1863	1863	1863	1900	1863	1569	1600
Adj Flow Rate, veh/h	33	92	114	274	341	185	54	647	234	207	1179	38
Adj No. of Lanes	0	1	1	1	1	1	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	40	112	341	373	391	394	69	1057	382	236	1499	48
Arrive On Green	0.08	0.08	0.08	0.21	0.21	0.21	0.04	0.41	0.41	0.13	0.51	0.51
Sat Flow, veh/h	485	1353	1583	1774	1863	1583	1774	2549	921	1774	2947	95
Grp Volume(v), veh/h	125	0	114	274	341	185	54	449	432	207	596	621
Grp Sat Flow(s),veh/h/ln	1838	0	1583	1774	1863	1583	1774	1770	1700	1774	1490	1552
Q Serve(g_s), s	10.0	0.0	9.1	21.6	26.6	14.9	4.5	29.9	29.9	17.2	49.1	49.2
Cycle Q Clear(g_c), s	10.0	0.0	9.1	21.6	26.6	14.9	4.5	29.9	29.9	17.2	49.1	49.2
Prop In Lane	0.26		1.00	1.00		1.00	1.00		0.54	1.00		0.06
Lane Grp Cap(c), veh/h	152	0	341	373	391	394	69	734	705	236	758	789
V/C Ratio(X)	0.82	0.00	0.33	0.74	0.87	0.47	0.78	0.61	0.61	0.88	0.79	0.79
Avail Cap(c_a), veh/h	172	0	358	402	422	421	83	734	705	319	758	789
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	0.00	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	67.7	0.0	49.8	55.4	57.3	47.9	71.4	34.4	34.5	63.8	30.2	30.2
Incr Delay (d2), s/veh	28.8	0.0	1.2	8.3	18.7	1.9	26.5	3.8	3.9	23.9	8.1	7.8
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	6.3	0.0	4.1	11.5	15.7	6.7	2.7	15.4	14.8	10.0	21.9	22.8
LnGrp Delay(d),s/veh	96.5	0.0	51.0	63.6	76.0	49.8	98.0	38.2	38.4	87.7	38.3	38.0
LnGrp LOS	F		D	E	E	D	F	D	D	F	D	D
Approach Vol, veh/h		239			800			935			1424	
Approach Delay, s/veh		74.8			65.7			41.8			45.3	
Approach LOS		E			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.8	82.3		18.4	25.9	68.2		37.5
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	71.0		14.0	27.0	51.0		34.0
Max Q Clear Time (g_c+I1), s	11.5	51.2		12.0	19.2	31.9		28.6
Green Ext Time (p_c), s	0.0	18.0		0.3	0.8	17.4		2.9

Intersection Summary	
HCM 2010 Ctrl Delay	51.2
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	55	60	105	125	40	90	990	100	30	1070	155
Future Volume (veh/h)	70	55	60	105	125	40	90	990	100	30	1070	155
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	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	76	60	65	114	136	43	98	1076	109	33	1163	168
Adj No. of Lanes	0	1	0	1	1	0	1	2	1	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	110	87	78	227	304	96	119	2331	1043	42	1912	275
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.07	0.66	0.66	0.02	0.62	0.62
Sat Flow, veh/h	342	387	348	1261	1358	429	1774	3539	1583	1774	3106	447
Grp Volume(v), veh/h	201	0	0	114	0	179	98	1076	109	33	661	670
Grp Sat Flow(s),veh/h/ln	1077	0	0	1261	0	1787	1774	1770	1583	1774	1770	1784
Q Serve(g_s), s	15.9	0.0	0.0	0.0	0.0	13.0	8.2	22.4	3.8	2.8	34.4	34.7
Cycle Q Clear(g_c), s	28.9	0.0	0.0	21.9	0.0	13.0	8.2	22.4	3.8	2.8	34.4	34.7
Prop In Lane	0.38		0.32	1.00		0.24	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	275	0	0	227	0	401	119	2331	1043	42	1089	1098
V/C Ratio(X)	0.73	0.00	0.00	0.50	0.00	0.45	0.83	0.46	0.10	0.78	0.61	0.61
Avail Cap(c_a), veh/h	386	0	0	322	0	536	248	2331	1043	189	1089	1098
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.9	0.0	0.0	53.6	0.0	50.2	69.1	12.6	9.4	72.8	17.7	17.7
Incr Delay (d2), s/veh	5.0	0.0	0.0	2.1	0.0	0.9	5.4	0.7	0.2	11.0	2.5	2.5
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	8.5	0.0	0.0	4.5	0.0	6.5	4.2	11.1	1.7	1.5	17.5	17.7
LnGrp Delay(d),s/veh	63.9	0.0	0.0	55.7	0.0	51.1	74.5	13.2	9.6	83.8	20.2	20.3
LnGrp LOS	E			E		D	E	B	A	F	C	C
Approach Vol, veh/h		201			293			1283			1364	
Approach Delay, s/veh		63.9			52.9			17.6			21.8	
Approach LOS		E			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.6	103.8		38.6	14.0	97.3		38.6
Change Period (Y+Rc), s	4.0	5.0		5.0	4.0	5.0		5.0
Max Green Setting (Gmax), s	16.0	75.0		45.0	21.0	70.0		45.0
Max Q Clear Time (g_c+I1), s	14.8	24.4		30.9	10.2	36.7		23.9
Green Ext Time (p_c), s	0.0	37.2		2.8	0.0	26.9		3.3

Intersection Summary	
HCM 2010 Ctrl Delay	25.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	80	440	75	5	5
Future Vol, veh/h	5	80	440	75	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	87	478	82	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	560	0	-	0	617	519
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	98	-
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	1011	-	-	-	453	557
Stage 1	-	-	-	-	597	-
Stage 2	-	-	-	-	926	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1011	-	-	-	451	557
Mov Cap-2 Maneuver	-	-	-	-	451	-
Stage 1	-	-	-	-	597	-
Stage 2	-	-	-	-	921	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1011	-	-	-	498
HCM Lane V/C Ratio	0.005	-	-	-	0.022
HCM Control Delay (s)	8.6	-	-	-	12.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	85	5	185	490	50	5	5	70	15	0	5
Future Vol, veh/h	5	85	5	185	490	50	5	5	70	15	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	92	5	201	533	54	5	5	76	16	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	587	0	0	98	0	0	1071	1095	95	1109	1071	560
Stage 1	-	-	-	-	-	-	106	106	-	962	962	-
Stage 2	-	-	-	-	-	-	965	989	-	147	109	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	988	-	-	1495	-	-	198	214	962	187	221	528
Stage 1	-	-	-	-	-	-	900	807	-	308	334	-
Stage 2	-	-	-	-	-	-	306	325	-	856	805	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	988	-	-	1495	-	-	175	184	962	150	190	528
Mov Cap-2 Maneuver	-	-	-	-	-	-	175	184	-	150	190	-
Stage 1	-	-	-	-	-	-	895	803	-	306	289	-
Stage 2	-	-	-	-	-	-	262	281	-	779	801	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	2	11.7	27.3
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	623	988	-	-	1495	-	-	183
HCM Lane V/C Ratio	0.14	0.006	-	-	0.135	-	-	0.119
HCM Control Delay (s)	11.7	8.7	-	-	7.8	-	-	27.3
HCM Lane LOS	B	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.5	0	-	-	0.5	-	-	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	150	715	20	10	10
Future Volume (veh/h)	5	150	715	20	10	10
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	1900
Adj Flow Rate, veh/h	5	163	777	22	11	11
Adj No. of Lanes	1	1	1	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	193	921	892	25	262	262
Arrive On Green	0.49	0.49	0.49	0.49	0.33	0.33
Sat Flow, veh/h	678	1863	1803	51	804	804
Grp Volume(v), veh/h	5	163	0	799	23	0
Grp Sat Flow(s),veh/h/ln	678	1863	0	1854	1681	0
Q Serve(g_s), s	0.4	3.0	0.0	23.5	0.6	0.0
Cycle Q Clear(g_c), s	23.9	3.0	0.0	23.5	0.6	0.0
Prop In Lane	1.00			0.03	0.48	0.48
Lane Grp Cap(c), veh/h	193	921	0	917	548	0
V/C Ratio(X)	0.03	0.18	0.00	0.87	0.04	0.00
Avail Cap(c_a), veh/h	245	1063	0	1073	548	0
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	24.4	8.6	0.0	13.8	14.1	0.0
Incr Delay (d2), s/veh	0.1	0.1	0.0	7.1	0.1	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	0.1	1.5	0.0	13.6	0.3	0.0
LnGrp Delay(d),s/veh	24.4	8.7	0.0	20.9	14.3	0.0
LnGrp LOS	C	A		C	B	
Approach Vol, veh/h		168	799		23	
Approach Delay, s/veh		9.1	20.9		14.3	
Approach LOS		A	C		B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		35.3		26.0		35.3		
Change Period (Y+Rc), s		5.0		6.0		* 5		
Max Green Setting (Gmax), s		35.0		20.0		* 36		
Max Q Clear Time (g_c+I1), s		25.9		2.6		25.5		
Green Ext Time (p_c), s		4.4		0.1		4.7		

Intersection Summary	
HCM 2010 Ctrl Delay	18.7
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	165	3	25	745	3	13
Future Vol, veh/h	165	3	25	745	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	179	3	27	810	3	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	183	0	1045	181
Stage 1	-	-	-	-	181	-
Stage 2	-	-	-	-	864	-
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	-	-	1392	-	253	862
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	413	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1392	-	248	862
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	405	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	862	-	-	1392	-
HCM Lane V/C Ratio	0.016	-	-	0.02	-
HCM Control Delay (s)	9.2	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	⚒	
Traffic Vol, veh/h	180	0	0	760	5	25
Future Vol, veh/h	180	0	0	760	5	25
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	0	0	826	5	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	1022	196
Stage 1	-	-	-	-	196	-
Stage 2	-	-	-	-	826	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	261	845
Stage 1	-	0	0	-	837	-
Stage 2	-	0	0	-	430	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	261	845
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	430	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	615	-	-
HCM Lane V/C Ratio	0.053	-	-
HCM Control Delay (s)	11.2	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	5	5	55	50	105
Future Vol, veh/h	15	5	5	55	50	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	5	5	60	54	114

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	182	111	168	0	-	0
Stage 1	111	-	-	-	-	-
Stage 2	71	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	807	942	1410	-	-	-
Stage 1	914	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	804	942	1410	-	-	-
Mov Cap-2 Maneuver	804	-	-	-	-	-
Stage 1	914	-	-	-	-	-
Stage 2	948	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	0.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1410	-	835	-	-
HCM Lane V/C Ratio	0.004	-	0.026	-	-
HCM Control Delay (s)	7.6	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	95	5	45	15	5	110
Future Vol, veh/h	95	5	45	15	5	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	103	5	49	16	5	120

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	187	57	0	0	65	0
Stage 1	57	-	-	-	-	-
Stage 2	130	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	802	1009	-	-	1537	-
Stage 1	966	-	-	-	-	-
Stage 2	896	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	800	1009	-	-	1537	-
Mov Cap-2 Maneuver	800	-	-	-	-	-
Stage 1	966	-	-	-	-	-
Stage 2	893	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	808	1537	-
HCM Lane V/C Ratio	-	-	0.135	0.004	-
HCM Control Delay (s)	-	-	10.1	7.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2021 PM Peak

HCM 2010 Signalized Intersection Summary
1: Kahekili Hwy

10/10/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1565	0	0	505	555	0	1950	0	0	510	1110
Future Volume (veh/h)	0	1565	0	0	505	555	0	1950	0	0	510	1110
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	0	1863	0	0	1863	1863	0	1674	0	0	1863	1863
Adj Flow Rate, veh/h	0	1701	0	0	549	0	0	2120	0	0	554	0
Adj No. of Lanes	0	3	0	0	2	1	0	2	0	0	1	2
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, %	0	2	0	0	2	2	0	2	0	0	2	2
Cap, veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
Arrive On Green	0.00	0.34	0.00	0.00	0.34	0.00	0.00	0.57	0.00	0.00	0.96	0.00
Sat Flow, veh/h	0	5421	0	0	3632	1583	0	3347	0	0	1863	2787
Grp Volume(v), veh/h	0	1701	0	0	549	0	0	2120	0	0	554	0
Grp Sat Flow(s),veh/h/ln	0	1695	0	0	1770	1583	0	1590	0	0	1863	1393
Q Serve(g_s), s	0.0	49.8	0.0	0.0	18.2	0.0	0.0	86.0	0.0	0.0	3.8	0.0
Cycle Q Clear(g_c), s	0.0	49.8	0.0	0.0	18.2	0.0	0.0	86.0	0.0	0.0	3.8	0.0
Prop In Lane	0.00		0.00	0.00		1.00	0.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
V/C Ratio(X)	0.00	0.98	0.00	0.00	0.46	0.00	0.00	1.16	0.00	0.00	0.52	0.00
Avail Cap(c_a), veh/h	0	1729	0	0	1203	538	0	1823	0	0	1068	1598
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67
Upstream Filter(I)	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.89	0.00
Uniform Delay (d), s/veh	0.0	49.1	0.0	0.0	38.7	0.0	0.0	32.0	0.0	0.0	1.4	0.0
Incr Delay (d2), s/veh	0.0	17.9	0.0	0.0	0.3	0.0	0.0	79.8	0.0	0.0	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	0.0	26.2	0.0	0.0	8.9	0.0	0.0	57.7	0.0	0.0	2.0	0.0
LnGrp Delay(d),s/veh	0.0	67.0	0.0	0.0	38.9	0.0	0.0	111.8	0.0	0.0	3.0	0.0
LnGrp LOS		E			D			F			A	
Approach Vol, veh/h		1701			549			2120			554	
Approach Delay, s/veh		67.0			38.9			111.8			3.0	
Approach LOS		E			D			F			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		92.0		58.0		92.0		58.0
Change Period (Y+Rc), s		6.0		7.0		6.0		7.0
Max Green Setting (Gmax), s		86.0		51.0		86.0		51.0
Max Q Clear Time (g_c+I1), s		88.0		51.8		5.8		20.2
Green Ext Time (p_c), s		0.0		0.0		56.3		20.9

Intersection Summary	
HCM 2010 Ctrl Delay	75.9
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	5	10	20	20	45	20	2385	105	110	1560	10
Future Volume (veh/h)	10	5	10	20	20	45	20	2385	105	110	1560	10
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	5	11	22	22	49	22	2592	114	120	1696	11
Adj No. of Lanes	0	1	1	0	1	1	1	3	0	1	3	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	226	96	321	172	161	406	35	3184	139	130	3600	23
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.04	1.00	1.00	0.07	0.69	0.69
Sat Flow, veh/h	1017	524	1583	743	878	1583	1774	4997	218	1774	5213	34
Grp Volume(v), veh/h	16	0	11	44	0	49	22	1750	956	120	1103	604
Grp Sat Flow(s),veh/h/ln	1541	0	1583	1621	0	1583	1774	1695	1824	1774	1695	1857
Q Serve(g_s), s	0.0	0.0	0.8	1.1	0.0	3.6	1.8	0.0	0.0	10.1	22.4	22.4
Cycle Q Clear(g_c), s	1.1	0.0	0.8	3.1	0.0	3.6	1.8	0.0	0.0	10.1	22.4	22.4
Prop In Lane	0.69		1.00	0.50		1.00	1.00		0.12	1.00		0.02
Lane Grp Cap(c), veh/h	322	0	321	332	0	406	35	2160	1162	130	2341	1282
V/C Ratio(X)	0.05	0.00	0.03	0.13	0.00	0.12	0.62	0.81	0.82	0.92	0.47	0.47
Avail Cap(c_a), veh/h	458	0	464	477	0	549	71	2160	1162	130	2341	1282
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.11	0.11	0.11	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.5	0.0	48.0	51.3	0.0	42.8	71.4	0.0	0.0	69.1	10.6	10.6
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.2	0.0	0.1	2.0	0.4	0.8	55.7	0.7	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	0.6	0.0	0.4	1.5	0.0	1.6	0.9	0.1	0.3	7.0	10.6	11.9
LnGrp Delay(d),s/veh	50.6	0.0	48.0	51.5	0.0	43.0	73.5	0.4	0.8	124.8	11.3	11.9
LnGrp LOS	D		D	D		D	E	A	A	F	B	B
Approach Vol, veh/h		27			93			2728			1827	
Approach Delay, s/veh		49.5			47.0			1.1			19.0	
Approach LOS		D			D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.0	109.6		32.4	16.0	101.6		32.4
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	6.0	87.0		41.0	11.0	82.0		41.0
Max Q Clear Time (g_c+I1), s	3.8	24.4		5.6	12.1	2.0		3.1
Green Ext Time (p_c), s	0.0	62.4		0.5	0.0	79.6		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	9.3
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	85	350	100	65	140	130	2130	175	125	1265	100
Future Volume (veh/h)	155	85	350	100	65	140	130	2130	175	125	1265	100
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	168	92	380	109	71	152	141	2315	190	136	1375	109
Adj No. of Lanes	1	1	1	1	1	0	1	3	0	1	3	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	248	529	660	275	150	322	236	2508	203	177	2353	187
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.13	0.52	0.52	0.10	0.49	0.49
Sat Flow, veh/h	1153	1863	1583	918	529	1133	1774	4796	388	1774	4805	381
Grp Volume(v), veh/h	168	92	380	109	0	223	141	1627	878	136	970	514
Grp Sat Flow(s),veh/h/ln	1153	1863	1583	918	0	1663	1774	1695	1794	1774	1695	1796
Q Serve(g_s), s	21.2	5.6	27.6	15.2	0.0	16.6	11.2	66.0	68.5	11.2	30.7	30.7
Cycle Q Clear(g_c), s	37.8	5.6	27.6	20.8	0.0	16.6	11.2	66.0	68.5	11.2	30.7	30.7
Prop In Lane	1.00		1.00	1.00		0.68	1.00		0.22	1.00		0.21
Lane Grp Cap(c), veh/h	248	529	660	275	0	472	236	1773	938	177	1660	879
V/C Ratio(X)	0.68	0.17	0.58	0.40	0.00	0.47	0.60	0.92	0.94	0.77	0.58	0.58
Avail Cap(c_a), veh/h	281	584	707	301	0	521	260	1773	938	237	1660	879
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	1.00	0.84	0.84	0.84
Uniform Delay (d), s/veh	60.0	40.4	33.5	48.3	0.0	44.4	61.3	32.8	33.4	65.8	27.4	27.4
Incr Delay (d2), s/veh	5.4	0.2	1.0	0.9	0.0	0.7	3.1	9.1	17.4	8.8	1.3	2.4
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	7.1	2.9	12.3	3.9	0.0	7.7	5.7	33.0	38.4	5.9	14.6	15.7
LnGrp Delay(d),s/veh	65.5	40.6	34.6	49.2	0.0	45.1	64.4	41.9	50.8	74.6	28.6	29.8
LnGrp LOS	E	D	C	D		D	E	D	D	E	C	C
Approach Vol, veh/h		640			332			2646			1620	
Approach Delay, s/veh		43.5			46.5			46.1			32.8	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	23.9	79.5		46.6	18.9	84.5		46.6
Change Period (Y+Rc), s	4.0	6.0		4.0	4.0	6.0		4.0
Max Green Setting (Gmax), s	22.0	67.0		47.0	20.0	69.0		47.0
Max Q Clear Time (g_c+I1), s	13.2	32.7		22.8	13.2	70.5		39.8
Green Ext Time (p_c), s	0.2	34.2		4.9	0.2	0.0		2.8

Intersection Summary	
HCM 2010 Ctrl Delay	41.7
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	50	105	255	35	50	190	1415	625	70	1100	5
Future Volume (veh/h)	5	50	105	255	35	50	190	1415	625	70	1100	5
Number	3	8	18	7	4	14	1	6	16	5	2	12
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	1863	1863	1900	1863	1618	1650	1863	1863	1900
Adj Flow Rate, veh/h	5	54	114	277	38	54	207	1538	679	76	1196	5
Adj No. of Lanes	0	1	1	1	1	0	1	3	0	1	3	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	48	460	418	339	184	261	229	1720	731	113	2618	11
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.26	1.00	1.00	0.06	0.50	0.50
Sat Flow, veh/h	84	1743	1583	1212	697	991	1774	3041	1293	1774	5227	22
Grp Volume(v), veh/h	59	0	114	277	0	92	207	1487	730	76	776	425
Grp Sat Flow(s),veh/h/ln	1826	0	1583	1212	0	1688	1774	1472	1389	1774	1695	1859
Q Serve(g_s), s	0.0	0.0	8.6	33.8	0.0	6.4	16.9	0.0	0.0	6.3	22.2	22.2
Cycle Q Clear(g_c), s	3.6	0.0	8.6	37.4	0.0	6.4	16.9	0.0	0.0	6.3	22.2	22.2
Prop In Lane	0.08		1.00	1.00		0.59	1.00		0.93	1.00		0.01
Lane Grp Cap(c), veh/h	508	0	418	339	0	445	229	1666	786	113	1698	931
V/C Ratio(X)	0.12	0.00	0.27	0.82	0.00	0.21	0.91	0.89	0.93	0.67	0.46	0.46
Avail Cap(c_a), veh/h	513	0	422	342	0	450	331	1666	786	118	1698	931
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.23	0.23	0.23	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.0	0.0	43.8	56.2	0.0	43.0	54.8	0.0	0.0	68.7	24.2	24.2
Incr Delay (d2), s/veh	0.1	0.0	0.3	14.3	0.0	0.2	6.3	2.0	5.8	13.1	0.9	1.6
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	1.9	0.0	3.8	12.7	0.0	3.0	8.7	0.5	1.3	3.5	10.6	11.8
LnGrp Delay(d),s/veh	42.1	0.0	44.2	70.5	0.0	43.2	61.1	2.0	5.8	81.8	25.1	25.9
LnGrp LOS	D		D	E		D	E	A	A	F	C	C
Approach Vol, veh/h		173			369			2424			1277	
Approach Delay, s/veh		43.5			63.7			8.2			28.7	
Approach LOS		D			E			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	24.3	81.1		44.6	14.6	90.9		44.6
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	28.6	66.0		40.0	10.0	84.0		40.0
Max Q Clear Time (g_c+I1), s	10.9	24.2		39.4	8.3	2.0		10.6
Green Ext Time (p_c), s	0.4	41.2		0.2	0.0	79.9		2.4

Intersection Summary	
HCM 2010 Ctrl Delay	20.6
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	95	70	240	110	335	65	1085	335	205	825	20
Future Volume (veh/h)	20	95	70	240	110	335	65	1085	335	205	825	20
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	22	103	22	190	219	250	71	1179	348	223	897	22
Adj No. of Lanes	0	1	1	1	1	1	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	26	122	338	260	273	312	89	1300	378	237	1988	49
Arrive On Green	0.08	0.08	0.08	0.15	0.15	0.15	0.05	0.48	0.48	0.13	0.56	0.56
Sat Flow, veh/h	325	1522	1583	1774	1863	1583	1774	2707	786	1774	3530	87
Grp Volume(v), veh/h	125	0	22	190	219	250	71	764	763	223	450	469
Grp Sat Flow(s),veh/h/ln	1846	0	1583	1774	1863	1583	1774	1770	1724	1774	1770	1847
Q Serve(g_s), s	10.0	0.0	1.7	15.4	17.1	22.0	5.9	59.3	61.9	18.7	22.3	22.3
Cycle Q Clear(g_c), s	10.0	0.0	1.7	15.4	17.1	22.0	5.9	59.3	61.9	18.7	22.3	22.3
Prop In Lane	0.18		1.00	1.00		1.00	1.00		0.46	1.00		0.05
Lane Grp Cap(c), veh/h	148	0	338	260	273	312	89	849	828	237	996	1040
V/C Ratio(X)	0.85	0.00	0.07	0.73	0.80	0.80	0.80	0.90	0.92	0.94	0.45	0.45
Avail Cap(c_a), veh/h	148	0	338	260	273	312	142	849	828	237	996	1040
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	0.00	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	68.1	0.0	47.1	61.2	61.9	57.4	70.5	35.7	36.4	64.4	19.2	19.2
Incr Delay (d2), s/veh	36.7	0.0	0.2	12.1	17.5	15.6	5.9	14.4	17.2	43.7	1.5	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	6.6	0.0	0.7	8.4	10.1	11.2	3.1	32.3	33.4	12.0	11.3	11.8
LnGrp Delay(d),s/veh	104.8	0.0	47.2	73.3	79.4	73.0	76.4	50.1	53.6	108.1	20.7	20.6
LnGrp LOS	F		D	E	E	E	E	D	D	F	C	C
Approach Vol, veh/h		147			659			1598			1142	
Approach Delay, s/veh		96.2			75.2			52.9			37.7	
Approach LOS		F			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.5	90.5		18.0	26.0	78.0		28.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	12.0	80.0		12.0	20.0	72.0		22.0
Max Q Clear Time (g_c+I1), s	17.9	24.3		12.0	20.7	63.9		24.0
Green Ext Time (p_c), s	0.0	49.9		0.0	0.0	7.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	54.0
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	100	60	110	55	85	45	1370	85	70	1345	110
Future Volume (veh/h)	90	100	60	110	55	85	45	1370	85	70	1345	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		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	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	98	109	65	120	60	92	49	1489	92	76	1462	120
Adj No. of Lanes	0	1	0	1	1	0	1	2	1	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	132	136	74	238	170	261	63	2115	946	95	2040	167
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.04	0.60	0.60	0.05	0.62	0.62
Sat Flow, veh/h	389	531	289	1206	664	1019	1774	3539	1583	1774	3314	271
Grp Volume(v), veh/h	272	0	0	120	0	152	49	1489	92	76	777	805
Grp Sat Flow(s),veh/h/ln	1208	0	0	1206	0	1683	1774	1770	1583	1774	1770	1815
Q Serve(g_s), s	22.8	0.0	0.0	0.0	0.0	11.1	4.1	43.8	3.7	6.4	45.2	46.0
Cycle Q Clear(g_c), s	33.9	0.0	0.0	23.9	0.0	11.1	4.1	43.8	3.7	6.4	45.2	46.0
Prop In Lane	0.36		0.24	1.00		0.61	1.00		1.00	1.00		0.15
Lane Grp Cap(c), veh/h	342	0	0	238	0	430	63	2115	946	95	1089	1117
V/C Ratio(X)	0.80	0.00	0.00	0.50	0.00	0.35	0.78	0.70	0.10	0.80	0.71	0.72
Avail Cap(c_a), veh/h	409	0	0	291	0	505	248	2115	946	189	1089	1117
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.0	0.0	0.0	50.4	0.0	45.7	71.8	21.0	12.9	70.2	19.8	19.9
Incr Delay (d2), s/veh	9.4	0.0	0.0	2.0	0.0	0.6	7.5	2.0	0.2	5.8	4.0	4.0
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	11.8	0.0	0.0	4.6	0.0	5.2	2.1	21.9	1.7	3.3	23.2	24.1
LnGrp Delay(d),s/veh	66.4	0.0	0.0	52.4	0.0	46.3	79.2	23.0	13.1	76.0	23.8	24.0
LnGrp LOS	E			D		D	E	C	B	E	C	C
Approach Vol, veh/h		272			272			1630			1658	
Approach Delay, s/veh		66.4			49.0			24.1			26.3	
Approach LOS		E			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.0	94.6		43.4	9.3	97.3		43.4
Change Period (Y+Rc), s	4.0	5.0		5.0	4.0	5.0		5.0
Max Green Setting (Gmax), s	16.0	75.0		45.0	21.0	70.0		45.0
Max Q Clear Time (g_c+I1), s	13.4	45.8		35.9	6.1	48.0		25.9
Green Ext Time (p_c), s	0.0	27.3		2.5	0.0	20.9		3.6

Intersection Summary	
HCM 2010 Ctrl Delay	29.8
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	295	100	25	45	5
Future Vol, veh/h	5	295	100	25	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	321	109	27	49	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	136	0	-	0	454	122
Stage 1	-	-	-	-	122	-
Stage 2	-	-	-	-	332	-
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	1448	-	-	-	564	929
Stage 1	-	-	-	-	903	-
Stage 2	-	-	-	-	727	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1448	-	-	-	562	929
Mov Cap-2 Maneuver	-	-	-	-	562	-
Stage 1	-	-	-	-	903	-
Stage 2	-	-	-	-	724	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1448	-	-	-	585
HCM Lane V/C Ratio	0.004	-	-	-	0.093
HCM Control Delay (s)	7.5	-	-	-	11.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	370	5	90	120	15	5	0	145	20	0	5
Future Vol, veh/h	5	370	5	90	120	15	5	0	145	20	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	402	5	98	130	16	5	0	158	22	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	147	0	0	408	0	0	753	758	405	829	752	139
Stage 1	-	-	-	-	-	-	416	416	-	334	334	-
Stage 2	-	-	-	-	-	-	337	342	-	495	418	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1435	-	-	1151	-	-	326	336	646	290	339	909
Stage 1	-	-	-	-	-	-	614	592	-	680	643	-
Stage 2	-	-	-	-	-	-	677	638	-	556	591	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1435	-	-	1151	-	-	302	306	646	204	309	909
Mov Cap-2 Maneuver	-	-	-	-	-	-	302	306	-	204	309	-
Stage 1	-	-	-	-	-	-	612	590	-	678	588	-
Stage 2	-	-	-	-	-	-	616	584	-	419	589	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	3.4	12.8	21.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	622	1435	-	-	1151	-	-	241
HCM Lane V/C Ratio	0.262	0.004	-	-	0.085	-	-	0.113
HCM Control Delay (s)	12.8	7.5	-	-	8.4	-	-	21.8
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1	0	-	-	0.3	-	-	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	505	200	35	35	5
Future Volume (veh/h)	0	505	200	35	35	5
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	1900
Adj Flow Rate, veh/h	0	549	217	38	38	5
Adj No. of Lanes	1	1	1	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	141	734	609	107	591	78
Arrive On Green	0.00	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1120	1863	1545	270	1513	199
Grp Volume(v), veh/h	0	549	0	255	44	0
Grp Sat Flow(s),veh/h/ln	1120	1863	0	1815	1752	0
Q Serve(g_s), s	0.0	13.0	0.0	5.1	0.8	0.0
Cycle Q Clear(g_c), s	0.0	13.0	0.0	5.1	0.8	0.0
Prop In Lane	1.00			0.15	0.86	0.11
Lane Grp Cap(c), veh/h	141	734	0	716	685	0
V/C Ratio(X)	0.00	0.75	0.00	0.36	0.06	0.00
Avail Cap(c_a), veh/h	465	1274	0	1259	685	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	13.3	0.0	10.9	9.7	0.0
Incr Delay (d2), s/veh	0.0	1.5	0.0	0.3	0.2	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	0.0	6.9	0.0	2.5	0.4	0.0
LnGrp Delay(d),s/veh	0.0	14.9	0.0	11.2	9.9	0.0
LnGrp LOS		B		B	A	
Approach Vol, veh/h		549	255		44	
Approach Delay, s/veh		14.9	11.2		9.9	
Approach LOS		B	B		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		25.2		26.0		25.2		
Change Period (Y+Rc), s		5.0		6.0		* 5		
Max Green Setting (Gmax), s		35.0		20.0		* 36		
Max Q Clear Time (g_c+I1), s		15.0		2.8		7.1		
Green Ext Time (p_c), s		5.2		0.1		5.8		

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	550	3	23	263	3	13
Future Vol, veh/h	550	3	23	263	3	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	175	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	598	3	25	286	3	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	601	0	935	599
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	336	-
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	-	-	976	-	295	502
Stage 1	-	-	-	-	549	-
Stage 2	-	-	-	-	724	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	976	-	287	502
Mov Cap-2 Maneuver	-	-	-	-	287	-
Stage 1	-	-	-	-	549	-
Stage 2	-	-	-	-	705	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	12.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	502	-	-	976	-
HCM Lane V/C Ratio	0.028	-	-	0.026	-
HCM Control Delay (s)	12.4	-	-	8.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	⚒	
Traffic Vol, veh/h	550	0	0	305	5	25
Future Vol, veh/h	550	0	0	305	5	25
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	598	0	0	332	5	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	930	598
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	332	-
Critical Hdwy	-	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	-	0	0	-	297	502
Stage 1	-	0	0	-	549	-
Stage 2	-	0	0	-	727	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	297	502
Mov Cap-2 Maneuver	-	-	-	-	297	-
Stage 1	-	-	-	-	549	-
Stage 2	-	-	-	-	727	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	450	-	-
HCM Lane V/C Ratio	0.072	-	-
HCM Control Delay (s)	13.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	75	5	5	55	55	35
Future Vol, veh/h	75	5	5	55	55	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	82	5	5	60	60	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	150	79	98	0	-	0
Stage 1	79	-	-	-	-	-
Stage 2	71	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	842	981	1495	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	839	981	1495	-	-	-
Mov Cap-2 Maneuver	839	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	949	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	0.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1495	-	847	-	-
HCM Lane V/C Ratio	0.004	-	0.103	-	-
HCM Control Delay (s)	7.4	0	9.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	5	185	75	5	25
Future Vol, veh/h	30	5	185	75	5	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	5	201	82	5	27

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	280	242	0	0	283	0
Stage 1	242	-	-	-	-	-
Stage 2	38	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	710	797	-	-	1279	-
Stage 1	798	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	707	797	-	-	1279	-
Mov Cap-2 Maneuver	707	-	-	-	-	-
Stage 1	798	-	-	-	-	-
Stage 2	980	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	1.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	719	1279	-
HCM Lane V/C Ratio	-	-	0.053	0.004	-
HCM Control Delay (s)	-	-	10.3	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

APPENDIX D

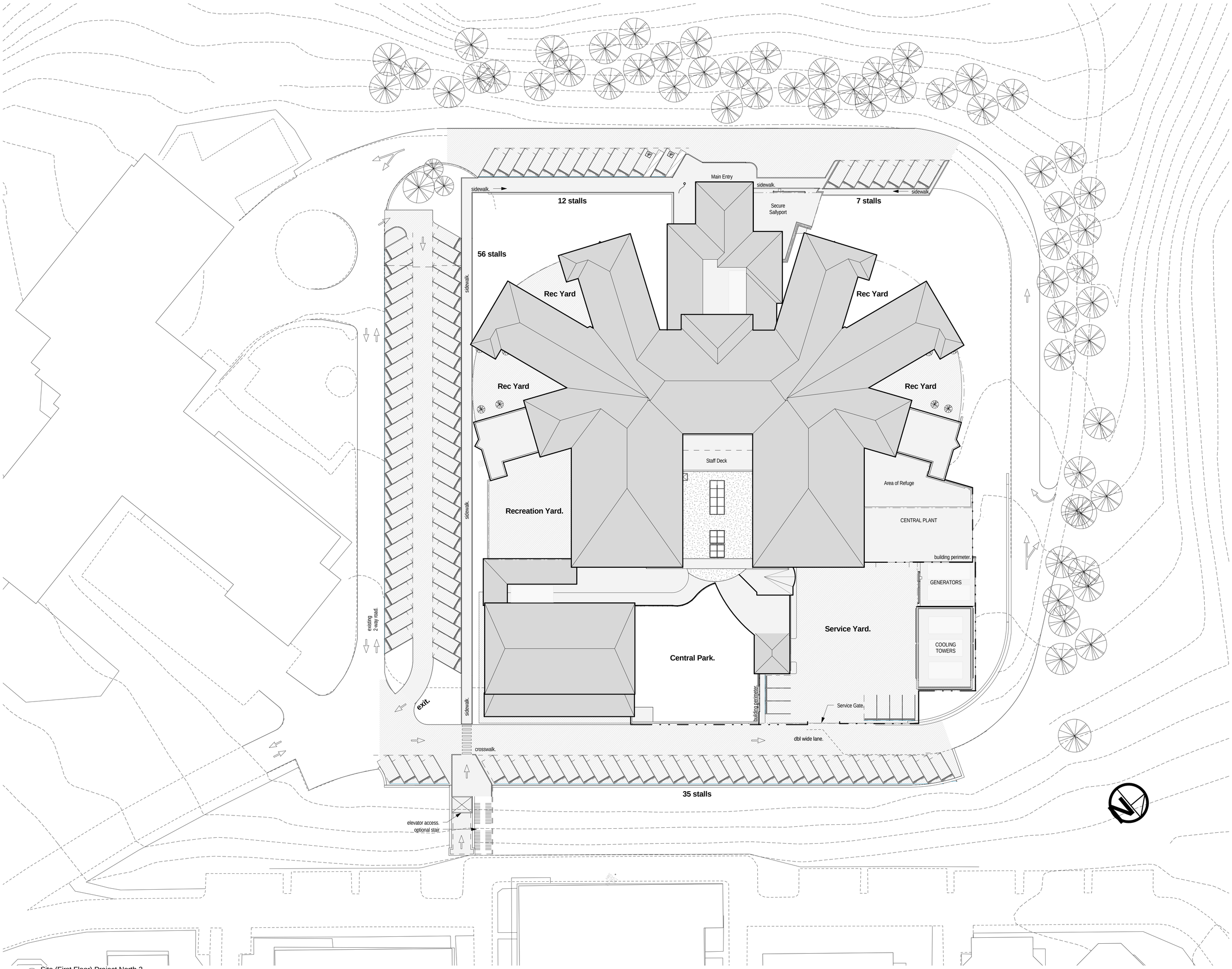
ADDITIONAL REFERENCES

List of Abbreviations

EB	Eastbound
HCM	Highway Capacity Manual
HSH	Hawaii State Hospital
LOS	Level of Service
NB	Northbound
RT	Right Turn
SB	Soutbound
TH	Through
v/c	Vehicle Capacity
WB	Westbound
WCC	Windward Community College
WCHC	Windward Comprehensive Health Center

Hawai'i State Hospital Population Assumption Summary
Brown and Caldwell - Honolulu
October 10, 2016

	Existing Condition (Condition #1)	EIS Project-Level Scope (Condition #2)	EIS Programmatic-Level Scope (Condition #3)
		First Phase of Improvements (New Patient Facility)	Overall Campus Buildout of Improvements (Planning Zones 1, 2, 3A, and 3B + 5)
Beds (Patients)	178	322	666
Bed Assumptions		Add 144 beds for first phase of improvements (New Patient Facility). Addition based on existing 178 beds.	Add 144 beds for each of the 2 new facilities (Planning Zones 1 and 2), 150 beds for new SNF (Planning Zone 5), and 72 beds for each of the 2 new facilities (Planning Zones 3A and 3B); and subtract 70 beds for Guensberg demolition and 24 beds for Building I demolition. All additions and subtractions based on existing 178 beds.
Estimated Staff	374	622	1,214
Staff Assumptions	Assumed from Baseline Day Shift Staff from Section 5.3 Parking Study of the 2015 HSH Master Plan Update. Assumed that the Day Shift Staff is the maximum staff on the HSH campus during the overlap of 2 daytime shifts and is inclusive of nursing personnel, security, nurse managers, psychiatrists, psychologist, social workers, housekeeping, therapists, counselors, and clerks.	Add 248 staff from day/night shift overlap estimation for a 144-bed facility (Matthew Moy's email 6/23/2016). Addition based on existing 374 staff.	Add 248 staff from day/night shift overlap estimation for each of the two 144-bed facilities (Matthew Moy's email 6/23/2016) and add 124 staff from day/night shift overlap estimation for each of the two 72-bed facilities; add 258 staff calculated from proportion of ratio of the 150 beds of the proposed SNF (Planning Zone 5) to the 248 staff estimated for a 144-bed new patient facility; and subtract 162 staff for 94 beds lost for Guensberg and Building I demolitions based on proportion of ratio of 248 staff for 144 beds to 94 beds. All additions and subtractions based on existing 374 staff.
Estimated Visitors	10	18	37
Visitor Assumption	Existing visitors estimation from Baseline assumption of Section 5.3 Parking Study of HSH 2015 Master Plan Update.	Add 8 visitors calculated from proportion of ratio of existing visitors and existing beds to Planning Zone 1 beds. Addition based on existing 10 visitors.	Add 27 visitors calculated from proportion of ratio of existing visitors and existing beds to Planning Zones 1, 2, 3A and 3B + 5 beds. Addition based on existing 10 visitors.
Total HSH Population	562	962	1,917
Condition calculations to be used for the following utilities/infrastructure resources:		Traffic, Water, Chilled Water, Sewer, Storm Drain, Natural Gas, Solid Waste, Medical Waste, Electrical, Parking, Back-Up Power (Generator), Landscaping, and Lighting	Parking, Back-Up Power (Generator), Landscaping, Water, Chilled Water, Sewer, Storm Drain, Natural Gas, Solid Waste, Medical Waste, Electrical, and Lighting



1 Site (First Floor) Project North 2
1" = 30'-0"

HSH CAMPUS EXPANSION: PATIENT CARE FACILITY | HAWAII STATE HOSPITAL

1" = 30'-0"

SITE PLAN (EXTENDED PER MEETING) 2

aai + HDR

Appendix M: Landscaping Conceptual Plans and Cost Estimate

First Phase and Planning Zone 2

Planning Zones 3A, 3B, and 13

Hawai‘i State Hospital Preliminary Landscape Cost Estimate

Hawai‘i State Hospital New Patient Facility and Campus Master Plan Develop: DEIS

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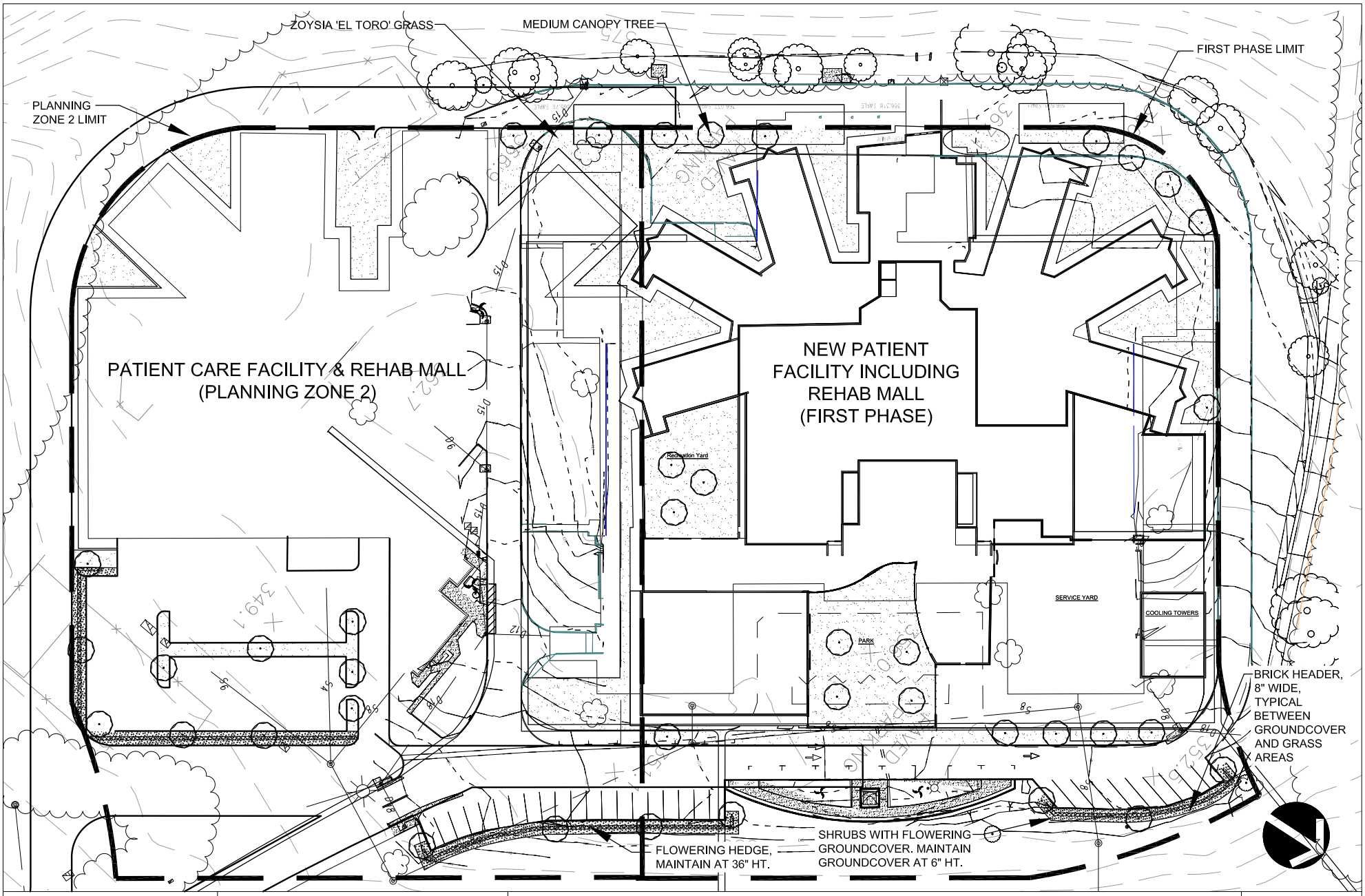

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Brown AND Caldwell

SCALE: 1" = 80'-0"

JOB NUMBER:

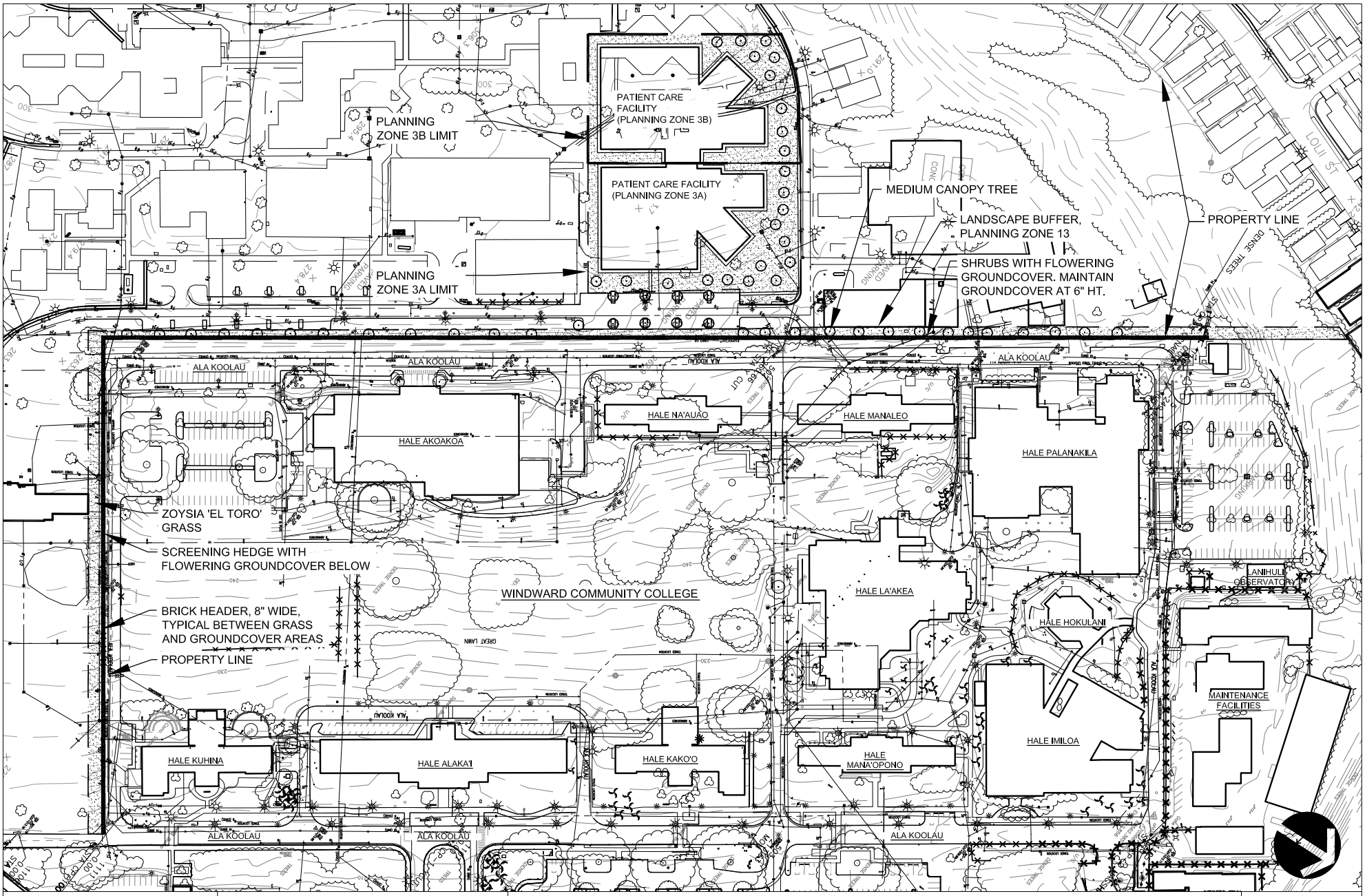
DATE: October 21, 2016

FIRST PHASE AND PLANNING ZONE 2

CONCEPTUAL LANDSCAPE PLAN

FIGURE

L001



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Brown AND Caldwell

SCALE: 1" = 200'-0"

JOB NUMBER:

DATE: October 21, 2016

PLANNING ZONES 3A, 3B AND 13

CONCEPTUAL LANDSCAPE PLAN

FIGURE

L002

BROWNLIE & LEE

Hawaii State Hospital
Preliminary Landscape Cost Estimate

October 21, 2016

Phase 1 - Goodard Patient Care Facility and Rehab Mall

Quantity	Unit	Plant Name	Description	Unit Cost	Amount
23	ea.	Medium Canopy Tree	25 Gal. Can, 8' Ht., 4' Spds., 2" Calip.	$ 350.00	$ 8,050.00
95	ea.	Flowering Hedge	3 Gal. Can, 18" ht., 18" o.c.	$ 30.00	$ 2,850.00
1,600	s.f.	Flowering Groundcover	4" Pots, 18" o.c.	$ 1.50	$ 2,400.00
29,575	s.f.	Zoysia 'El Toro'	Sprigs with Hydromulch	$ 1.00	$ 29,575.00
385	c.y.	Imported Screened Soil	4" Depth-In All Planting Areas	$ 45.00	$ 17,325.00
31,175	s.f.	Soil Prep and Fine Grading		$ 0.30	$ 9,352.50
31,175	s.f.	Temporary Irrigation System	For all planting areas	$ 0.50	$ 15,587.50
31,175	s.f.	1 Year Maintenance Period		$ 0.80	$ 24,940.00

TOTAL PHASE 1 LANDSCAPE AND IRRIGATION COST $ 110,080.00

Phase 2 - Patient Care Facility and Rehab Mall

Quantity	Unit	Plant Name	Description	Unit Cost	Amount
12	ea.	Medium Canopy Tree	25 Gal. Can, 8' Ht., 4' Spds., 2" Calip.	$ 350.00	$ 4,200.00
205	ea.	Flowering Hedge	3 Gal. Can, 18" ht., 18" o.c.	$ 30.00	$ 6,150.00
3,450	s.f.	Flowering Groundcover	4" Pots, 18" o.c.	$ 1.50	$ 5,175.00
14,175	s.f.	Zoysia 'El Toro'	Sprigs with Hydromulch	$ 1.00	$ 14,175.00
220	c.y.	Imported Screened Soil	4" Depth-In All Planting Areas	$ 45.00	$ 9,900.00
17,625	s.f.	Soil Prep and Fine Grading		$ 0.30	$ 5,287.50
17,625	s.f.	Temporary Irrigation System	For all planting areas	$ 0.50	$ 15,587.50
17,625	s.f.	1 Year Maintenance Period		$ 0.80	$ 14,100.00

TOTAL PHASE 2 LANDSCAPE AND IRRIGATION COST $ 74,575.00

BROWNLIE & LEE

Hawaii State Hospital
Preliminary Landscape Cost Estimate

October 21, 2016

Phase 3A - Patient Care Facility

Quantity	Unit	Plant Name	Description	Unit Cost	Amount
14	ea.	Medium Canopy Tree	25 Gal. Can, 8' Ht., 4' Spds., 2" Calip.	$ 350.00	$ 4,900.00
26,710	s.f.	Zoysia 'El Toro'	Sprigs with Hydromulch	$ 1.00	$ 26,710.00
330	c.y.	Imported Screened Soil	4" Depth-In All Planting Areas	$ 45.00	$ 14,850.00
26,710	s.f.	Soil Prep and Fine Grading		$ 0.30	$ 8,013.00
26,710	s.f.	Temporary Irrigation System	For all planting areas	$ 0.50	$ 13,355.00
26,710	s.f.	1 Year Maintenance Period		$ 0.80	$ 21,368.00
			TOTAL PHASE 3A LANDSCAPE AND IRRIGATION COST		$ 89,196.00

Phase 3B - Patient Care Facility

Quantity	Unit	Plant Name	Description	Unit Cost	Amount
9	ea.	Medium Canopy Tree	25 Gal. Can, 8' Ht., 4' Spds., 2" Calip.	$ 350.00	$ 3,150.00
22,215	s.f.	Zoysia 'El Toro'	Sprigs with Hydromulch	$ 1.00	$ 22,215.00
275	c.y.	Imported Screened Soil	4" Depth-In All Planting Areas	$ 45.00	$ 12,375.00
22,215	s.f.	Soil Prep and Fine Grading		$ 0.30	$ 6,664.50
22,215	s.f.	Temporary Irrigation System	For all planting areas	$ 0.50	$ 11,107.50
22,215	s.f.	1 Year Maintenance Period		$ 0.80	$ 17,772.00
			TOTAL PHASE 3B LANDSCAPE AND IRRIGATION COST		$ 73,284.00

Hawaii State Hospital
Preliminary Landscape Cost Estimate

BROWNLIE & LEE

October 21, 2016

Phase 13 - Landscape Buffer Zone

Quantity	Unit	Plant Name	Description	Unit Cost	Amount
25	ea.	Medium Canopy Tree	25 Gal. Can, 8' Ht., 4' Spds., 2" Calip.	$ 350.00	$ 8,750.00
1,210	ea.	Flowering Hedge	3 Gal. Can, 18" ht., 18" o.c.	$ 30.00	$ 36,300.00
12,500	s.f.	Flowering Groundcover	4" Pots, 18" o.c.	$ 1.50	$ 18,750.00
37,800	s.f.	Zoysia 'El Toro'	Sprigs with Hydromulch	$ 1.00	$ 37,800.00
2,435	l.f.	Brick Header	8" Wide	$ 14.00	$ 34,090.00
630	c.y.	Imported Screened Soil	4" Depth-In All Planting Areas	$ 45.00	$ 28,350.00
50,300	s.f.	Soil Prep and Fine Grading		$ 0.30	$ 15,090.00
50,300	s.f.	Temporary Irrigation System	For all planting areas	$ 0.50	$ 25,150.00
50,300	s.f.	1 Year Maintenance Period		$ 0.80	$ 40,240.00
			TOTAL PHASE 13 LANDSCAPE AND IRRIGATION COST		$ 244,520.00

OVERALL TOTAL PHASE 1, 2 3A, 3B AND 13 LANDSCAPE AND IRRIGATION COST	$ 591,655.00

From: Richard Brownlie [mailto:richard@blhawaii.com]
Sent: Thursday, October 20, 2016 6:18 PM
To: Michael Nishimura <mnishimura@BrwnCald.com>; Jennifer Brownlie Hanzawa <jennifer@blhawaii.com>
Cc: Mark Ohigashi <mohigashi@BrwnCald.com>
Subject: RE: State DAGS Job 12-20-2701, HSH NPF & Campus Mstr Plan Develop: DEIS—Request for Review Comments on Landscaping Plans & Updated Sidewalk Figure

Mike I edited the text you provided as follows, I retained your narrative below for reference if you need it:

1. Providing trees to shield the first 2 floors of the NPF appears infeasible/impractical. Available tree species which are capable of obtaining 50 in height are Eucalyptus, Ironwood, Norfolk Pine, Mahogany and Bamboo. There are no native tree species available in the local marketplace that will obtain heights exceeding 50 feet. Of these species the Eucalyptus and Ironwood are on the State of Hawaii Department of Agriculture Invasive Plant List so we do not recommend utilizing these trees.

2. Norfolk Pines are available in field stock sizes up to perhaps 25 feet. They grow at a rough average of 1–2 feet per year (depending on rainfall, soil conditions/fertility, wind exposure, etc.), they will probably not achieve the desired 50' height for 25–30 years and because of their open branching structure they may ultimately provide only limited screening. The Norfolk Pine is susceptible to trunk rot in mature trees and there have been fatalities and injuries related to falling Norfolk Pines. Because of its structure with a single non-branching trunk it cannot be trimmed when the height becomes excessive for the available space or it becomes a danger to adjacent buildings.

3. Mahogany is available locally in very limited quantities from only one nursery source. The last time we checked they had a few trees 10-12 feet high, many of them misshapen. Mahogany will probably grow at the project site at the rate of 12 to 18 inches per year. We estimate it will take 20-30 years to obtain Mahogany trees that are 50 feet in height.

4. Bamboo is available in species which can quickly grow to 50 feet or more in height, but controlling their growth and spread even in clumping varieties can be a challenge and the leaf sheaths and falling leaves tend to become a breeding area for mosquitoes

5. Fruit trees will not obtain heights of 50 feet. Availability of fruit trees locally is an issue, particularly in sizes larger than 3 gallon, 2 feet high because of the high demand from homeowners. There is very limited availability of fruit trees in 25 gallon (6 feet high) or field stocks. Fruit trees tend to create insect, mice and rat problems unless the client is very diligent in picking-up falling fruit and wrapping

trees trunks with guards to prevent rodents from climbing the trees. Bagging of fruit may also be necessary to minimize rodent and insect problems. Often ownership conflicts over the fruit can arise.

6. Regarding the 6' fence currently being installed by the HSH along their western property border with the WCC, a dense native hedge can be provided, such as either native white Hibiscus or native Naupaka; or Copperleaf or Bougainvillea can be utilized iif a more formidable, faster growing or thorny barrier is desired. This can be provided on the landscaping PS&E and could be installed on the HSH-side of the fence.

7. Irrigation system will be temporary only at completion of landscape installation & onset of recommended 1-year maintenance period. Due to the high rainfall at the project site and as per suggestion of the State DOT-AMHD HSH plant operations and maintenance personnel, permanent irrigation is not needed for the upkeep of the landscape and would only incur undesired cost & labor to maintain it.

Mike If you have any questions, let me know.

Richard Brownlie

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Appendix N: Potential Costs

Engineer’s Opinion of Approximate Conceptual Probable Costs for Various Infrastructure and Site Improvements

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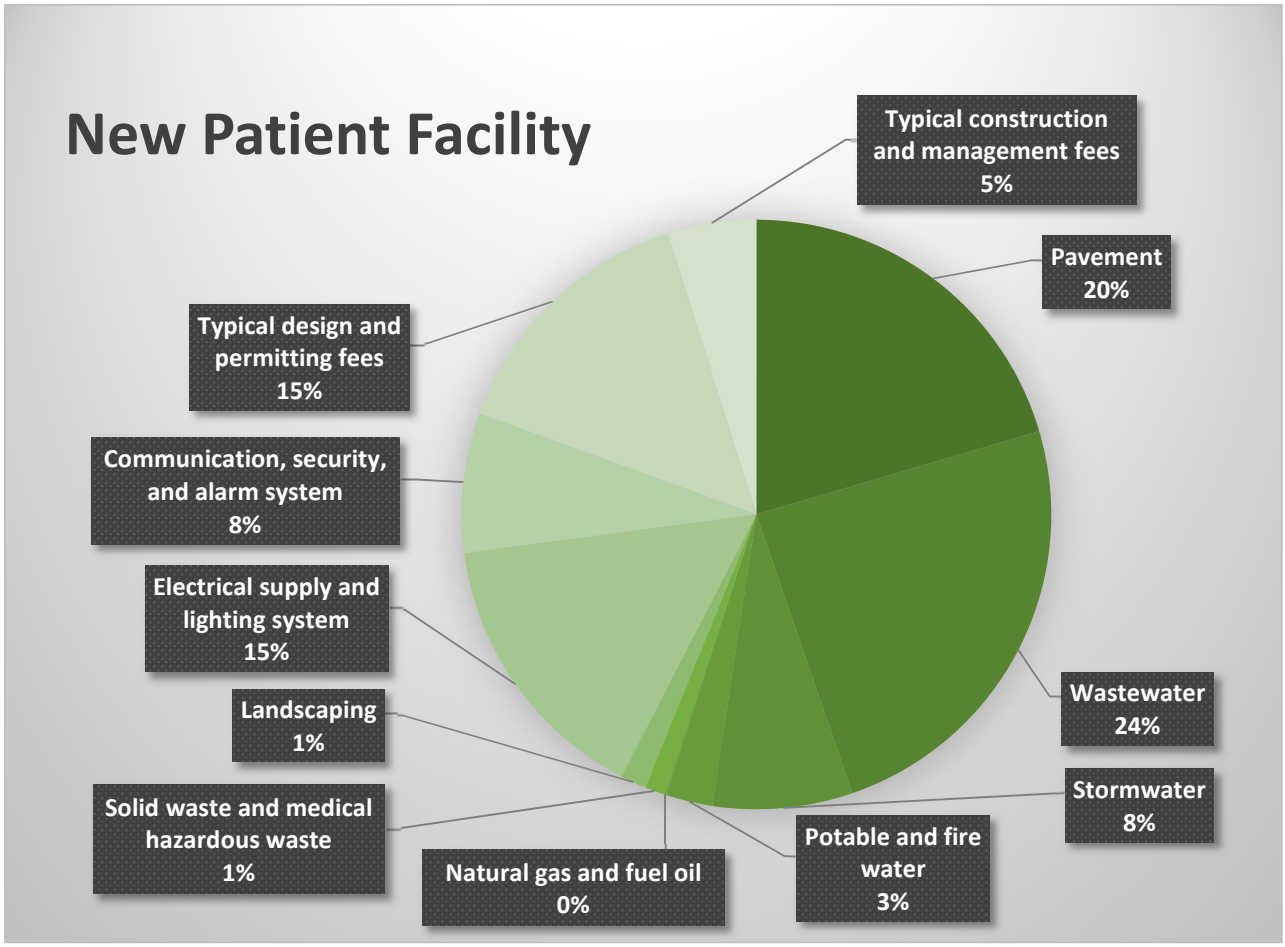
Engineer's Opinion of Approximate Conceptual Probable Costs for Various Infrastructure and Site Improvements

Table 1. Engineer's Opinion of Approximate Conceptual Probable Costs for Various Infrastructure and Site Improvements to Support the New Patient Facility [1]

Category	Total cost (based on 2016 U.S. dollars)
Pavement	1,600,000
Wastewater	1,900,000
Stormwater	600,000
Potable and fire water	200,000
Natural gas and fuel oil (including heaters)	10,000
Solid waste and medical hazardous waste	7,000/month [2]
Landscaping	110,000
Electrical supply and lighting system	1,200,000
Communication, security, and alarm system	600,000
Typical design and permitting fees (18%)	1,140,000
Typical construction and management fees (6%)	380,000
TOTAL (rounded)	**7,820,000**

Note: [1] All costs are AACE class 5 cost estimates with an expected accuracy of -20% to -50% on the low end and +30% to +100% on the high end [2] Total (Rounded) accounts for 12 months of servicing of solid and medical waste.



Breakdown of Engineer's Opinion of Approximate Conceptual Probably Costs (Based on 2016 U.S. Dollars)
Hawai'i State Hospital—New Patient Facility and Campus Master Plan Development

A. First Phase of Improvements (New Patient Facility)

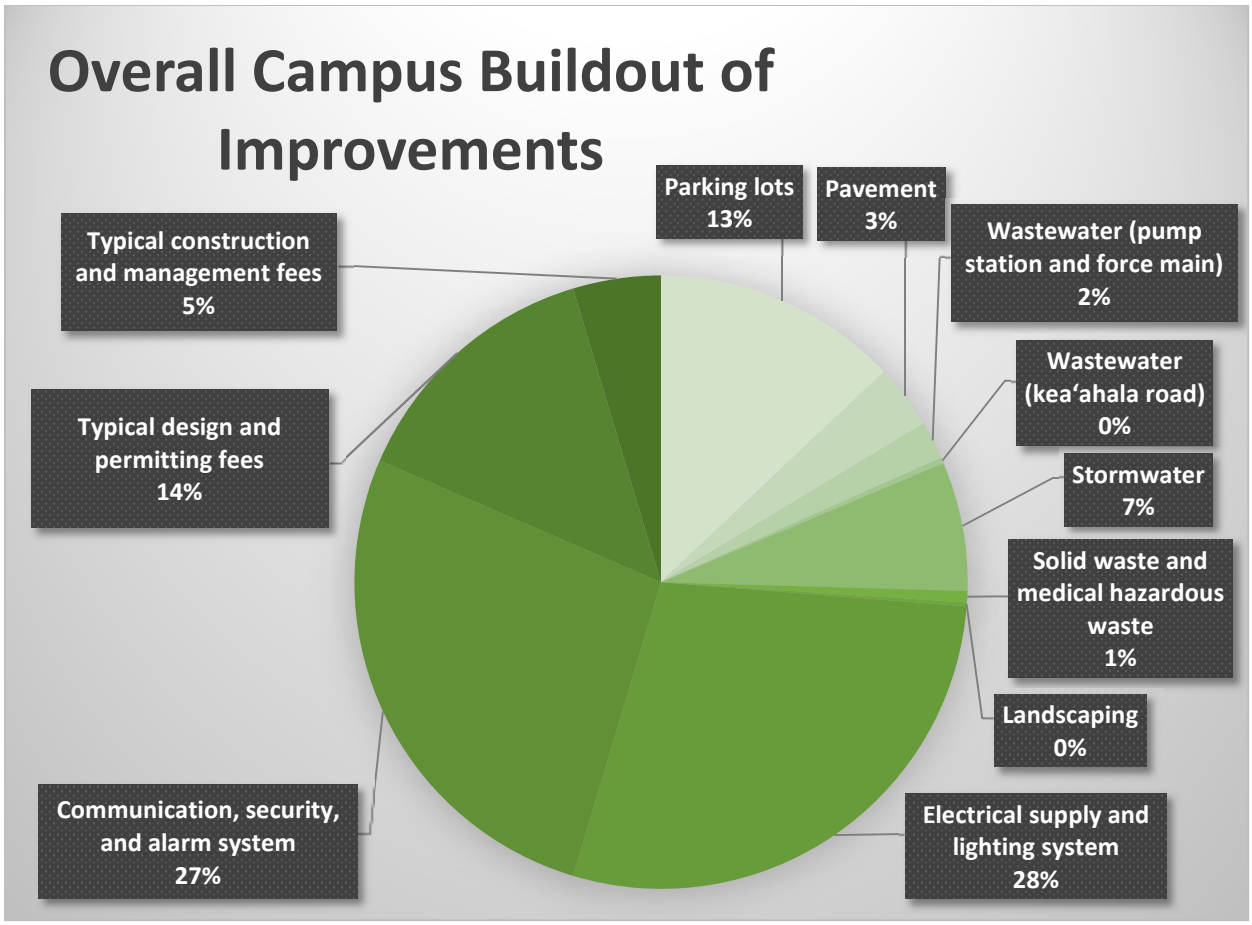
Description	Qty	Unit	Unit Cost	Total
1. Parking lots				N/A
2. Paving				
2.1 Roadway				
Reconstruction	1	LS	$ 1,000,000	**$ 1,000,000**
Resurfacing	1	LS	$ 500,000	**$ 500,000**
2.2 Pedestrian walkways/sidewalks	1	LS	$ 87,000	**$ 87,000**
2.3 Bike routes and racks	1	LS	$ 15,000	**$ 15,000**
3. Potable and fire water				
3.1 Fire hydrant assembly, with FH extension, furnish and install, in place complete	2	EA	$ 3,910	$ 7,820
3.2 Fire hydrant reflective marker, in place complete	2	EA	$ 189	$ 377
3.3 4-inch thick asphaltic concrete pavement (state mix III or IV), inclusive of 8-inch appregrate base and subbase courses for repaving trenches, in place complete	156	SY	$ 184	$ 28,622
3.4 Furnish and install 12-inch diameter DI pipe, CL52, and 6"-wide non-metallic warning tape, in place complete.	700	LF	$ 100	$ 70,000
3.5 Furnish and install 12-inch diameter fittings	6	EA	$ 4,000	$ 24,000
3.6 Furnish and install 12-inch diameter gate valves	2	EA	$ 7,000	$ 14,000
3.7 Furnish and install thrust blocks 40 SF bearing area, DWS 2500 concrete	22	CY	$ 1,000	$ 22,222
3.8 Hydrotesting, chlorination and flushing of water pipeline	1	LS	$ 20,000	$ 20,000
				$ 200,000
4. Wastewater				
4.1 P30 sewerline	1	LS	$ 298,000	$ 298,000
4.2 P41 sewerline	1	LS	$ 169,000	$ 169,000
4.3 P53 sewerline	1	LS	$ 657,000	$ 657,000
4.4 P54 sewerline	1	LS	$ 617,000	$ 617,000
4.5 P58 sewerline	1	LS	$ 159,000	$ 159,000
				$ 1,900,000
5. Stormwater				
5.1 P-01 drainline	1	LS	$ 63,000	$ 63,000
5.2 P-02 drainline	1	LS	$ 63,000	$ 63,000
5.3 P-05 drainline	1	LS	$ 474,000	$ 474,000
				$ 600,000
6. Natural gas and fuel oil (including heaters)	1	LS	$ 10,000	**$ 10,000**
7. Solid waste and medical hazardous waste				
7.1 6-CY solid waste containers	8	EA	$ 600/EA	**$ 2,400/month**
7.2 3-CY solid waste containers	3	EA	$ 300/EA	**$ 900/month**
7.3 0.7-CY medical waste containers	1	EA	$ 1,500/EA	**$ 1,500/month**
8. Site electrical improvements (see New Patient Facility section 15)				
8.1 Electrical supply and lighting system	1	LS	$ 1,200,000	**$ 1,200,000**
8.2 Communication, security, and alarm system	1	LS	$ 600,000	**$ 600,000**
9. Landscaping				
9.1 Medium canopy tree, 25 gal. can, 8' HT., 4' spds., 2" calip.	23.00	EA	$ 350.00	$ 8,050
9.2 Flowering hedge, 3 gal. can, 18" HT., 18" o.c.	95.00	EA	$ 30.00	$ 2,850
9.3 Flowering groundcover, 4" pots, 18" o.c.	1,600.00	SF	$ 1.50	$ 2,400
9.4 Zoysia 'El Toro', sprigs with hydromulch	29,575.00	SF	$ 1.00	$ 29,575
9.5 Imported screened soil, 4" depth, for all planting areas	385.00	CY	$ 45.00	$ 17,325
9.6 Soil prep and fine grading, for all planting areas	31,175.00	SF	$ 0.30	$ 9,353
9.7 Temporary irrigation system, for all planting areas	31,175.00	SF	$ 0.50	$ 15,588
9.8 1-year maintenance period, for all planting areas	31,175.00	SF	$ 0.80	$ 24,940
				$ 110,080
SUBTOTAL				**$ 6,300,000**
Estimated typical design and permitting fees (18%)				**$ 1,140,000**
Estimated construction and management fees (6%)				**$ 380,000**
Total funding for first phase of improvements				**$ 7,820,000**

Note: calip.—caliper, CY—cubic yard, EA—each, GAL—gallon, HT—height, LF—linear foot, LS—lump sum, o.c.—on center, Spds.—spreads, SF—squarefoot

Engineer's Opinion of Approximate Conceptual Probable Costs for Various Infrastructure and Site Improvements

Table 2. Engineer's Opinion of Approximate Conceptual Probable Costs for Various Infrastructure and Site Improvements to Support the Overall Campus Buildout of Improvements [1]	
Category	Total cost (based on 2016 U.S. dollars)
Parking lots	4,200,000
Pavement	1,100,000
Wastewater (pump station and force main)	650,000
Wastewater (Kea'ahala Road)	100,000
Stormwater	2,200,000
Solid waste and medical hazardous waste	16,000/month [2]
Landscaping	68,000
Electrical supply and lighting system	9,200,000
Communication, security, and alarm system	8,700,000
Typical design and permitting fees (18%)	4,500,000
Typical construction and management fees (6%)	1,500,000
TOTAL (rounded)	**31,000,000**

Note: [1] All costs are AACE class 5 cost estimates with an expected accuracy of -20% to -50% on the low end and +30% to +100% on the high end [2] Total (Rounded) accounts for 12 months of servicing of solid and medical waste.



Breakdown of Engineer's Opinion of Approximate Conceptual Probably Costs (Based on 2016 U.S. Dollars)
Hawai‘i State Hospital—New Patient Facility and Campus Master Plan Development

B. Overall Campus Buildout of Improvements

Description	Qty	Unit	Unit Cost	Total
1. Parking lots				
1.1 Planning zone 14	1	LS	$ 1,400,000	**$ 1,400,000**
1.2 Planning zone 15	1	LS	$ 2,800,000	**$ 2,800,000**
2. Paving				
2.1 Roadway				
Reconstruction	1	LS	$ 750,000	**$ 750,000**
Resurfacing				N/A
2.2 Pedestrian walkways/sidewalks	1	LS	$ 310,000	**$ 310,000**
2.3 Bike routes and racks	1	LS	$ 50,000	**$ 50,000**
3. Potable and Fire Water				N/A
4. Wastewater				
4.1 Pump station	1	LS	$ 500,000	$ 500,000
4.2 4" force main (~600 ft)	1	LS	$ 150,000	$ 150,000
4.3 Administration and processing for dedicating WW in Kea‘ahala Road (~1,000 ft)	1	LS	$ 100,000	$ 100,000
				$ 750,000
5. Stormwater				
5.1 Planning zone 15	1	LS	$ 990,000	$ 990,000
5.2 Planning zone 14	1	LS	$ 480,000	$ 480,000
5.3 New drainline and outfall	1	LS	$ 730,000	$ 730,000
				$ 2,200,000
6. Natural gas and fuel oil (including heaters)				N/A
7. Solid waste and medical hazardous waste				
7.1 6-CY solid waste containers	20	EA	$ 600/EA	**$ 12,000/month**
7.2 3-CY solid waste containers	4	EA	$ 300/EA	**$ 1,200/month**
7.3 0.7-CY medical waste containers	2	EA	$ 1,500/EA	**$ 3,000/month**
8. Site electrical improvements				
8.1 Electrical supply and lighting system	1	LS	$ 9,200,000	**$ 9,200,000**
8.2 Communication, security, and alarm system	1	LS	$ 8,700,000	**$ 8,700,000**
9. Landscaping				
9.1 Medium canopy tree, 25 gal. can, 8' HT., 4' spds., 2" calip.	12.00	EA	$ 350.00	$ 4,200
9.2 Flowering hedge, 3 gal. can, 18" HT., 18" o.c.	205.00	EA	$ 30.00	$ 6,150
9.3 Flowering groundcover, 4" pots, 18" o.c.	3,450.00	SF	$ 1.50	$ 5,175
9.4 Zoysia 'El Toro', sprigs with hydromulch	14,175.00	SF	$ 1.00	$ 14,175
9.5 Imported screened soil, 4" depth, for all planting areas	220.00	CY	$ 45.00	$ 9,900
9.6 Soil prep and fine grading, for all planting areas	17,625.00	SF	$ 0.30	$ 5,288
9.7 Temporary irrigation system, for all planting areas	17,625.00	SF	$ 0.50	$ 8,813
9.8 1-year maintenance period, for all planting areas	17,625.00	SF	$ 0.80	$ 14,100
				$ 67,800
SUBTOTAL				**$ 25,000,000**
Estimated typical design and permitting fees (18%)				**$ 4,500,000**
Estimated construction and management fees (6%)				**$ 1,500,000**
Total funding for overall campus buildout of improvements				**$ 31,000,000**

Note: calip.—caliper, CY—cubic yard, EA—each, GAL—gallon, HT—height, LF—linear foot, LS—lump sum, o.c.—on center, Spds.—spreads, SF—squarefoot

Appendix O: Mechanical Conceptual Cost Estimate & Calculations

August 26, 2016

Construction Cost Estimate

May 11, 2016

Area Summary

May 31, 2016

Equipment Loading

June 2, 2016

Fire Sprinkler

May 11, 2016

Estimated List of Fixtures

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KATAYAMA & ASSOCIATES, INC.

725 Kapiolani Boulevard, Suite C212 - Honolulu, Hawaii 96813-6026 - Telephone (808) 521-5086 Fax (808) 521-1713

CONSTRUCTION COST ESTIMATE

DATE: 8/26/2016
SHEET: 1 OF 8
BY: KK

JOB NAME: HAWAII STATE HOSPITAL
GODDARD BUILDING

SUMMARY	QUANTITIES		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
MECHANICAL	NO. UNIT	UNIT	UNIT COST	COST	UNIT COST	COST	UNIT COST	COST
I. AIR CONDITIONING								
CHILLER PLANT								1,819,000
BUILDING								1,033,000
II. VENTILATION								251,400
III. PLUMBING								1,581,000
IV. FIRE PROTECTION								518,075
V. EMCS								230,500
SUBTOTAL								5,432,975
35% CONTINGENCY								1,901,541
SUBTOTAL								7,334,516
TOTAL								7,334,516

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CONSTRUCTION COST ESTIMATE

DATE: 8/26/2016

JOB NAME: HAWAII STATE HOSPITAL
GODDARD BUILDING

SHEET: 2 OF 8

BY: KK

SUMMARY	QUANTITIES		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
AIR CONDITIONING	NO. UNIT	UNIT	UNIT COST	COST	UNIT COST	COST	UNIT COST	COST
CENTRAL PLANT								
CHILLER PLANT								
300 T. CHILLER	2	EA					350,000	700,000
PUMPS	4	EA					12,000	48,000
VARIABLE SPEED								
DRIVES	2	EA	10000	20000	8000	16000	18,000	36,000
O2, REFRIG. ALARMS	1	EA					20,000	20,000
REFRIG. RECLAIM	2	EA					20,000	40,000
CONTROL & WIRING		LS					50,000	50,000
MISC. (AIR SEP., EXP.								
TANK, ETC.)		LS					30,000	30,000
PIPING & VALVING		LS					125,000	125,000
TEST & BALANCE		LS					20,000	20,000
SUBTOTAL # 1								1,069,000

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CONSTRUCTION COST ESTIMATE

DATE: 8/26/2016

JOB NAME: HAWAII STATE HOSPITAL
GODDARD BUILDING

SHEET: 3 OF 8

BY: KK

SUMMARY	QUANTITIES		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
AIR CONDITIONING	NO. UNIT	UNIT	UNIT COST	COST	UNIT COST	COST	UNIT COST	COST
CENTRAL PLANT								
COOLING TOWERS								
300 TON COOLING TOWER	2	EA					200000	400,000
CONDENSER WATER								
TREATMENT	1	EA					50000	50,000
CONTROL & WIRING		LS					25000	25,000
CONDENSER WATER								
PIPING (UNDERGROUND)	500	LF					150	75,000
SOUND ATTENUATORS	80	EA					2500	200,000
SUBTOTAL # 2								750,000
SUBTOTAL # 1								1,069,000
TOTAL								1,819,000

KATAYAMA & ASSOCIATES, INC.

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CONSTRUCTION COST ESTIMATE

DATE: 8/26/2016

JOB NAME: HAWAII STATE HOSPITAL
GODDARD BUILDING

SHEET: 4 OF 8

BY: KK

SUMMARY	QUANTITIES		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
AIR CONDITIONING	NO. UNIT	UNIT	UNIT COST	COST	UNIT COST	COST	UNIT COST	COST
AIR HANDLING UNIT	10	EA	11000	110000	6000	60000	17000	170,000
PRECOOLER	4	EA	11000	44000	6000	24000	17000	68,000
FAN COIL UNIT	10	EA	3000	30000	2500	25000	5500	55,000
SOUND ATTEN.	20	EA					2500	50,000
DUCTWORK &								
ACCESSORIES	20000	LBS					12	240,000
DUCTWORK &								
ACCESSORIES (VAV)	5000	LBS					14	70,000
AIR DEVICES	500	EA					150	75,000
VAV BOXES	30	EA					1600	48,000
ELEC. REHEAT COIL	10	EA	3000	30000	2500	25000	5500	55,000
HEPA FILTERS	0	EA	12500	0	4000	0	16500	0
CONTROLS	30	EA					1500	45,000
TEST & BALANCE		LS						30,000
CHW PIPE	2000	LF					60	120,000
CD PIPING	200	LF					35	7,000
TOTAL								1,033,000

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CONSTRUCTION COST ESTIMATE

DATE: 8/26/2016

JOB NAME: HAWAII STATE HOSPITAL
GODDARD BUILDING

SHEET: 5 OF 8

BY: KK

SUMMARY	QUANTITIES		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
VENTILATION	NO. UNIT	UNIT	UNIT COST	COST	UNIT COST	COST	UNIT COST	COST
EXHAUST FAN (IN-LINE)	4	EA	2700		1600		8000	32,000
EXH FAN (UTILITY SET)	7	EA	2100		1200		3300	23,100
EXH FAN (TOILET)	17	EA	500	8500	400	6800	900	15,300
DUCT WORK &								
ACCESSORIES	10000	LBS					9	90,000
SOUND ATTENUATORS	10	EA	1250		750		2000	20,000
CONTROLS & WIRING	29	EA					1500	43,500
TEST & BALANCE	29	EA					500	14,500
TOTAL								238,400

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CONSTRUCTION COST ESTIMATE

DATE: 8/26/2016

JOB NAME: HAWAII STATE HOSPITAL
GODDARD BUILDING

SHEET: 6 OF 8

BY: KK

SUMMARY	QUANTITIES		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
PLUMBING	NO. UNIT	UNIT	UNIT COST	COST	UNIT COST	COST	UNIT COST	COST
FIXTURES	500	EA					3000	1,500,000
BACKFLOW PREVENTER	2	EA					8000	16,000
ROOF DRAINAGE		LS						40,000
ELEVATOR SUMP PUMP		LS						25,000
DOMESTIC WATER	1	EA					75000	75,000
BOOSTER PUMP								
HEAT PUMP WH	1	LS					25000	25,000
INSTANT GAS WH	1	LS					10000	10,000
TOTAL								1,581,000

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CONSTRUCTION COST ESTIMATE

DATE: 9/6/2000

JOB NAME: KAUAI JUDICIARY COMPLEX

SHEET: 7 OF 8

BY: KK

SUMMARY	QUANTITIES		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
FIRE PROTECTION	NO. UNIT	UNIT	UNIT COST	COST	UNIT COST	COST	UNIT COST	COST
FIRE SPRINKLER	83615	FT^2					5	418,075
FIRE EXTINGUISHERS	40	EA					500	20,000
FIRE PUMP	1	EA					60000	60,000
JOCKEY PUMP	1	EA					20000	20,000
ELEVATOR PREACTION	2	EA					5000	10,000
TOTAL								518,075

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CONSTRUCTION COST ESTIMATE

DATE: 9/6/2000

JOB NAME: KAUAI JUDICIARY COMPLEX

SHEET: 8 OF 8

BY: KK

SUMMARY	QUANTITIES		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
EMCS	NO. UNIT	UNIT	UNIT COST	COST	UNIT COST	COST	UNIT COST	COST
EMCS	83615	FT^2					2.5	209,038
TOTAL								209,038
							SAY	230,500

KATAYAMA & ASSOCIATES, INC
725 Kapiolani Blvd., Suite C-212 • Honolulu, Hawaii 96813-6026 • Telephone (808) 521-5086 • Fax (808) 521-1713 • Email: mail@katayama-assoc.com

JOB NAME: HAWAII STATE HOSPITAL SUBJECT: AREA SUMMARY DATE: 5/11/2016

PATIENT FACILITY JOB NUMBER: 15-022

BY: KL SHEET 1 OF 1

GODDARD BUILDING

GROUND FLOOR:	36,005 SQ FT
FIRST FLOOR:	17,350 SQ FT
SECOND FLOOR:	15,070 SQ FT
THIRD FLOOR:	15,190 SQ FT
TOTAL AREA:	83,615 SQ FT

(83,615 SQ FT) x (40 BTUH/SQ FT) / (12,000 BTU/TON) = 278 TONS

HALOA BUILDING

(6,988 SQ FT) x (40 BTUH/SQ FT) / (12,000 BTU/TON) = 23 TONS

IOLANI BUILDING

(13,881 SQ FT) x (40 BTUH/SQ FT) / (12,000 BTU/TON) = 46 TONS

COOKE BUILDING

(10,586 SQ FT) x (40 BTUH/SQ FT) / (12,000 BTU/TON) = 35 TONS

EQUIPMENT LOADING

PROJECT NAME: HAWAII STATE HOSPITAL

DATE: 05/31/16

FLOOR: GROUND FLOOR

ZONE	ROOM NUMBER	ROOM NAME	AREA	Comp 65 (W)	Monitors 65 (W)	Printers 215 (W)	Xerox 550 (W)	TV 85 (W)	Refrig 90 (w)	Other	TOTAL (W)	Remarks
1		OCCUOPATIONAL THERAPY	12330								-	
		RECREATIONAL THERAPY	10695								-	
		REHABILITATION THERAPY	5170								-	
		OPPERATIONS CENTER	600								-	
		DINING ROOM	2000								-	
		AUTO DETAILING	600								-	
		GREENHOUSE	400								-	
		GENERAL STORE/EMERGENCY SUPP	3230								-	
		MATERIALS MANAGEMENT	980								-	
											-	
TOTAL			36005								-	
											-	
											-	

EQUIPMENT LOADING

PROJECT NAME: HAWAII STATE HOSPITAL

DATE: 05/31/16

FLOOR: FIRST FLOOR PART 1 OF 2

ZONE	ROOM NUMBER	ROOM NAME	AREA	Comp 65 (W)	Monitors 65 (W)	Printers 215 (W)	Xerox 550 (W)	TV 85 (W)	Refrig 90 (w)	Other	TOTAL (W)	Remarks
		PATIENT ROOM (22)	110									
2		ISO PATIENT ROOM (2)	110								-	
		SECLUSION (8)	80								-	
		SOCIAL ROOM NOISY (2)	480								-	
		SOCIAL ROOM QUIET (2)	480								-	
		ANTE (2)	200								-	
		FEMALE GROOM (2)	120								-	
		MALE GROOM (2)	120								-	
		GROUP THERAPY (2)	225								-	
		TREATMENT PLAN/CONFERENCE (2)	300								-	
		CONSULT/VISITOR (4)	120								-	
		COPY ROOM (2)	60								-	
		OFFICE LARGE (6)	120								-	
		OFFICE SMALL (12)	100								-	
		STAFF LOUNGE (2)	225									
		PATIENT LAUNDRY (2)	130									
		LINEN (2)	100									
		NURSE STATION (2)	240									
		MED CHART (6)	30									
		MEDS (2)	100									
		TREATMENT (2)	120									
		QUIET/VISITOR (2)	100									
		CLASSROOM	350									
		CLASSROOM/OT OFFICE	350									
		CLASSROOM/RT OFFICE	350									
		CLASSROOM INTERVIEW	200									
		CLASSROOM VISITOR	200									

EQUIPMENT LOADING

PROJECT NAME: HAWAII STATE HOSPITAL

DATE: 05/31/16

FLOOR: FIRST FLOOR PART 2 OF 2

ZONE	ROOM NUMBER	ROOM NAME	AREA	Comp 65 (W)	Monitors 65 (W)	Printers 215 (W)	Xerox 550 (W)	TV 85 (W)	Refrig 90 (w)	Other	TOTAL (W)	Remarks
		NOURISH/KITCHEN (2)	200									
3		TRIAGE (4)	110								-	
		HARDENED PAT. RM. W/ TLT/SHR (24	145								-	
											-	
	TOTAL		17350								-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

EQUIPMENT LOADING

PROJECT NAME: HAWAII STATE HOSPITAL

DATE: 05/31/16

FLOOR: SECOND FLOOR

ZONE	ROOM NUMBER	ROOM NAME	AREA	Comp 65 (W)	Monitors 65 (W)	Printers 215 (W)	Xerox 550 (W)	TV 85 (W)	Refrig 90 (w)	Other	TOTAL (W)	Remarks
		PATIENT ROOM (38)	110									
3		ISOLATION PATIENT ROOM (2)	110								-	
		ANTE ROOM (2)	80								-	
		SECLUSION (8)	80								-	
		SOCIAL NOISY (2)	480								-	
		SOCIAL QUIET (2)	480								-	
		FEMALE GROOM (2)	120								-	
		MALE GROOM (2)	120								-	
		GROUP THERAPY (2)	225								-	
		TREASTMENT PLAN/CONFERENCE (2	300								-	
		CONSULT/VISITOR (6)	120								-	
		COPY ROOM (2)	60								-	
		OFFICE LARGE (6)	120								-	
		OFFICE SMALL (12)	100								-	
		STAFF LOUNGE (2)	220								-	
		LINEN (2)	100									
		MEDS ROOM (2)	100									
		TREATMENT (2)	120									
		QUIET VISITOR (2)	100									
		NOURISH/KITCHEN (2)	200									
		PATIENT LAUNDRY (2)	130									
		NURSE STATION (2)	240									
		MED CHART (6)	30									
		MEDICAL PATIENT ROOM (8)	120									
	TOTAL		15070									

EQUIPMENT LOADING

PROJECT NAME: HAWAII STATE HOSPITAL

DATE: 05/31/16

FLOOR: THIRD FLOOR

ZONE	ROOM NUMBER	ROOM NAME	AREA	Comp 65 (W)	Monitors 65 (W)	Printers 215 (W)	Xerox 550 (W)	TV 85 (W)	Refrig 90 (w)	Other	TOTAL (W)	Remarks
		PATIENT ROOM (44)	110									
3		ISOLATION PATIENT ROOM (4)	110								-	
		SECLUTION (8)	80								-	
		ANTE ROOM (2)	80								-	
		MED ROOM (4)	100								-	
		SOCIAL NOISY (2)	480								-	
		SOCIAL QUIET (2)	480								-	
		FEMALE GROOM (2)	120								-	
		MALE GROOM (2)	120								-	
		GROUP THERAPY (2)	225								-	
		TREATMENT PLAN/CONFERENCE (2)	300								-	
		LINEN (2)	100								-	
		CONSULT/VISITOR (6)	120								-	
		COPY ROOM (2)	60								-	
		OFFICE LARGE (6)	120								-	
		OFFICE SMALL (12)	100									
		STAFF LOUNGE (2)	220									
		TREATMENT (2)	120									
		QUIET VISITOR (2)	100									
		NOURISH/KITCHEN (2)	200									
		PATIENT LAUNDRY (2)	130									
		NURSE STATION (2)	240									
		MED CHART (6)	3O									
	TOTAL		15190									

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JOB NAME: HSH SUBJECT: FIRE SPRINKLER DATE: 6/2/16
GODDARD JOB NUMBER:
BY: KK SHEET OF

ASSUMPTIONS: 20 PSI INCOMING WATER PRESSURE @ BASEMEN
PER JENNIFER (BRIRN & CALDWELL)

	FT
PRESSURE REQUIRED @ REMOTE FIRE SPRINKLER HEAD – 7 PSI × 2.2 FT/PSI	15.4
BUILDING HEIGHT (PER MATT @ AAI)	70.0
ESTIMATED PIPING LOSS	20.0
SUB TOTAL	85.4
15% SF	12.8
TOTAL	98.2
SAY	100 FT/2.2 =

45.45 PSI REQ'D
VS. 20 PSI AVAILABLE
∴ FIRE PUMP REQ'D.

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JOB NAME HAWAII STATE HOSPITAL

SUBJECT: ESTIMATED LIST OF FIXTURES

DATE: 5/11/2016

PATIENT FACILITY

TYPICAL 24 BED UNIT (TYP FOR 5 BLDGS)

JOB NUMBER: 15-022

BY: KL

SHEET 1 OF 4

SUMMARY OF FIXTURE ESTIMATE

BUILDING	FIXTURES													
	WC	UR	LAV	SHR	BATHTUB	FD	FS	HB	WASHER	KS	DISHWASHER	SK	SS	ICE MACHINE
FIVE 24 BED UNITS	105	10	125	85	5	115	10	15	5	5	5	5	5	5
HIGH RICK BLDG	32	2	36	28	1	34	2	3	1	1	1	1	1	1
REHAB MALL	6	2	8	2	0	7	2	4	0	2	2	8	1	2
FIXTURE TOTALS	143	14	169	115	6	156	14	22	6	8	8	14	7	8

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JOB NAME HAWAII STATE HOSPITAL

PATIENT FACILITY

SUBJECT: ESTIMATED LIST OF FIXTURES

TYPICAL 24 BED UNIT (TYP FOR 5 BLDG)

DATE: 5/11/2016

JOB NUMBER: 15-022

BY: KL

SHEET 2 OF 4

FIXTURES IN ONE TYPICAL 24 BED UNIT

ROOM NAME	# OF ROOMS	WC	UR	LAV	SHR	BATHTUB	FD	FIXTURES FS	HB	WASHER	KS	DISHWASHER	SK	SS	ICE MACHINE
TOILET/SHR	11	11		11	11		11								
ISOLATION TOILET/SHR	2	2		2	2		2								
SECLUSION RM TOILET/SHR	1	1		1	1		1								
TRIAGE ROOM TOILET/SHR	1	1		1	1		1								
TUB ROOM	1					1	1								
MEN'S GROOMING RM	1			1											
WOMEN'S GROOMING RM	1			1											
PATIENT RESTROOM - MEN	1	1	2	3			1		1						
PAITIENT RESTROOM - WOME	1	3		3			1		1						
LAUNDRY	1						1	1		1				1	
STAFF TOILET/SHR	2	2		2	2		2		1						
KITCHEN	1						2	1			1	1			1
STAFF LOUNGE	1												1		
SOILED UTILITY	1														

TOTAL FIXTURES IN ALL FIVE TYPICAL 24 BED UNIT

ROOM NAME	# OF ROOMS	WC	UR	LAV	SHR	BATHTUB	FD	FIXTURES FS	HB	WASHER	KS	DISHWASHER	SK	SS	ICE MACHINE
TOILET/SHR	55	55		55	55		55								
ISOLATION TOILET/SHR	10	10		10	10		10								
SECLUSION RM TOILET/SHR	5	5		5	5		5								
TRIAGE ROOM TOILET/SHR	5	5		5	5		5								
TUB ROOM	5					5	5								
MEN'S GROOMING RM	5			5											
WOMEN'S GROOMING RM	5			5											
PATIENT RESTROOM - MEN	5	5	10	15			5		5						
PAITIENT RESTROOM - WOME	5	15		15			5		5						
LAUNDRY	5						5	5		5				5	
STAFF TOILET/SHR	10	10		10	10		10		5						
KITCHEN	5						10	5			5	5			5
STAFF LOUNGE	5												5		
SOILED UTILITY	5														
FIXTURE TOTALS		105	10	125	85	5	115	10	15	5	5	5	5	5	5

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JOB NAME HAWAII STATE HOSPITAL

SUBJECT: ESTIMATED LIST OF FIXTURES

DATE: 5/11/2016

PATIENT FACILITY

HIGH RISK BLDG (TYP FOR 1 BLDG)

JOB NUMBER: 15-022

BY: KL

SHEET 3 OF 4

TOTAL FIXTURES IN ONE HIGH RISK BLDG

ROOM NAME	# OF ROOMS	FIXTURES WC	UR	LAV	SHR	BATHTUB	FD	FS	HB	WASHER	KS	DISHWASHER	SK	SS	ICE MACHINE
TOILET/SHR	22	22		22	22		22								
ISOLATION TOILET/SHR	2	2		2	2		2								
SECLUSION RM TOILET/SHR	1	1		1	1		1								
TRIAGE ROOM TOILET/SHR	1	1		1	1		1								
TUB ROOM	1					1	1								
MEN'S GROOMING RM	1			1											
WOMEN'S GROOMING RM	1			1											
PATIENT RESTROOM - MEN	1	1	2	3			1		1						
PAITIENT RESTROOM - WOME	1	3		3			1		1						
LAUNDRY	1						1	1		1				1	
STAFF TOILET/SHR	2	2		2	2		2		1						
KITCHEN	1						2	1			1	1			1
STAFF LOUNGE	1												1		
SOILED UTILITY	1														
FIXTURE TOTALS		32	2	36	28	1	34	2	3	1	1	1	1	1	1

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JOB NAME HAWAII STATE HOSPITAL

SUBJECT: ESTIMATED LIST OF FIXTURES

DATE: 5/11/2016

PATIENT FACILITY

REHAB MALL (TYP FOR 1 BLDG)

JOB NUMBER: 15-022

BY: KL

SHEET 4 OF 4

TOTAL FIXTURES IN ONE REHAB MALL

ROOM NAME	# OF ROOMS	FIXTURES													
		WC	UR	LAV	SHR	BATHTUB	FD	FS	HB	WASHER	KS	DISHWASHER	SK	SS	ICE MACHINE
MED BAY	1												1		
SICK BAY	2												2		
SICK EXAM RM	1												1		
LOUNGE	1														
AUTO DETAIL GARAGE	1												1		
INTERNET CAFÉ	1												1		
CLASSROOM KITCHEN	1						1	1			1	1			1
CLASSROOM DINNING	1												1		
CLASSROOM ART	1												1		
STAFF TOILET/SHR - FEMALE	1	1		1	1		1		1						
STAFF TOILET/SHR - MALE	1	1		1	1		1		1						
DINING	1														
SERVING KITCHEN	1						1	1			1	1			1
PATIENT RESTROOM - MEN	1	1	2	3			1		1						
PATIENT RESTROOM - WOME	1	3		3			1		1						
F/M REHAB REST	2														
HOUSEKEEPNG	1						1							1	
FIXTURE TOTALS		6	2	8	2	0	7	2	4	0	2	2	8	1	2

Appendix P: Water Analysis and Model

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.

Brown AND Caldwell

3264 Goni Road, Suite 153
Carson City, NV 89706-7925

T: 775-883-4118
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Memorandum

Subject: Hawaii State Hospital – Water Model

Date: October 24, 2016

To: Jennifer Honda, P.E.

From: Alok Gupta, P.E.

Copy to: Bill Faisst, P.E.

This Technical Memorandum (Tech Memo 1) describes the development of the hydraulic model for the analysis and assessment of the water distribution system for Hawaii State Hospital (HSH).

Section 1: Objective and Scope

HSH contracted with Brown and Caldwell to develop a water distribution model for the existing water system and evaluate water system meets the Maximum Day Demand (MDD), Peak Hour Demand (PHD) and fire flow requirements. The Scope of the project included:

1. Construct a water model which includes distribution system pipelines, storage tanks, valves, and fire hydrants.
2. Allocate demand among the nodes.
3. Perform simulations for MDD, PHD, and fire flow to estimate residual pressures at nodes. The fire flow modeling should occur coincident with MDD.
4. Provide a summary report summarizing water model results.

Section 2: System Overview

HSH is located in Kaneohe, Hawaii. The Honolulu Board of Water Supply 16-inch-diameter water line northeast of the HSH campus supplies the HSH water distribution system via a 4-inch meter and provides water for storage in the onsite 0.4 million gallons (MG) Tank. Figure 1 provides a layout of the existing water system. The water system has looping service using several 6- and 8-inch-diameter water mains. Most mains are constructed of ductile iron pipe. A larger loop covers the majority of the site, and smaller interior loop divides the larger loop such that the system generally draws water from two directions. This pipeline loop helps in minimizing water supply disruption during a pipeline break or system maintenance. The system includes:

1. 24 fire hydrants, located approximately 250 feet apart (Includes two future fire hydrants near the Guensberg building).
2. A future 10-inch diameter, 700-feet long pipeline is added in the water model to loop Guensberg building as shown in Figure 1 to provide fire flow and pressure for the new fire hydrant.

Section 3: Water Demand and Fire Flow

We used the July 2014 through July 2015 monthly usage bill to estimate the water demand. The maximum monthly demand occurred in July 2014. We have assumed a conversion factor of 2 and 3 to convert existing maximum monthly demand to MDD and PHD, respectively. Absent more detailed data, these factors describe typical water service demand factors for relatively small served areas, especially those served through a single master water meter. Table 1 summarizes the demand data used in the model for three conditions for the HSH. Condition 1 considers existing water system serving 562 patients. Condition 2 considers an expansion to serve 962 patients and Condition 3 considers full buildout serving 1,907 patients.

Table 1. Demand Data

Demand	Condition 1	Condition 2	Condition 3
Maximum Monthly Demand, gpm	48.5	83.0	164.5
Maximum Day Demand[1], gpm	97	166	329
Peak Hour Demand[2], gpm	145	249	494

Section 4: Model Development

We used the WaterGEMS V8i software to construct the water system model with series of nodes linked with pipes. The nodes represent the spatial intersection of water mains and facilities and serve as locations where we allocated demand and where the model estimates service pressure. We extracted node and storage tank elevations from design drawings. Where we had no design drawings for water mains, we used topographic maps that show elevations for sewer manhole tops or valve covers.

We allocated water demand across the distribution system over the 56 demand nodes for three service conditions described above The supply pressure at the meter is unavailable from the HBWS. The existing storage tank is reported to be full most of the time which suggests that the node pressure would follow the hydraulic grade line of the Tank and the water system would have high pressure when the tank is full and low pressure when the tank is empty. Based on the elevation difference of the meter node and tank operational water level, we estimate that the system supply pressure at the meter node would range between 85 and 87 pounds per square inch gage (psig).

The model calculated friction losses within the water model using a Hazen-Williams C-factor. As recommended by Section 111 of Hawaii Water System Standard. we have used a C-factor of 110 as majority of the pipe material is ductile iron that has operated for several years.

In the model, we have included a new 10-inch-diameter pipeline, which will loop the Guensberg building to provide fire flow as shown in Figure 1.

Section 5: Water System Analysis Results

Modeling results indicated that the existing water distribution system is adequately sized to meet the current and projected MDD and PHD. The analysis of the distribution system indicated that the pressures within the water system are expected to range between approximately 40 psig and 86 psig. This pressure range meets the Section 111 of Hawaii Water System Standard requirements as described below. Table 2 and Appendix A present the results.

- At least 20 psi during conditions of fire flow (fire demand of 1,000 gpm coincident with maximum day demand). The fire flow demand is provided by the local fire department.
- At least 40 psi during the peak hour flow. The reader should note that per the Uniform Plumbing Code, the pressure within an occupied structure should not exceed 80 psig. Building located adjacent to and at the same or a lower elevation than a node where the model predicts a pressure greater than 80 psig should have a pressure reducing device on their water connections.

Table 2. Water Model Pressure Results

Demand	Condition 1	Condition 2	Condition 3
Node Pressure Range, psig (Tank Low Operational Water Level)	40 - 84	40 - 84	40 - 84
Node Pressure Range, psig (Tank High Operational Water Level)	43 - 87	43 - 86	43 - 86

Section 6: Field Fire Flow Results

For fire flow modeling, we applied a 1,000-gpm fire flow rate with MDD to all fire hydrants within the system. The water model analysis with fire flow on conjunction with MDD indicate that all fire hydrants would provide the necessary 1,000-gpm water flow rate at a minimum residual pressure of 20 psig. Appendix B contains the water model results for the fire flow.

To ensure necessary pressure for the fire sprinkler system, we recommend adding a booster pump to increase the water pressure to achieve adequate pressure and flow for the fire sprinkler system.

Section 7: Conclusion

The water distribution system modeling results indicate that the existing water system is adequately sized to meet the current and projected MDD and PHD. The water system would also support the 1,000 gpm flow with MDD at a minimum 20 psig residual pressure during fire flow.

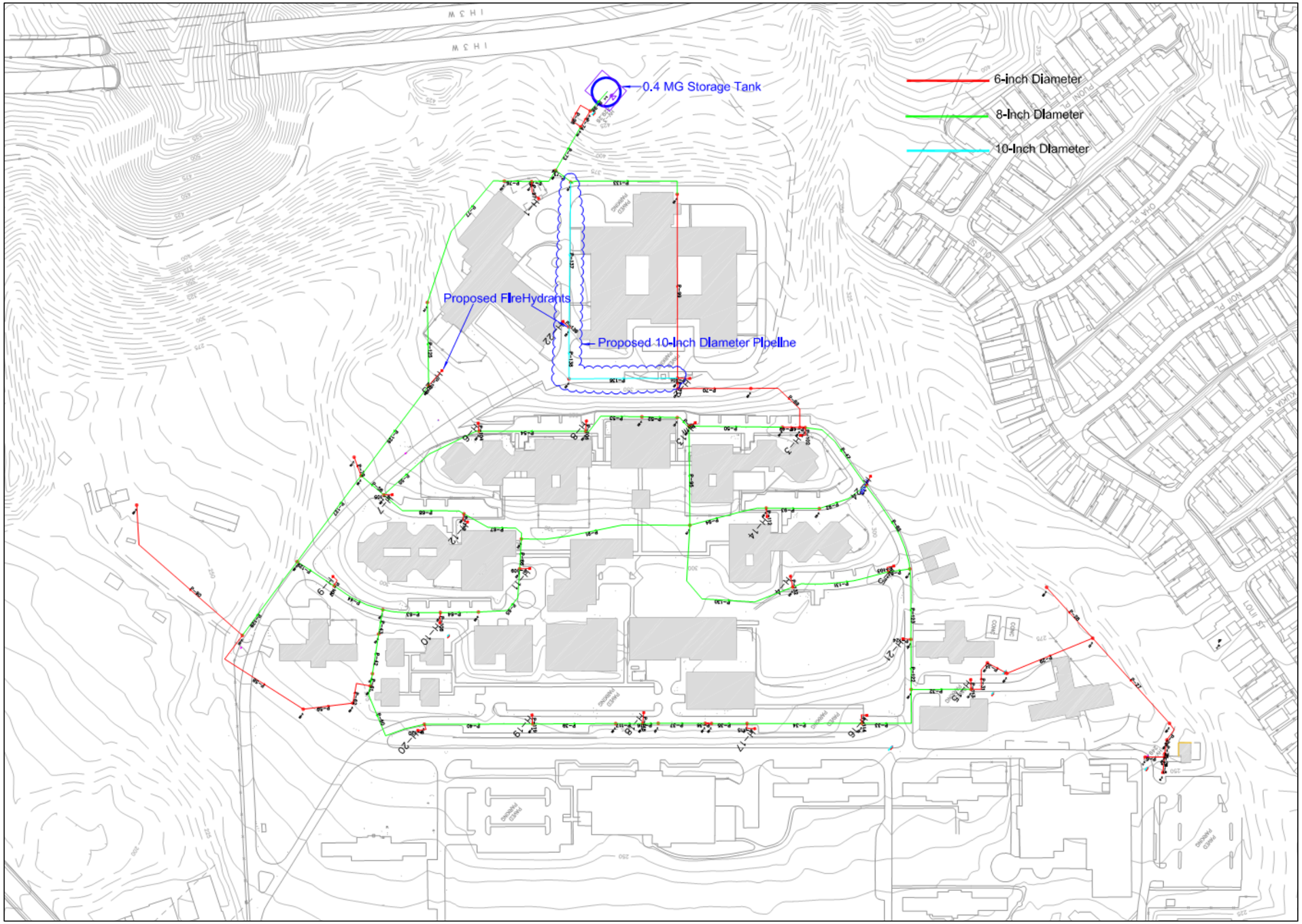


Figure 1. Hawaii State Hospital Water System

Appendix A

Table A-1. Condition # 1 Water Model Demand Node Pressure (MDD = 87 GPM)						
ID	Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
167	J-68	351.3	Hosp	1.73	449.91	42.66
282	J-93	351.16	Hosp	1.73	449.91	42.72
165	J-67	345	Hosp	1.73	449.9	45.39
279	J-92	341	Hosp	1.73	449.91	47.12
163	J-66	340	Hosp	1.73	449.86	47.53
179	J-74	340	Hosp	1.73	449.87	47.54
264	J-88	326.5	Hosp	1.73	449.85	53.37
136	J-54	319	Hosp	1.73	449.83	56.6
128	J-50	318	Hosp	1.73	449.83	57.03
130	J-51	318	Hosp	1.73	449.83	57.03
132	J-52	318	Hosp	1.73	449.83	57.03
134	J-53	318	Hosp	1.73	449.83	57.03
126	J-49	312	Hosp	1.73	449.83	59.63
122	J-47	312	Hosp	1.73	449.83	59.63
124	J-48	312	Hosp	1.73	449.83	59.63
205	J-84	303	Hosp	1.73	449.82	63.52
203	J-83	302	Hosp	1.73	449.82	63.96
184	J-76	301	Hosp	1.73	449.82	64.39
120	J-46	300	Hosp	1.73	449.82	64.82
182	J-75	300	Hosp	1.73	449.83	64.82
140	J-56	300	Hosp	1.73	449.83	64.82
160	J-65	298	Hosp	1.73	449.83	65.69
138	J-55	298	Hosp	1.73	449.83	65.69
158	J-64	296	Hosp	1.73	449.82	66.55
156	J-63	295	Hosp	1.73	449.82	66.98
271	J-90	289.49	Hosp	1.73	449.82	69.37
154	J-62	288	Hosp	1.73	449.82	70.01
152	J-61	287	Hosp	1.73	449.82	70.45
114	J-43	285	Hosp	1.73	449.82	71.31
187	J-78	283	Hosp	1.73	449.82	72.18
185	J-77	283	Hosp	1.73	449.82	72.18
112	J-42	280	Hosp	1.73	449.82	73.47
116	J-44	277	Hosp	1.73	449.82	74.77
267	J-89	277	Hosp	1.73	449.82	74.77
84	J-28	275	Hosp	1.73	449.82	75.63
110	J-41	275	Hosp	1.73	449.82	75.64
98	J-35	272	Hosp	1.73	449.82	76.93
100	J-36	272	Hosp	1.73	449.82	76.93
96	J-34	272	Hosp	1.73	449.82	76.93
102	J-37	272	Hosp	1.73	449.82	76.93
249	J-86	272	Hosp	1.73	449.82	76.93
104	J-38	272	Hosp	1.73	449.82	76.93
260	J-87	271	Hosp	1.73	449.82	77.37
106	J-39	270	Hosp	1.73	449.82	77.8
148	J-60	270	Hosp	1.73	449.82	77.8
108	J-40	267	Hosp	1.73	449.82	79.1
82	J-27	265	Hosp	1.73	449.82	79.96
146	J-59	265	Hosp	1.73	449.82	79.96
92	J-32	264	Hosp	1.73	449.82	80.39
94	J-33	262	Hosp	1.73	449.82	81.26
86	J-29	261	Hosp	1.73	449.82	81.69

Table A-1. Condition # 1 Water Model Demand Node Pressure (MDD = 87 GPM)						
88	J-30	261	Hosp	1.73	449.82	81.69
90	J-31	261	Hosp	1.73	449.82	81.69
142	J-57	260.8	Hosp	1.73	449.82	81.78
144	J-58	260	Hosp	1.73	449.82	82.13
200	J-82	250	Hosp	1.73	449.82	86.45

Table A-2. Condition # 2 Water Model Demand Node Pressure (MDD = 166 GPM)						
ID	Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
167	J-68	351.3	Hosp	2.96	449.82	42.63
282	J-93	351.16	Hosp	2.96	449.83	42.69
165	J-67	345	Hosp	2.96	449.81	45.35
279	J-92	341	Hosp	2.96	449.83	47.08
163	J-66	340	Hosp	2.96	449.74	47.48
179	J-74	340	Hosp	2.96	449.75	47.49
264	J-88	326.5	Hosp	2.96	449.72	53.31
136	J-54	319	Hosp	2.96	449.67	56.54
130	J-51	318	Hosp	2.96	449.67	56.97
128	J-50	318	Hosp	2.96	449.67	56.97
132	J-52	318	Hosp	2.96	449.67	56.97
134	J-53	318	Hosp	2.96	449.67	56.97
126	J-49	312	Hosp	2.96	449.67	59.56
122	J-47	312	Hosp	2.96	449.67	59.57
124	J-48	312	Hosp	2.96	449.68	59.57
205	J-84	303	Hosp	2.96	449.67	63.46
203	J-83	302	Hosp	2.96	449.67	63.89
184	J-76	301	Hosp	2.96	449.67	64.32
120	J-46	300	Hosp	2.96	449.67	64.75
182	J-75	300	Hosp	2.96	449.68	64.76
140	J-56	300	Hosp	2.96	449.68	64.76
160	J-65	298	Hosp	2.96	449.67	65.62
138	J-55	298	Hosp	2.96	449.67	65.62
158	J-64	296	Hosp	2.96	449.67	66.48
156	J-63	295	Hosp	2.96	449.67	66.92
271	J-90	289.49	Hosp	2.96	449.67	69.3
154	J-62	288	Hosp	2.96	449.67	69.94
152	J-61	287	Hosp	2.96	449.66	70.38
114	J-43	285	Hosp	2.96	449.66	71.24
185	J-77	283	Hosp	2.96	449.67	72.11
187	J-78	283	Hosp	2.96	449.67	72.11
112	J-42	280	Hosp	2.96	449.66	73.41
116	J-44	277	Hosp	2.96	449.67	74.7
267	J-89	277	Hosp	2.96	449.67	74.7
110	J-41	275	Hosp	2.96	449.66	75.57
84	J-28	275	Hosp	2.96	449.69	75.58
102	J-37	272	Hosp	2.96	449.66	76.87
104	J-38	272	Hosp	2.96	449.66	76.87
249	J-86	272	Hosp	2.96	449.66	76.87
100	J-36	272	Hosp	2.96	449.66	76.87
98	J-35	272	Hosp	2.96	449.66	76.87
96	J-34	272	Hosp	2.96	449.66	76.87
260	J-87	271	Hosp	2.96	449.67	77.3
106	J-39	270	Hosp	2.96	449.66	77.73
148	J-60	270	Hosp	2.96	449.66	77.73
108	J-40	267	Hosp	2.96	449.66	79.03
146	J-59	265	Hosp	2.96	449.66	79.89
82	J-27	265	Hosp	2.96	449.69	79.91
92	J-32	264	Hosp	2.96	449.67	80.33
94	J-33	262	Hosp	2.96	449.66	81.19
90	J-31	261	Hosp	2.96	449.67	81.63

Table A-2. Condition # 2 Water Model Demand Node Pressure (MDD = 166 GPM)						
88	J-30	261	Hosp	2.96	449.67	81.63
86	J-29	261	Hosp	2.96	449.68	81.63
142	J-57	260.8	Hosp	2.96	449.66	81.71
144	J-58	260	Hosp	2.96	449.66	82.06
200	J-82	250	Hosp	2.96	449.66	86.39

Table A-3. Condition # 3 Water Model Demand Node Pressure (MDD = 329 GPM)						
ID	Label	Elevation (ft)	Zone	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
167	J-68	351.3	Hosp	5.875	449.46	42.47
282	J-93	351.16	Hosp	5.875	449.49	42.54
165	J-67	345	Hosp	5.875	449.43	45.18
279	J-92	341	Hosp	5.875	449.48	46.93
163	J-66	340	Hosp	5.875	449.23	47.26
179	J-74	340	Hosp	5.875	449.27	47.27
264	J-88	326.5	Hosp	5.875	449.16	53.07
136	J-54	319	Hosp	5.875	449.02	56.26
130	J-51	318	Hosp	5.875	449.02	56.69
132	J-52	318	Hosp	5.875	449.02	56.69
128	J-50	318	Hosp	5.875	449.02	56.69
134	J-53	318	Hosp	5.875	449.02	56.69
126	J-49	312	Hosp	5.875	449.03	59.29
122	J-47	312	Hosp	5.875	449.03	59.29
124	J-48	312	Hosp	5.875	449.04	59.29
205	J-84	303	Hosp	5.875	449.02	63.18
203	J-83	302	Hosp	5.875	449.02	63.61
184	J-76	301	Hosp	5.875	449.02	64.04
120	J-46	300	Hosp	5.875	449.02	64.47
182	J-75	300	Hosp	5.875	449.03	64.48
140	J-56	300	Hosp	5.875	449.03	64.48
160	J-65	298	Hosp	5.875	449.02	65.34
138	J-55	298	Hosp	5.875	449.03	65.34
158	J-64	296	Hosp	5.875	449.01	66.2
156	J-63	295	Hosp	5.875	449.01	66.63
271	J-90	289.49	Hosp	5.875	449.02	69.02
154	J-62	288	Hosp	5.875	449.01	69.66
152	J-61	287	Hosp	5.875	449	70.09
114	J-43	285	Hosp	5.875	449	70.96
185	J-77	283	Hosp	5.875	449.02	71.83
187	J-78	283	Hosp	5.875	449.02	71.83
112	J-42	280	Hosp	5.875	449	73.12
116	J-44	277	Hosp	5.875	449	74.42
267	J-89	277	Hosp	5.875	449.01	74.42
110	J-41	275	Hosp	5.875	449	75.28
84	J-28	275	Hosp	5.875	449.25	75.39
104	J-38	272	Hosp	5.875	448.99	76.58
249	J-86	272	Hosp	5.875	448.99	76.58
102	J-37	272	Hosp	5.875	448.99	76.58
100	J-36	272	Hosp	5.875	448.99	76.58
98	J-35	272	Hosp	5.875	448.99	76.58
96	J-34	272	Hosp	5.875	449	76.58
260	J-87	271	Hosp	5.875	449.02	77.02
106	J-39	270	Hosp	5.875	448.99	77.44
148	J-60	270	Hosp	5.875	449	77.44
108	J-40	267	Hosp	5.875	448.99	78.74
146	J-59	265	Hosp	5.875	449	79.61
82	J-27	265	Hosp	5.875	449.25	79.71
92	J-32	264	Hosp	5.875	449.02	80.05
94	J-33	262	Hosp	5.875	449.01	80.91
90	J-31	261	Hosp	5.875	449.03	81.35

Table A-3. Condition # 3 Water Model Demand Node Pressure (MDD = 329 GPM)						
88	J-30	261	Hosp	5.875	449.07	81.37
86	J-29	261	Hosp	5.875	449.1	81.38
142	J-57	260.8	Hosp	5.875	449	81.43
144	J-58	260	Hosp	5.875	449	81.77
200	J-82	250	Hosp	5.875	449	86.1

Appendix B

Table B-1. Condition # 1 Fire Flow Results (Maximum Day Demand = 97 gpm)

ID	Label	Hydrant Status	Include Lateral Loss?	Lateral Length (ft)	Elevation (ft)	Zone	Hydraulic Grade (ft)	Pressure (psi)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Pressure (Calculated Residual) (psi)	Satisfies Fire Flow Con-straints?	Junction w/ Minimum Pres-sure (Zone @ Total Flow Needed)
211	H-1	Open	TRUE	20	365	Hosp	449.91	36.74	2,336	1000	20	TRUE	J-72
217	H-2	Open	TRUE	20	356	Hosp	449.91	40.63	2,346	1000	20	TRUE	J-85
219	H-3	Open	TRUE	20	318	Hosp	449.83	57.04	2,813	1000	20.01	TRUE	J-72
221	H-4	Open	TRUE	20	295	Hosp	449.82	66.98	3,011	1000	20.01	TRUE	J-72
222	H-5	Open	TRUE	20	291	Hosp	449.82	68.71	3,201	1000	20.01	TRUE	J-72
224	H-6	Open	TRUE	20	324	Hosp	449.83	54.44	2,550	1000	20.01	TRUE	H-1
226	H-7	Open	TRUE	20	303	Hosp	449.83	63.53	3,136	1000	20.01	TRUE	J-72
228	H-8	Open	TRUE	20	322	Hosp	449.83	55.3	2,572	1000	20.01	TRUE	J-72
230	H-9	Open	TRUE	20	283	Hosp	449.82	72.18	3,238	1000	20.01	TRUE	J-72
232	H-10	Open	TRUE	20	293	Hosp	449.82	67.85	3,075	1000	20.01	TRUE	J-72
234	H-11	Open	TRUE	20	295	Hosp	449.82	66.98	3,116	1000	20.01	TRUE	J-72
236	H-12	Open	TRUE	20	303	Hosp	449.83	63.52	3,004	1000	20.01	TRUE	J-72
238	H-13	Open	TRUE	20	321	Hosp	449.83	55.74	2,753	1000	20.01	TRUE	J-72
240	H-14	Open	TRUE	20	308	Hosp	449.82	61.36	2,901	1000	20.01	TRUE	J-72
242	H-15	Open	TRUE	20	267	Hosp	449.82	79.1	3,407	1000	20.01	TRUE	J-72
244	H-16	Open	TRUE	20	262	Hosp	449.82	81.26	3,378	1000	20.01	TRUE	J-72
246	H-17	Open	TRUE	20	277	Hosp	449.82	74.77	2,771	1000	20.01	TRUE	J-72
248	H-18	Open	TRUE	20	272	Hosp	449.82	76.93	3,019	1000	20.01	TRUE	J-72
253	H-19	Open	TRUE	20	276	Hosp	449.82	75.2	2,989	1000	20.01	TRUE	H-1
255	H-20	Open	TRUE	20	267	Hosp	449.82	79.1	3,202	1000	20.01	TRUE	J-72
259	H-21	Open	TRUE	20	276	Hosp	449.82	75.2	3,425	1000	20.01	TRUE	J-72
285	H-22	Open	TRUE	20	355	Hosp	449.91	41.06	2,463	1000	20	TRUE	J-85
287	H-23	Open	TRUE	20	330	Hosp	449.85	51.85	2,687	1000	20.01	TRUE	J-72

Table B-2. Condition # 2 Fire Flow Results (Maximum Day Demand = 166 gpm)

ID	Label	Hydrant Status	Include Lateral Loss?	Lateral Length (ft)	Elevation (ft)	Zone	Hydraulic Grade (ft)	Pressure (psi)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Pressure (Calculated Residual) (psi)	Satisfies Fire Flow Constraints?	Junction w/ Minimum Pressure (Zone @ Total Flow Needed)
211	H-1	Open	TRUE	20	365	Hosp	449.84	36.7	2,299	1000	20	TRUE	J-72
217	H-2	Open	TRUE	20	356	Hosp	449.82	40.59	2,314	1000	20	TRUE	J-85
219	H-3	Open	TRUE	20	318	Hosp	449.67	56.97	2,771	1000	20	TRUE	J-72
221	H-4	Open	TRUE	20	295	Hosp	449.67	66.92	2,972	1000	20	TRUE	J-72
222	H-5	Open	TRUE	20	291	Hosp	449.67	68.65	3,159	1000	20	TRUE	J-72
224	H-6	Open	TRUE	20	324	Hosp	449.67	54.37	2,510	1000	20	TRUE	H-1
226	H-7	Open	TRUE	20	303	Hosp	449.67	63.46	3,091	1000	20	TRUE	H-1
228	H-8	Open	TRUE	20	322	Hosp	449.67	55.24	2,533	1000	20	TRUE	J-72
230	H-9	Open	TRUE	20	283	Hosp	449.67	72.11	3,197	1000	20	TRUE	J-72
232	H-10	Open	TRUE	20	293	Hosp	449.66	67.78	3,034	1000	20	TRUE	J-72
234	H-11	Open	TRUE	20	295	Hosp	449.67	66.92	3,074	1000	20	TRUE	J-72
236	H-12	Open	TRUE	20	303	Hosp	449.67	63.46	2,962	1000	20	TRUE	J-72
238	H-13	Open	TRUE	20	321	Hosp	449.67	55.67	2,710	1000	20	TRUE	J-72
240	H-14	Open	TRUE	20	308	Hosp	449.67	61.29	2,860	1000	20	TRUE	H-1
242	H-15	Open	TRUE	20	267	Hosp	449.67	79.03	3,370	1000	20	TRUE	J-72
244	H-16	Open	TRUE	20	262	Hosp	449.66	81.19	3,340	1000	20	TRUE	J-72
246	H-17	Open	TRUE	20	277	Hosp	449.66	74.7	2,740	1000	20	TRUE	J-72
248	H-18	Open	TRUE	20	272	Hosp	449.66	76.87	2,984	1000	20	TRUE	J-72
253	H-19	Open	TRUE	20	276	Hosp	449.66	75.13	2,954	1000	20	TRUE	J-72
255	H-20	Open	TRUE	20	267	Hosp	449.66	79.03	3,164	1000	20	TRUE	J-72
259	H-21	Open	TRUE	20	276	Hosp	449.67	75.14	3,383	1000	20	TRUE	J-72
285	H-22	Open	TRUE	20	355	Hosp	449.83	41.03	2,430	1000	20	TRUE	J-85
287	H-23	Open	TRUE	20	330	Hosp	449.72	51.8	2,647	1000	20	TRUE	J-72

Table B-3. Condition # 3 Fire Flow Results (Maximum Day Demand = 329 gpm)

ID	Label	Hydrant Status	Include Lateral Loss?	Lateral Length (ft)	Elevation (ft)	Zone	Hydraulic Grade (ft)	Pressure (psi)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Pressure (Calculated Residual) (psi)	Satisfies Fire Flow Constraints?	Junction w/ Minimum Pressure (Zone @ Total Flow Needed)
211	H-1	Open	TRUE	20	365	Hosp	449.51	36.56	2,210	1000	20	TRUE	J-72
217	H-2	Open	TRUE	20	356	Hosp	449.46	40.44	2,236	1000	20	TRUE	J-85
219	H-3	Open	TRUE	20	318	Hosp	449.03	56.69	2,669	1000	20	TRUE	J-72
221	H-4	Open	TRUE	20	295	Hosp	449.02	66.64	2,879	1000	20	TRUE	H-1
222	H-5	Open	TRUE	20	291	Hosp	449.02	68.37	3,059	1000	20	TRUE	H-1
224	H-6	Open	TRUE	20	324	Hosp	449.02	54.09	2,416	1000	20	TRUE	J-72
226	H-7	Open	TRUE	20	303	Hosp	449.03	63.18	2,983	1000	20	TRUE	J-72
228	H-8	Open	TRUE	20	322	Hosp	449.02	54.96	2,439	1000	20	TRUE	J-72
230	H-9	Open	TRUE	20	283	Hosp	449	71.82	3,097	1000	20	TRUE	J-72
232	H-10	Open	TRUE	20	293	Hosp	449	67.5	2,935	1000	20	TRUE	J-72
234	H-11	Open	TRUE	20	295	Hosp	449.01	66.63	2,973	1000	20	TRUE	J-72
236	H-12	Open	TRUE	20	303	Hosp	449.02	63.18	2,862	1000	20	TRUE	J-72
238	H-13	Open	TRUE	20	321	Hosp	449.02	55.39	2,606	1000	20	TRUE	J-72
240	H-14	Open	TRUE	20	308	Hosp	449.02	61.01	2,761	1000	20	TRUE	H-1
242	H-15	Open	TRUE	20	267	Hosp	449.03	78.76	3,281	1000	20	TRUE	J-72
244	H-16	Open	TRUE	20	262	Hosp	449.01	80.91	3,249	1000	20	TRUE	J-72
246	H-17	Open	TRUE	20	277	Hosp	449	74.41	2,666	1000	20	TRUE	J-72
248	H-18	Open	TRUE	20	272	Hosp	448.99	76.58	2,900	1000	20	TRUE	J-72
253	H-19	Open	TRUE	20	276	Hosp	448.99	74.85	2,868	1000	20	TRUE	J-72
255	H-20	Open	TRUE	20	267	Hosp	448.99	78.74	3,075	1000	20	TRUE	J-72
259	H-21	Open	TRUE	20	276	Hosp	449.02	74.86	3,284	1000	20	TRUE	J-72
285	H-22	Open	TRUE	20	355	Hosp	449.49	40.88	2,350	1000	20	TRUE	J-85
287	H-23	Open	TRUE	20	330	Hosp	449.16	51.56	2,552	1000	20	TRUE	J-72

Appendix Q: Wastewater Analysis and Model

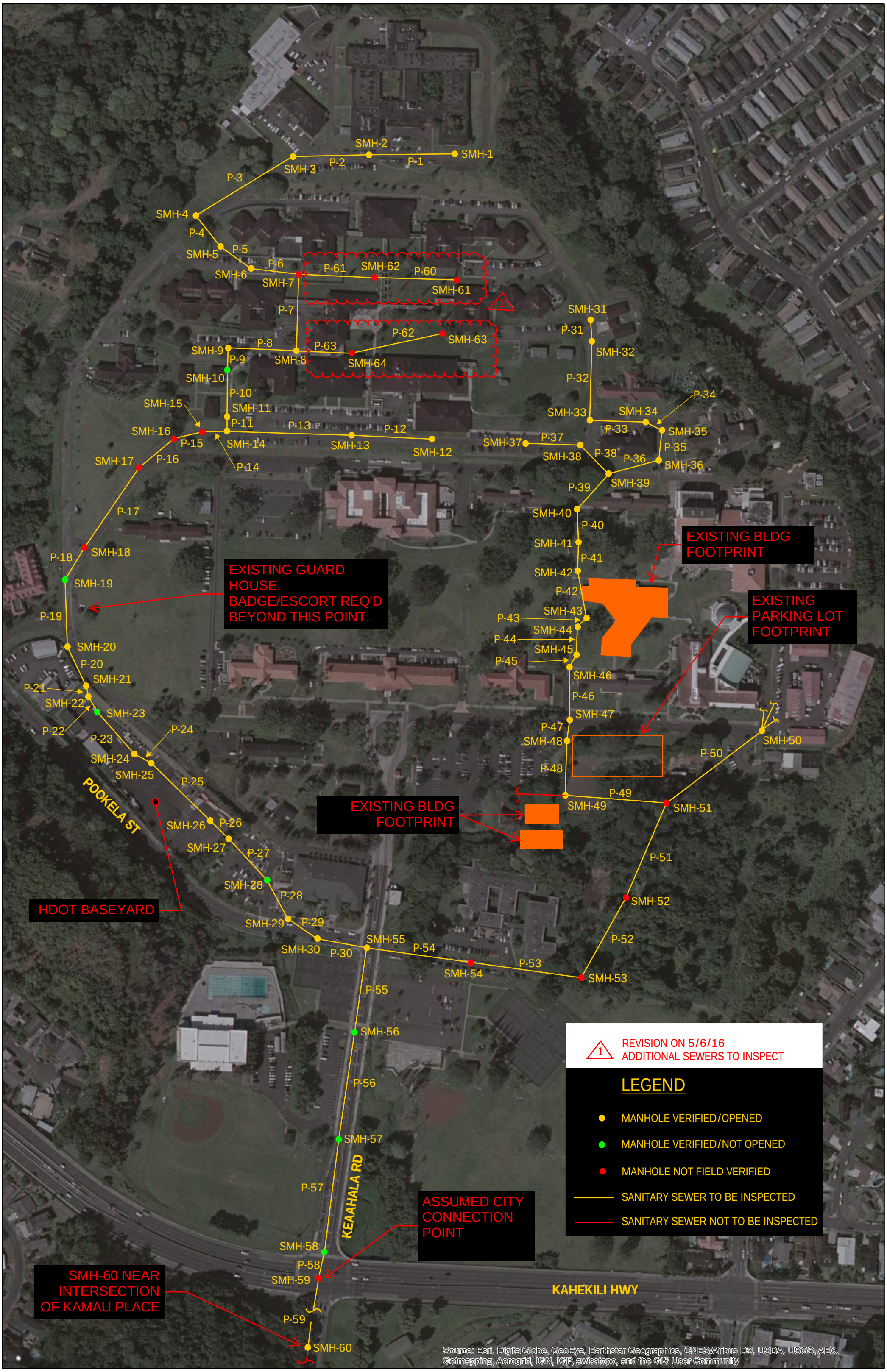
Hawai‘i State Hospital Sanitary Sewer and Manhole Map

Hawai‘i State Hospital Sanitary Sewer CCTV

Hawai‘i State Hospital Sewer System Map

Hawai‘i State Hospital Sewer Profiles

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.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SMH-51
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SMH-52
P-52
EXISTING BLDG FOOTPRINT
EXISTING GUARD HOUSE. BADGE/ESCORT REQ'D BEYOND THIS POINT.
EXISTING PARKING LOT FOOTPRINT
EXISTING BLDG FOOTPRINT
HDOT BASEYARD
ASSUMED CITY CONNECTION POINT
SMH-60 NEAR INTERSECTION OF KAMAU PLACE
1 REVISION ON 5/6/16 ADDITIONAL SEWERS TO INSPECT
LEGEND
MANHOLE VERIFIED/OPENED
MANHOLE VERIFIED/NOT OPENED
MANHOLE NOT FIELD VERIFIED
SANITARY SEWER TO BE INSPECTED
SANITARY SEWER NOT TO BE INSPECTED
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Hawaii State Hospital CCTV Status

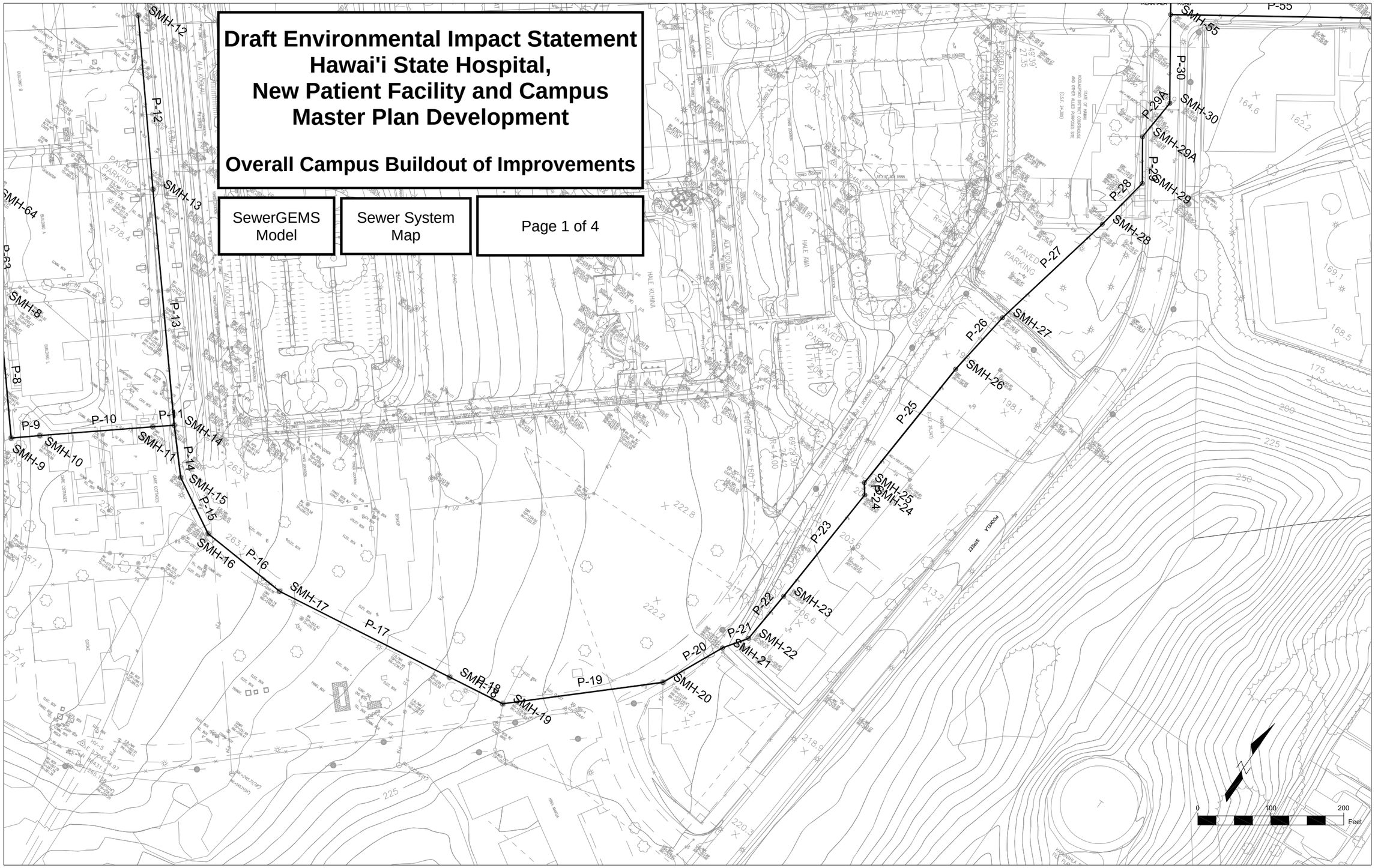
USMH Street	US Manhole	DSMH Street	DS Manhole	Sewer ID	Diameter	Material	Plan Length	CCTV Length	Direction	Comments	DVD DISK
Hawaii State Hospital	SMH 1		SMH 2	P 1	8	VCP	243	228.5	DS		Hawaii State Hospital CCTV #01
Hawaii State Hospital	SMH 2		SMH 3	P 2	8	VCP	215	213	DS	Unable to pass roots.	Hawaii State Hospital CCTV #01
	SMH 2	Hawaii State Hospital	SMH 3	P 2	8	VCP		1.1	US	Reached overlap point.	Hawaii State Hospital CCTV #01
Hawaii State Hospital	SMH 3		SMH 4	P 3	8	VCP	315	314.3	DS		Hawaii State Hospital CCTV #01
	SMH 4	Hawaii State Hospital	SMH 5	P 4	8	VCP	112	129.9	US		Hawaii State Hospital CCTV #01
	SMH 5	Hawaii State Hospital	SMH 6	P 5	8	VCP	106	94.2	US		Hawaii State Hospital CCTV #01
Hawaii State Hospital	SMH 6		SMH 7	P 6	8	VCP	136	135.5	DS		Hawaii State Hospital CCTV #01
Hawaii State Hospital	SMH 9		SMH 10	P 9	8	VCP	63	38	DS		Hawaii State Hospital CCTV #01
	SMH 61	Hawaii State Hospital	SMH 62	P 60	8	VCP	234	235	US	SMH-61 not field verified.	Hawaii State Hospital CCTV #02
	SMH 62	Hawaii State Hospital	SMH 7	P 61	8	VCP	215	203.4	US	SMH-62 not field verified.	Hawaii State Hospital CCTV #02
	SMH 7	Hawaii State Hospital	SMH 8	P 7	8	VCP	216	193.2	US	SMH-7 not found.	Hawaii State Hospital CCTV #02
Hawaii State Hospital	SMH 8		SMH 9	P 8	8	VCP	194	187.4	DS	SMH-8 Slightly surcharged on 4/22.	Hawaii State Hospital CCTV #02
Hawaii State Hospital	SMH 11		SMH 14	P 11	8	VCP	42	30	DS		Hawaii State Hospital CCTV #02
Hawaii State Hospital	SMH 10		SMH 11	P 10	8	VCP	132	157.1	DS	SMH-10 not opened in the field.	Hawaii State Hospital CCTV #03
Hawaii State Hospital	SMH 12		SMH 13	P 12	8	VCP	235	241.8	DS		Hawaii State Hospital CCTV #03
	SMH 13	Hawaii State Hospital	SMH 14	P 13	8	VCP	354	326.1	US		Hawaii State Hospital CCTV #03
Hawaii State Hospital	SMH 14		SMH 15	P 14	8	VCP	80	70.5	DS		Hawaii State Hospital CCTV #03
	SMH 63	Hawaii State Hospital	SMH 64	P 62	8	VCP	262	255.7	US	SMH-63 not field verified.	Hawaii State Hospital CCTV #03
Hawaii State Hospital	SMH 15		SMH 16	P 15	8	VCP	92	82.6	DS	SMH-15 thru SMH-18 not field verified.	Hawaii State Hospital CCTV #03
	SMH 64	Hawaii State Hospital	SMH 8	P 63	8	VCP	157	140.4	US	SMH-64 not field verified.	Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 16		SMH 17	P 16	8	VCP	125	125	DS		Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 17		SMH 18	P 17	8	VCP	277	266	DS		Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 18		SMH 19	P 18	8	VCP	86	84.2	DS		Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 19		SMH 20	P 19	8	VCP	237	223.2	DS		Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 20		SMH 21	P 20	8	VCP	123	93.5	DS		Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 33		SMH 34	P 33	8	PVC	158	160	DS		Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 34		SMH 35	P 34	8	PVC	52	34.4	DS		Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 37		SMH 38	P 37	6	VCP	162	186.1	DS		Hawaii State Hospital CCTV #04
Hawaii State Hospital	SMH 22		SMH 23	P 22	8	VCP	50	73	DS		Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 23		SMH 24	P 23	8	VCP	159	181.3	DS	SMH-23 not opened in the field.	Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 24		SMH 25	P 24	8	VCP	55	15.2	DS		Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 25		SMH 26	P 25	8	VCP	233	201.1	DS		Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 26		SMH 27	P 26	8	VCP	73	93.2	DS	Unable to pass line-right 50%.	Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 28		SMH 29	P 28	8	PVC	126	76.5	DS	SMH-28 not opened in the field.	Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 29		SMH 30	P 29	8	PVC	100	64	DS		Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 39		SMH 40	P 39	8	CP (NR)	134	135	DS		Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 40		SMH 41	P 40	8	RCP	93	65.1	DS		Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 41		SMH 42	P 41	8	RCP	80	107	DS		Hawaii State Hospital CCTV #05
Hawaii State Hospital	SMH 56		SMH 57	P 56	10	VCP	306	292.2	DS		Hawaii State Hospital CCTV #06
Hawaii State Hospital	SMH 42		SMH 43	P 42	8	PVC	135	123.1	DS		Hawaii State Hospital CCTV #06
Hawaii State Hospital	SMH 43		SMH 44	P 43	8	PVC	36	19	DS		Hawaii State Hospital CCTV #06
Hawaii State Hospital	SMH 44		SMH 45	P 44	8	RCP	79	110.2	DS	Reached a drop connection.	Hawaii State Hospital CCTV #06
Hawaii State Hospital	SMH 47		SMH 48	P 47	8	PVC	60	41.4	DS		Hawaii State Hospital CCTV #06
Hawaii State Hospital	SMH 48		SMH 49	P 48	8	PVC	155	146.9	DS		Hawaii State Hospital CCTV #06
	SMH 31	Hawaii State Hospital	SMH 32	P 31	8	PVC	61	58.5	US		Hawaii State Hospital CCTV #07
	SMH 32	Hawaii State Hospital	SMH 33	P 32	8	PVC	224	218.1	US		Hawaii State Hospital CCTV #07
Hawaii State Hospital	SMH 57		SMH 58	P 57	10	VCP	322	297.1	DS		Hawaii State Hospital CCTV #07
Hawaii State Hospital	SMH 58		SMH 59	P 58	10	VCP	76	279.3	DS	SMH-59 does not exist. Line stops at SMH-60 that's paved over.	Hawaii State Hospital CCTV #07
	SMH 21	Hawaii State Hospital	SMH 22	P 21	8	VCP	38	36.8	US	SMH-21 thru SMH-27 are on HDOT Baseyard parcel.	Hawaii State Hospital CCTV #07
	SMH 27	Hawaii State Hospital	SMH 28	P 27	8	PVC	160	185.1	US	SMH-27 is in vegetated area between HDOT Baseyard & courthouse parking lot.	Hawaii State Hospital CCTV #08
Hawaii State Hospital	SMH 55A		SMH 55	P 30	8	VCP	142	119.8	DS		Hawaii State Hospital CCTV #08
Hawaii State Hospital	SMH 30		SMH 55A	P 30	8	VCP		59.6	DS	Reached a new found sewer manhole 55A.	Hawaii State Hospital CCTV #08
	SMH 35	Hawaii State Hospital	SMH 36	P 35	8	VCP	85	90.9	US		Hawaii State Hospital CCTV #08
	SMH 36	Hawaii State Hospital	SMH 39	P 36	8	VCP	147	131.8	US		Hawaii State Hospital CCTV #08
	SMH 38	Hawaii State Hospital	SMH 39	P 38	6	VCP	115	120.1	US	Pipe diameter is 6".	Hawaii State Hospital CCTV #08
Hawaii State Hospital	SMH-45		SMH-47	P-45/P-46	8	PVC		178.7	DS	There was no SMH-46. Line went through SMH-47.	Hawaii State Hospital CCTV #08
	SMH 55	Hawaii State Hospital	SMH 56	P 55	10	VCP	242	275.1	US		Hawaii State Hospital CCTV #09
Hawaii State Hospital	SMH 50		SMH 51A	P 50	8	PVC		87	DS	Reached new found manhole SMH-51A.	Hawaii State Hospital CCTV #09
Hawaii State Hospital	SMH 49		SMH 51B	P 49	8	RCP	287	121	DS	Reached a new found manhole SMH-51B.	Hawaii State Hospital CCTV #09
Hawaii State Hospital	SMH-51B		SMH-51	P-49/P-51B	8	RCP		173.1	DS		Hawaii State Hospital CCTV #09
Hawaii State Hospital	SMH 51A		SMH 51	P 50	8	RCP	340	243.9	DS	Would like to know what's upstream of SMH-50 if possible.	Hawaii State Hospital CCTV #10
	SMH 51	Hawaii State Hospital	SMH 52	P 51	8	VCP	290	293.1	US	SMH-51 thru SMH-54 not found. Try access the sewers between these via SMHs 49, 50, or 55 if possible.	Hawaii State Hospital CCTV #10
	SMH 52	Hawaii State Hospital	SMH 53	P 52	8	VCP	260	256.2	US		Hawaii State Hospital CCTV #10
Hawaii State Hospital	SMH 53		SMH 54	P 53	8	VCP	316	292.2	DS		Hawaii State Hospital CCTV #10
Hawaii State Hospital	SMH 54		SMH 55	P 54	8	VCP	297	294.8	DS		Hawaii State Hospital CCTV #11
							Total LF =	10006.5			

Draft Environmental Impact Statement
Hawai'i State Hospital,
New Patient Facility and Campus Master Plan Development

Overall Campus Buildout of Improvements

SewerGEMS Model

Sewer System Map



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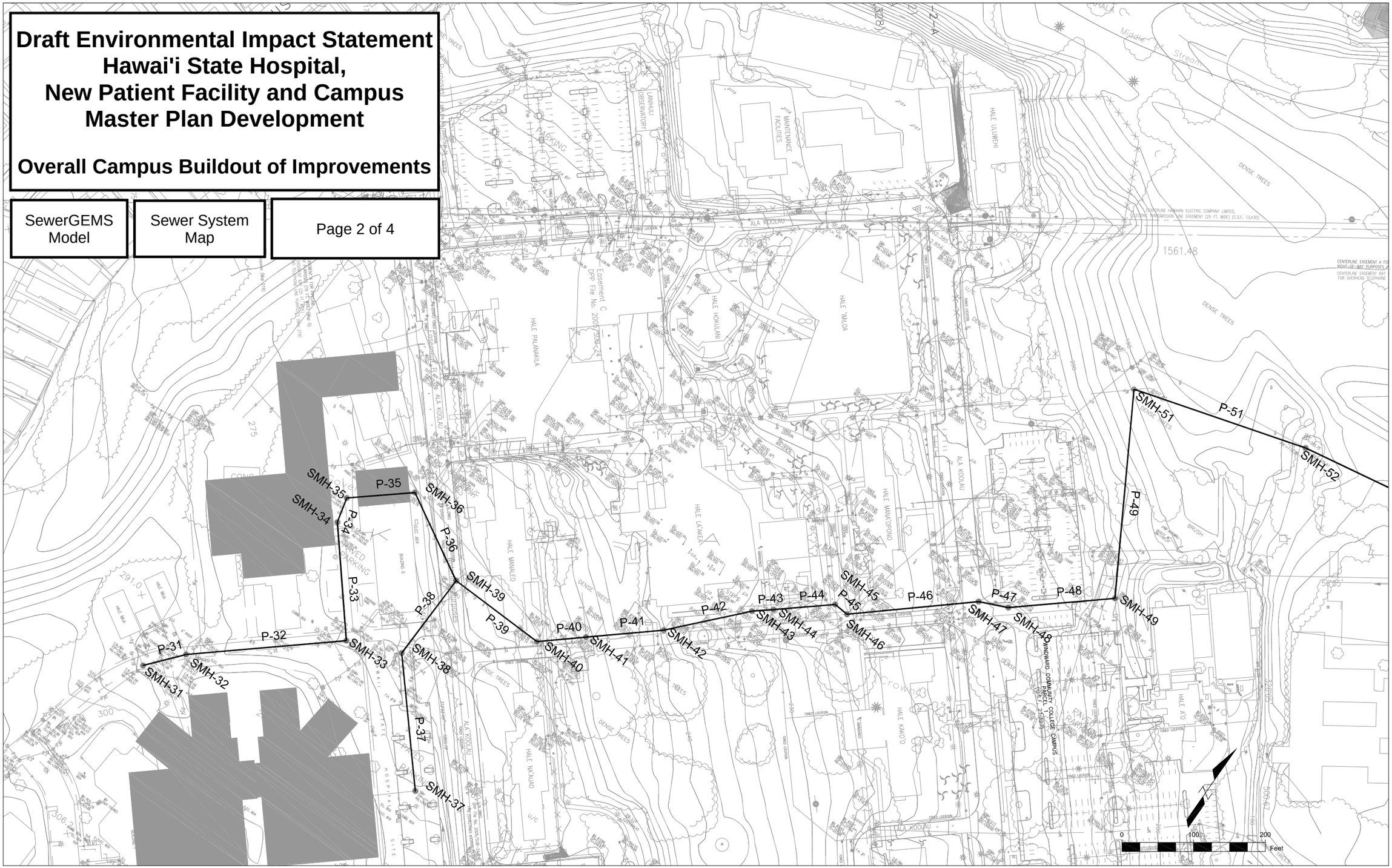

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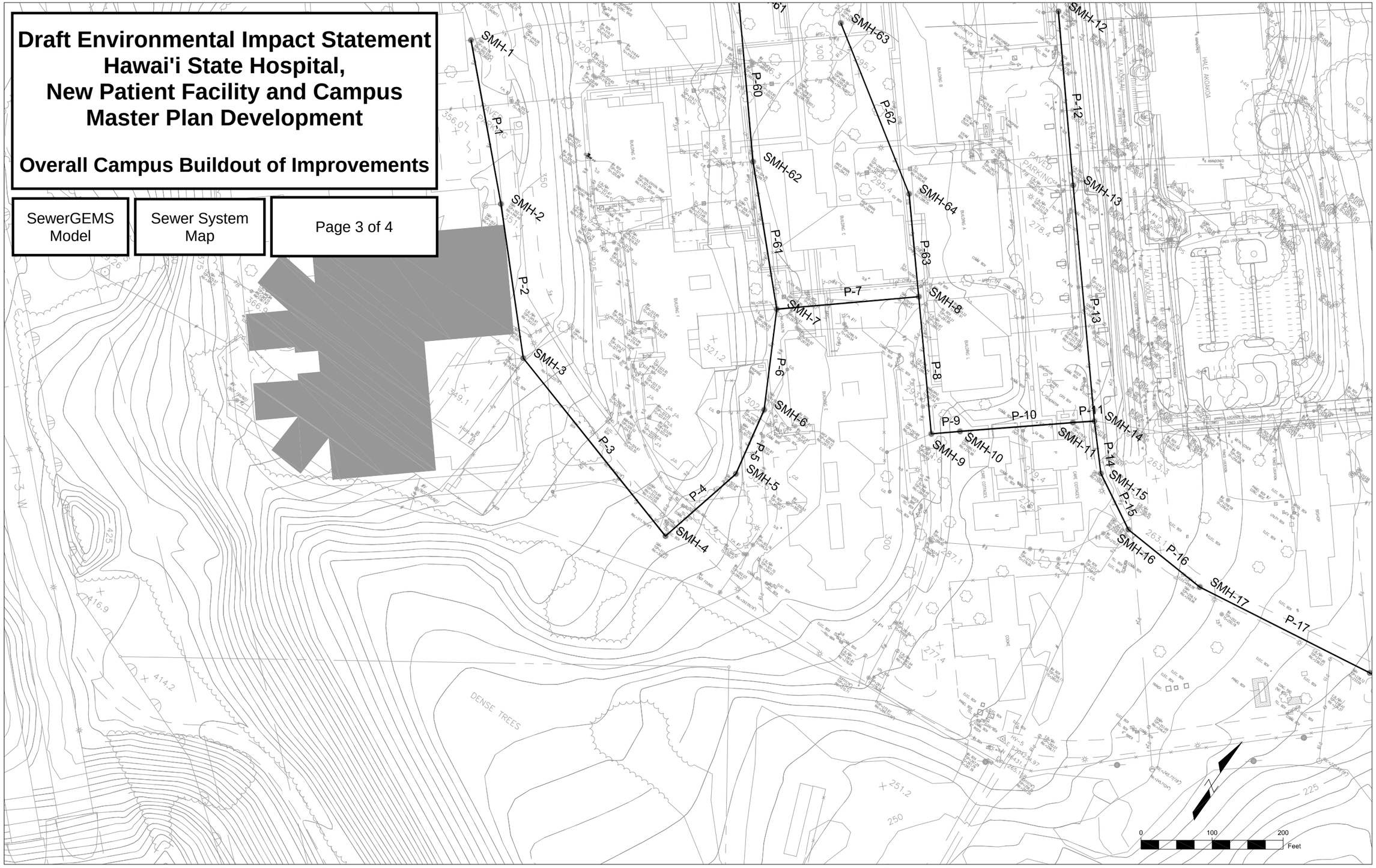

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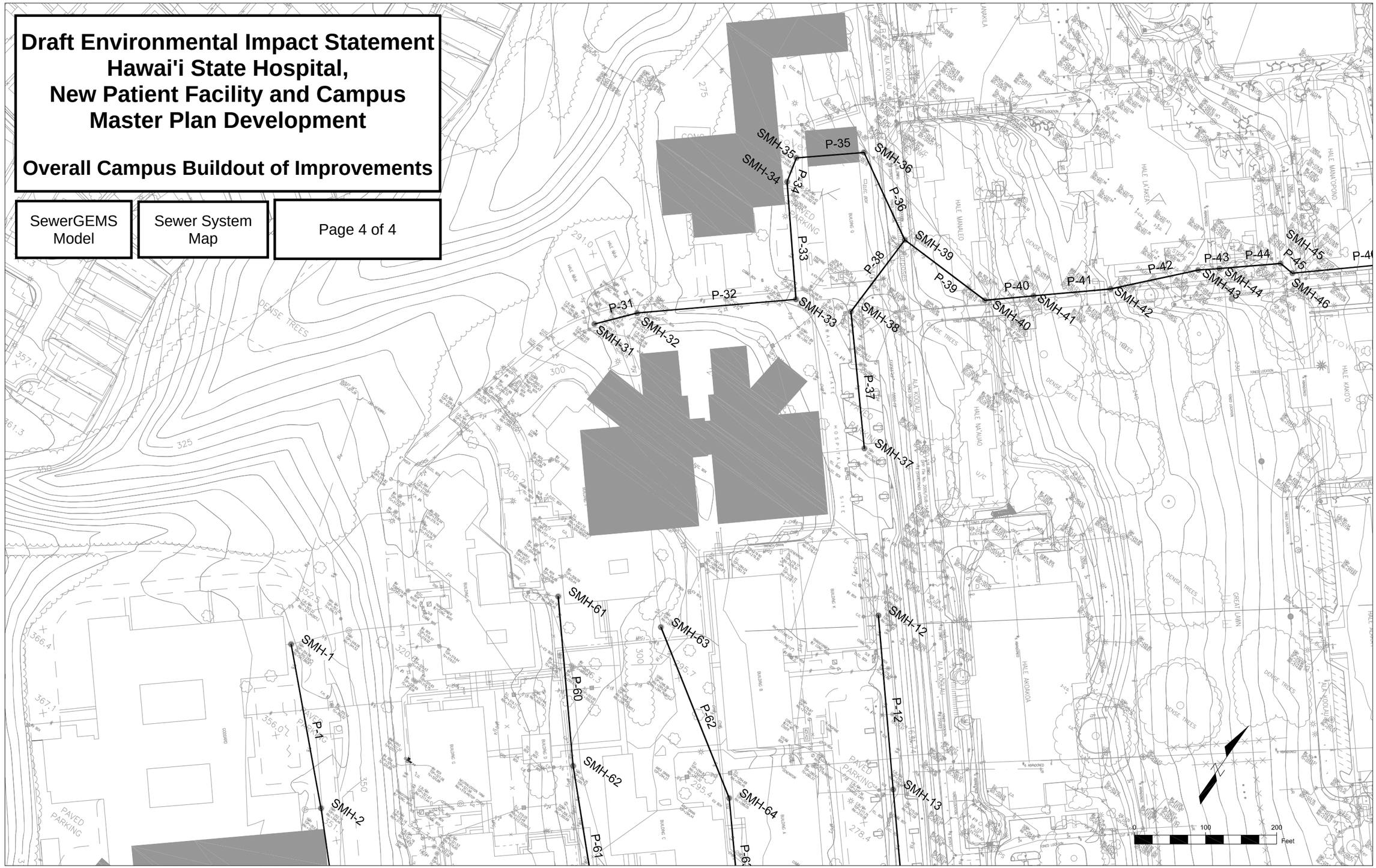

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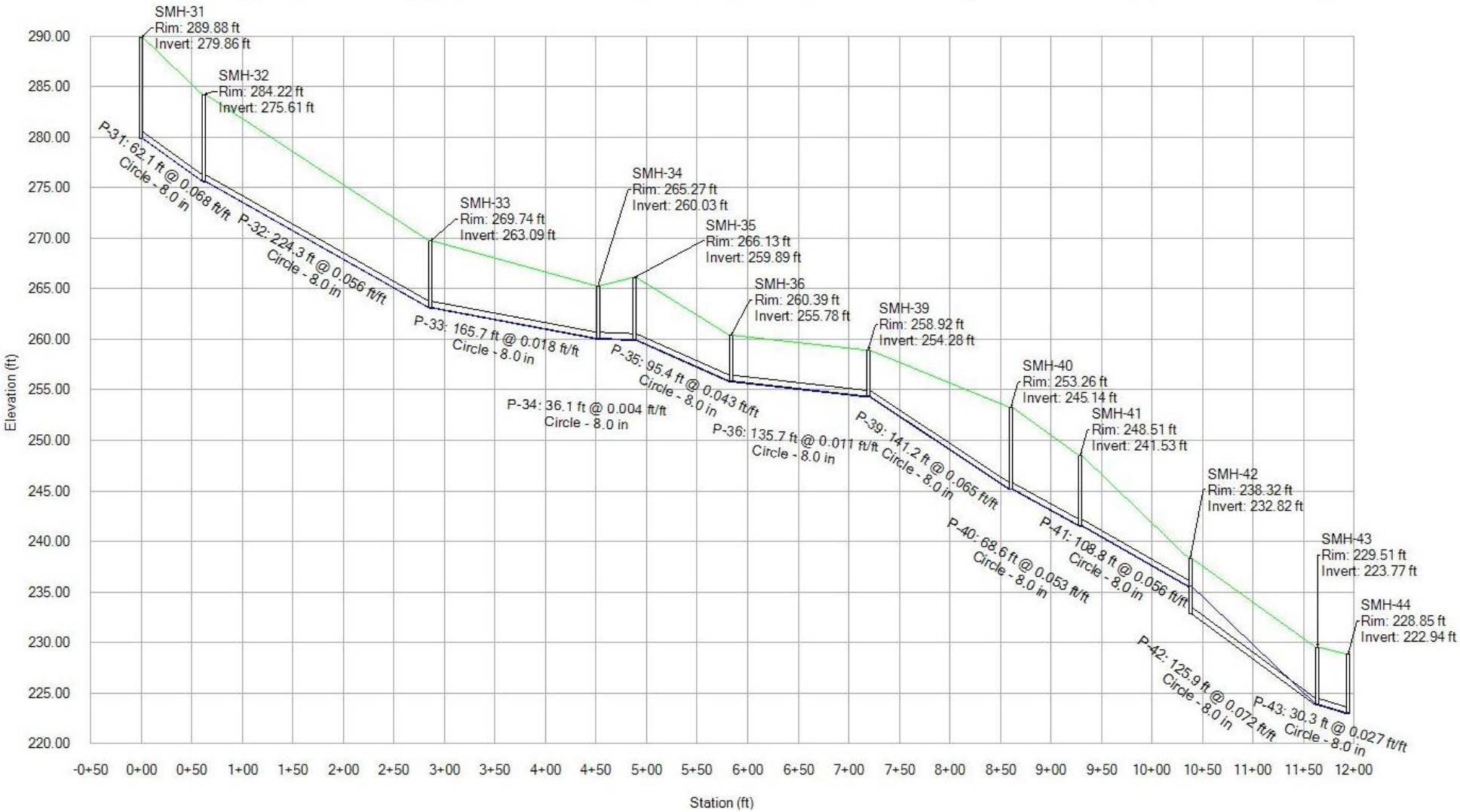

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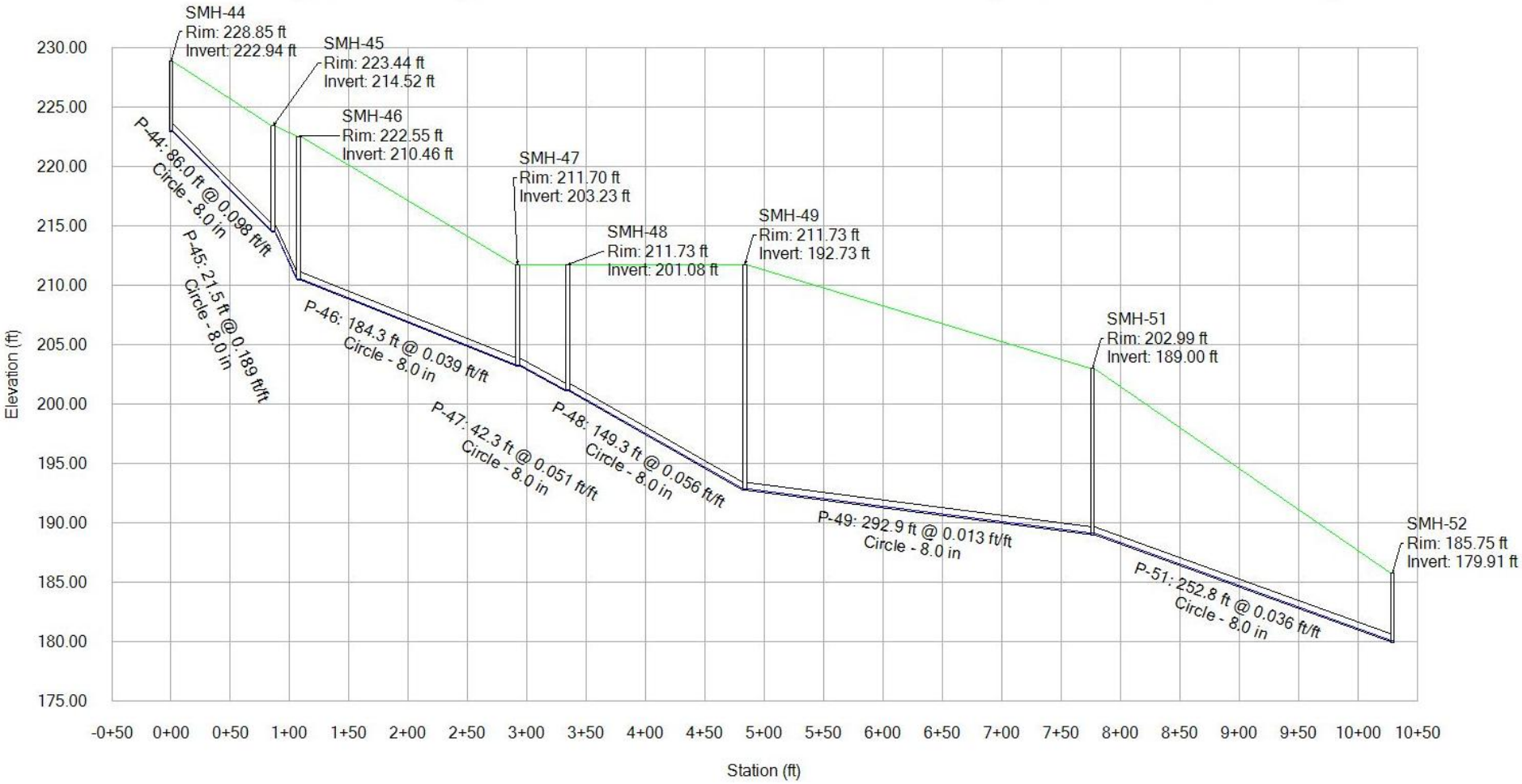

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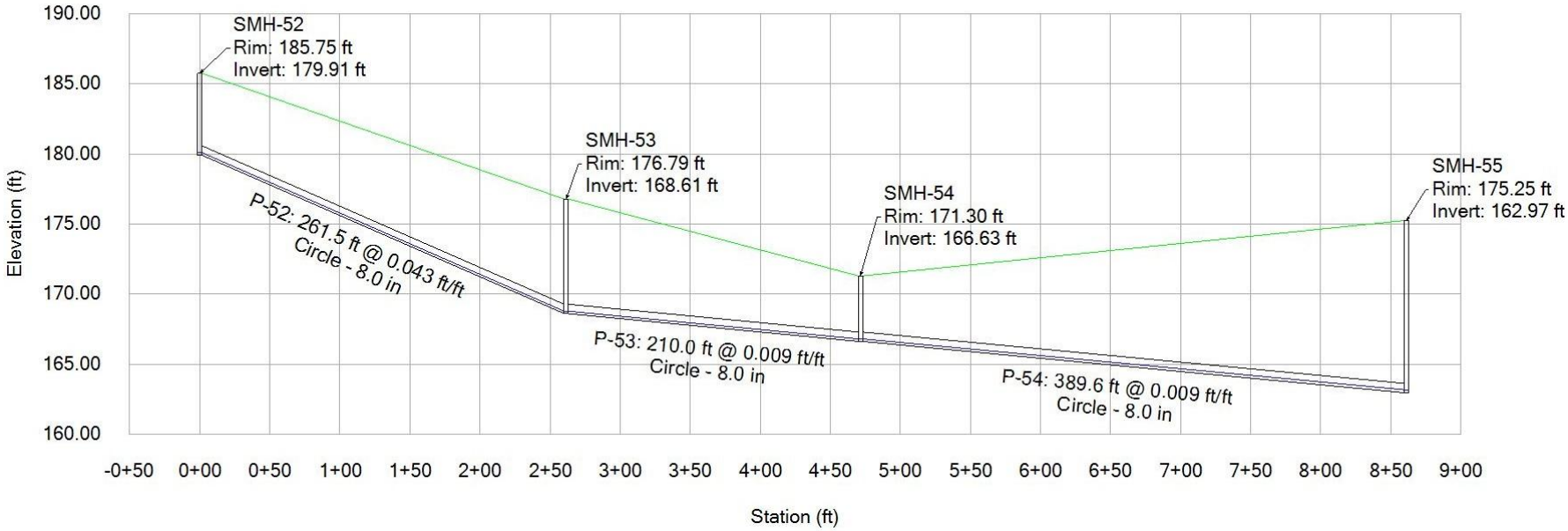

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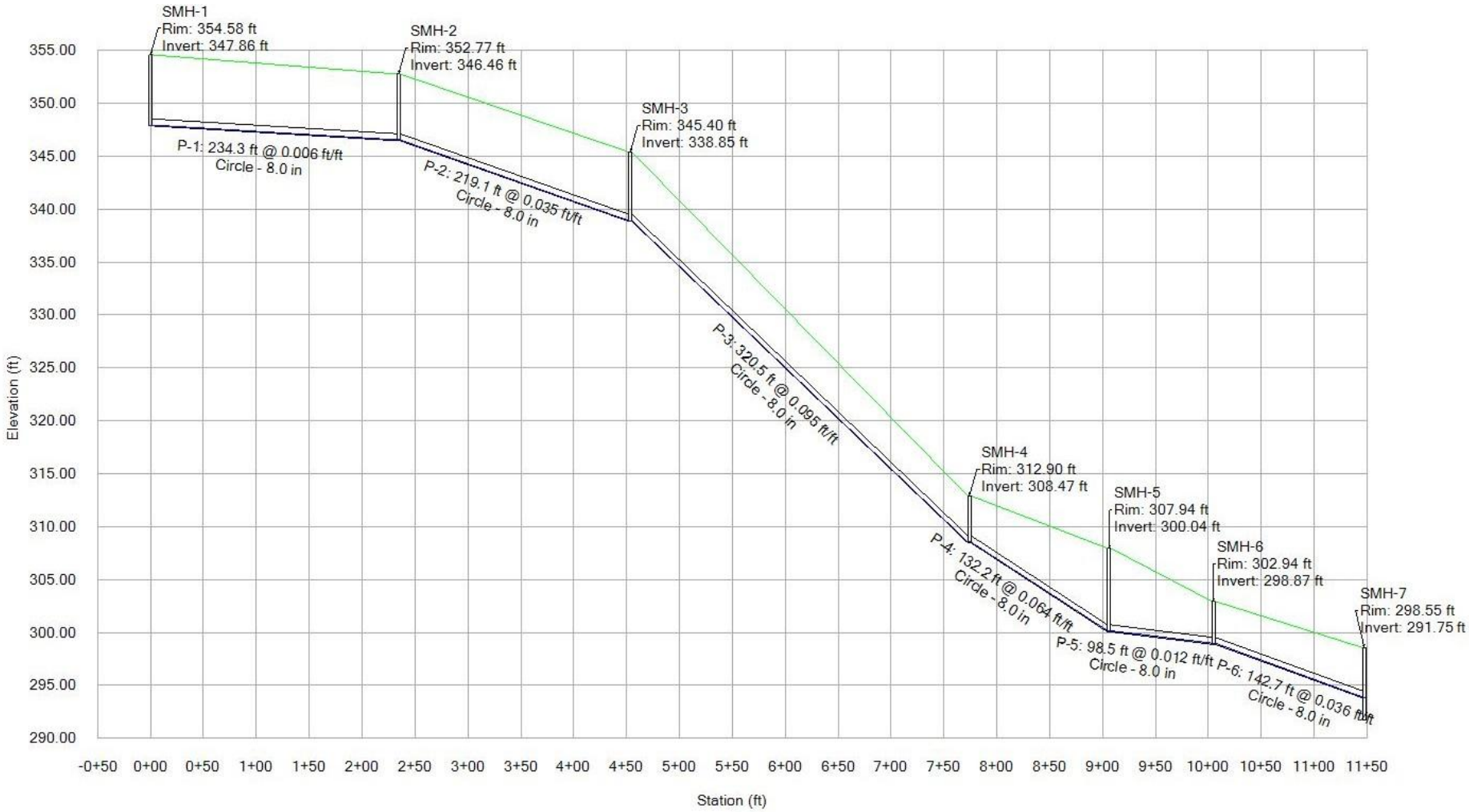

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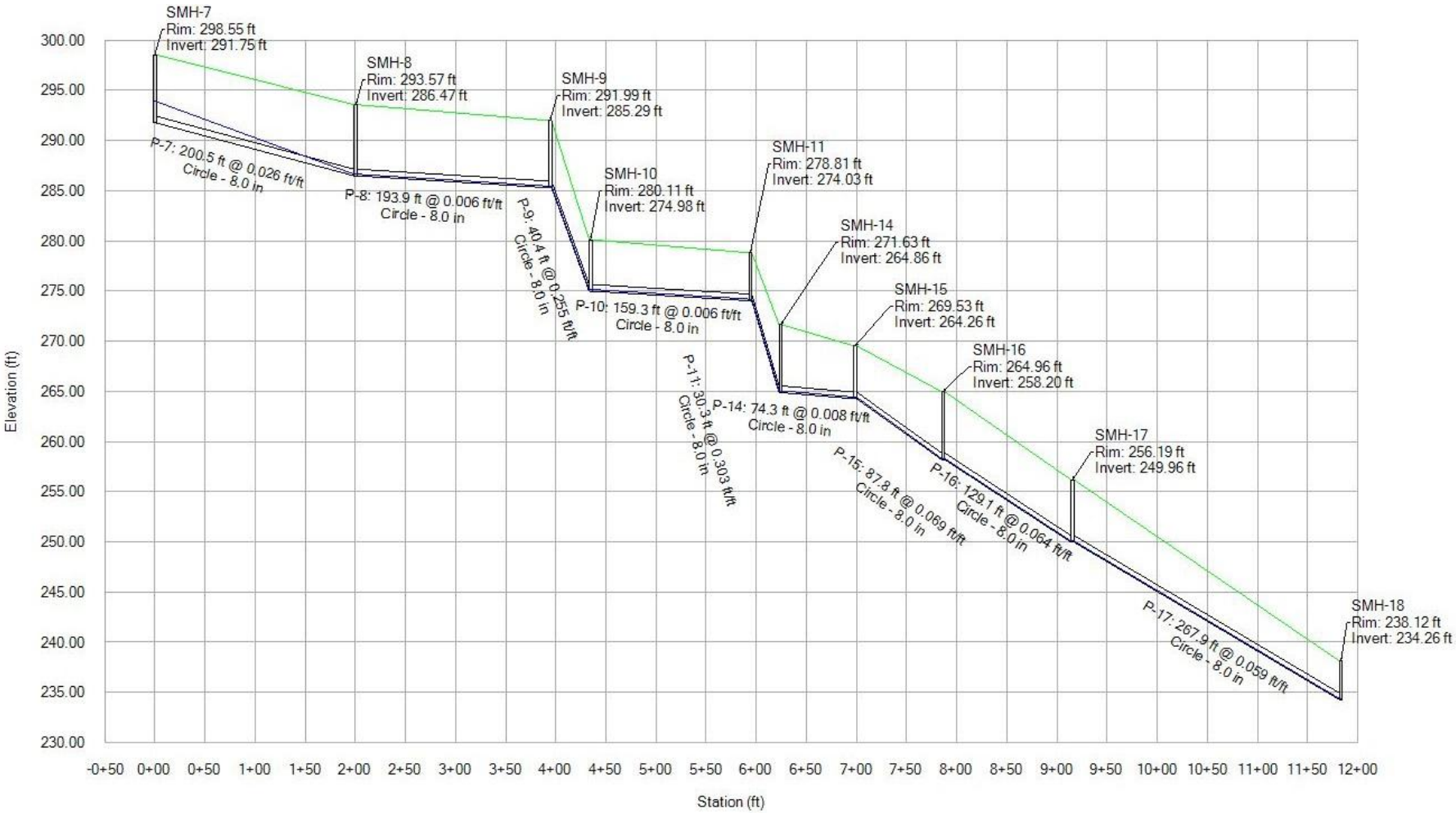

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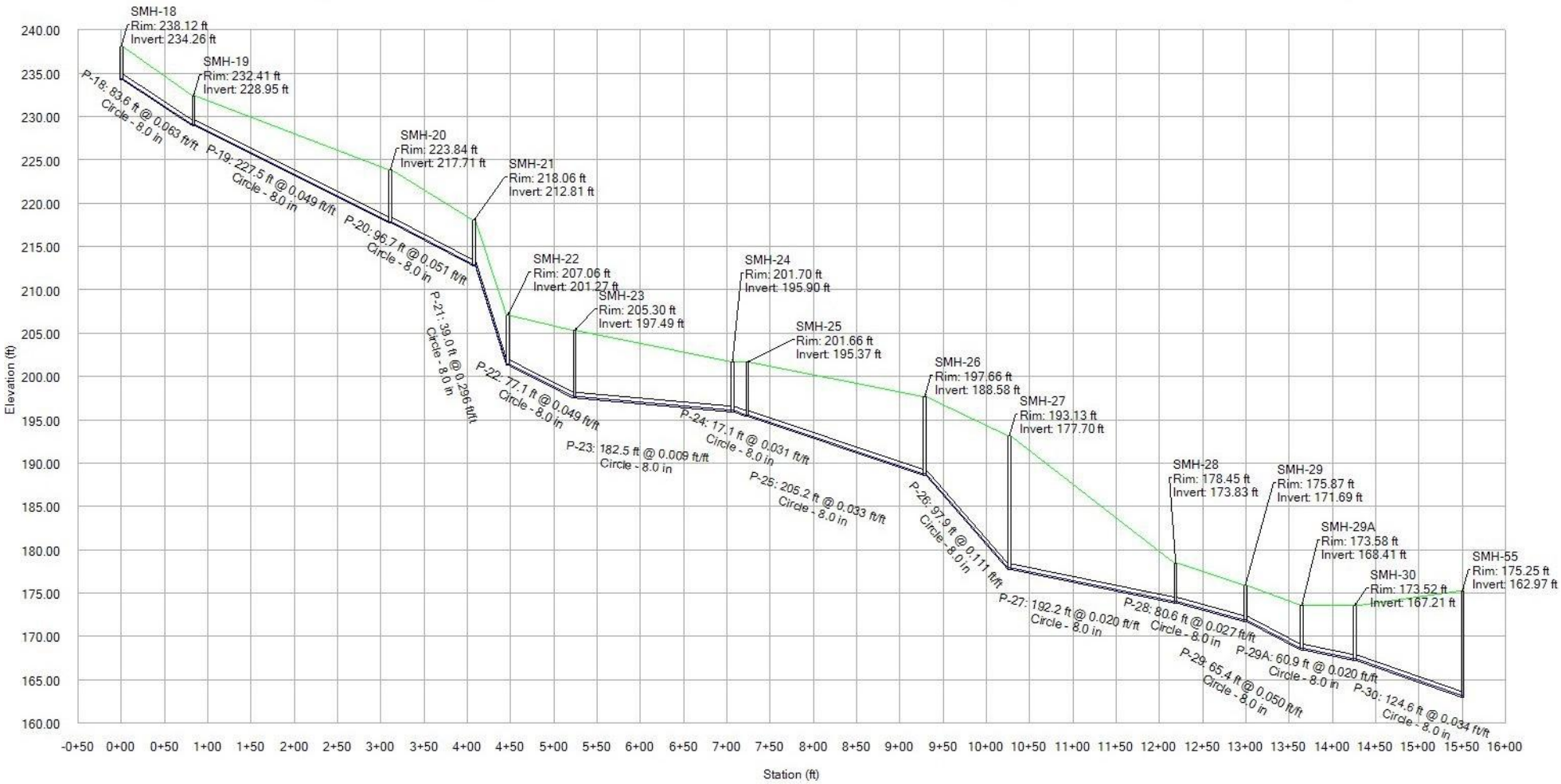

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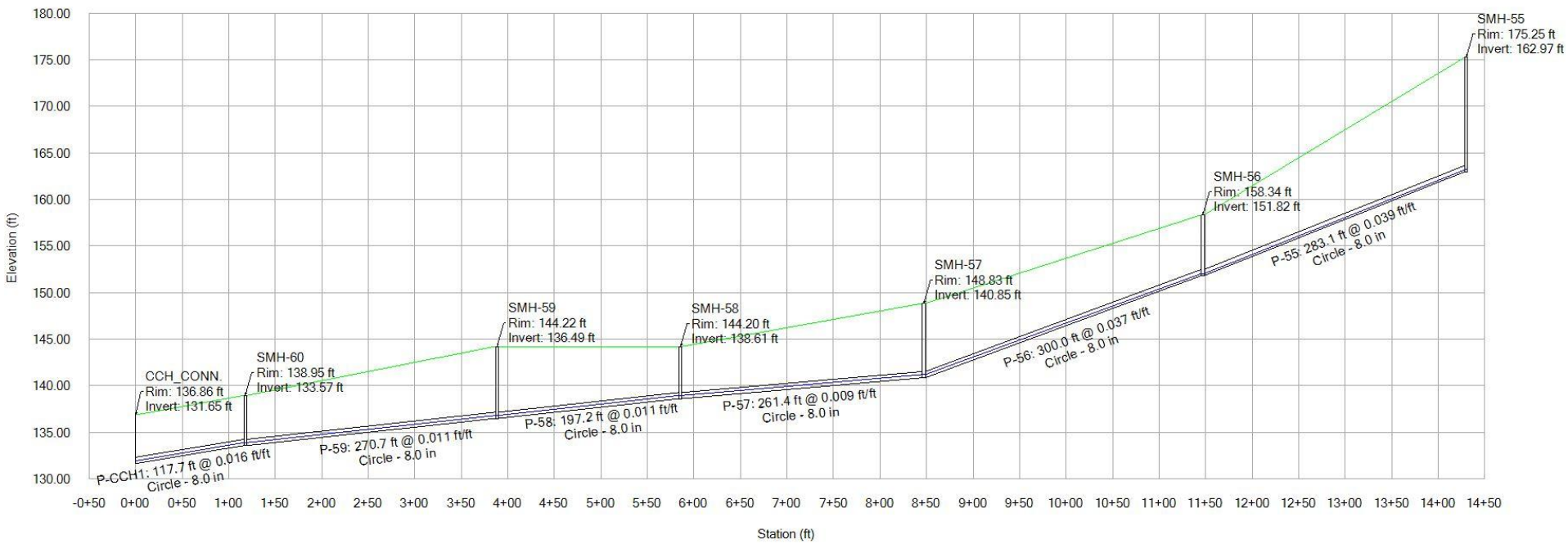

Appendix R: Stormwater Analysis and Model

Hawai‘i State Hospital Stormwater Map

Hawai‘i State Hospital Storm Drain CCTV

Hawai‘i State Hospital Stormwater System Map

Hawai‘i State Hospital Stormwater Profiles

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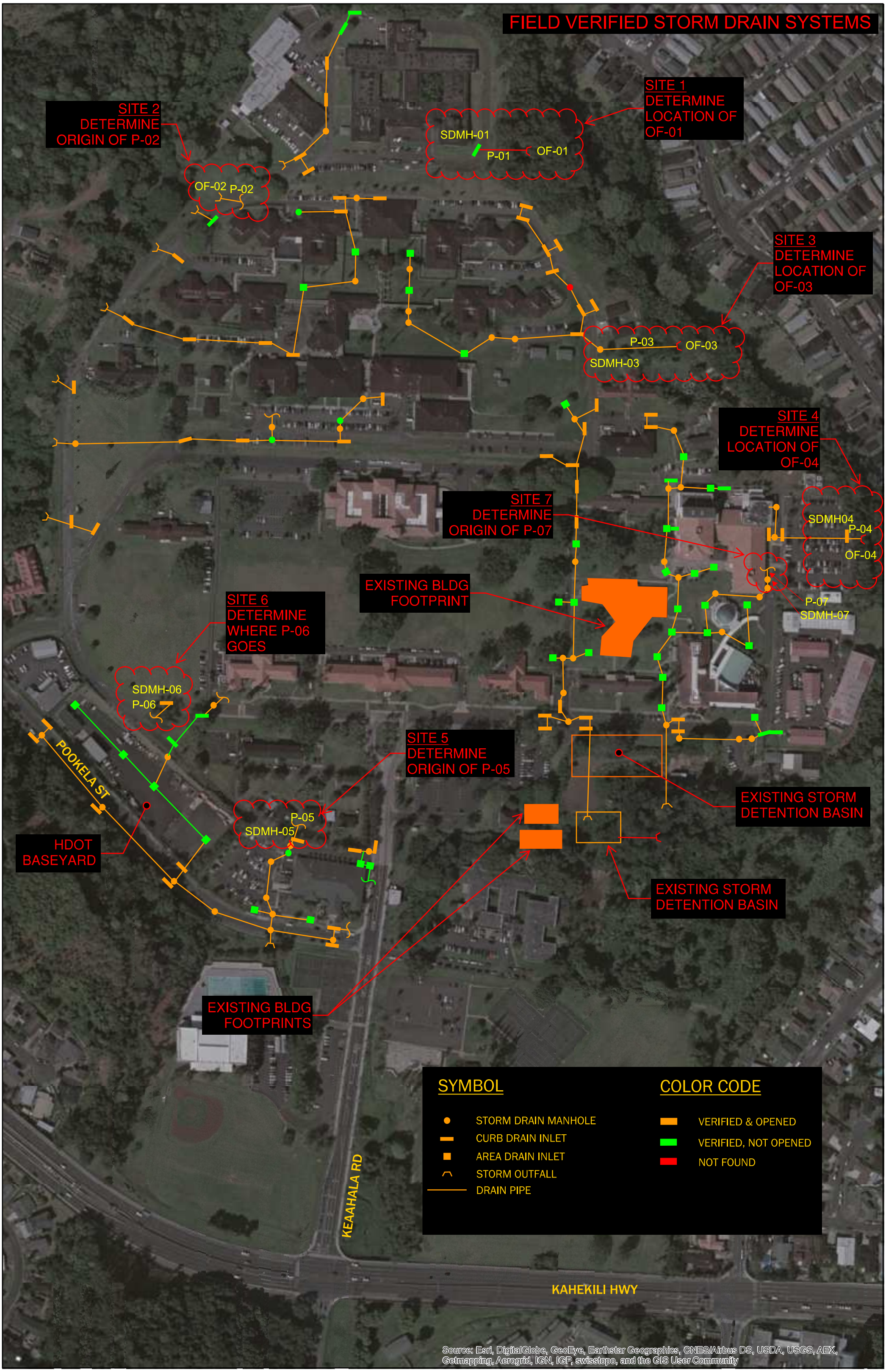
FIELD VERIFIED STORM DRAIN SYSTEMS



Hawaii State Hospital Storm Drain CCTV Status

USMH Street	US Manhole	DSMH Street	DS Manhole	Sewer ID	Diameter	Material	Plan Length	CCTV Length	Direction	Comments	DVD DISK
Hawaii State Hospital	SDMH-01		OF-01	P 01	18	RCP	UNK	242.7	DS	Unable to pass rootball.	Hawaii State Hospital CCTV #12
	SDMH-02	Hawaii State Hospital	OF-02	P 02	18	RCP	UNK	49.3	US	Collapsed pipe.	Hawaii State Hospital CCTV #12
Hawaii State Hospital	SDMH-03		OF-03	P 03	24	CMP	UNK	3.9	DS	Unable to pass deposits.	Hawaii State Hospital CCTV #12
	SDMH-05A	Hawaii State Hospital	SDMH-05	P 05	21x21	RCP	UNK	36.4	US	Unable to pass hole in pipe .	Hawaii State Hospital CCTV #12
Hawaii State Hospital	SDMH-06		SDMH-06A	P 06	18	RCP	UNK	58.9	DS	Reached T connection.	Hawaii State Hospital CCTV #12
Hawaii State Hospital	SDMH-04		OF-04	P 04	18	RCP	UNK	10.1	DS		Hawaii State Hospital CCTV #12
	SDMH-07	Hawaii State Hospital	SDMH-07A	P 07	12	PVC	UNK	80.1	US		Hawaii State Hospital CCTV #12

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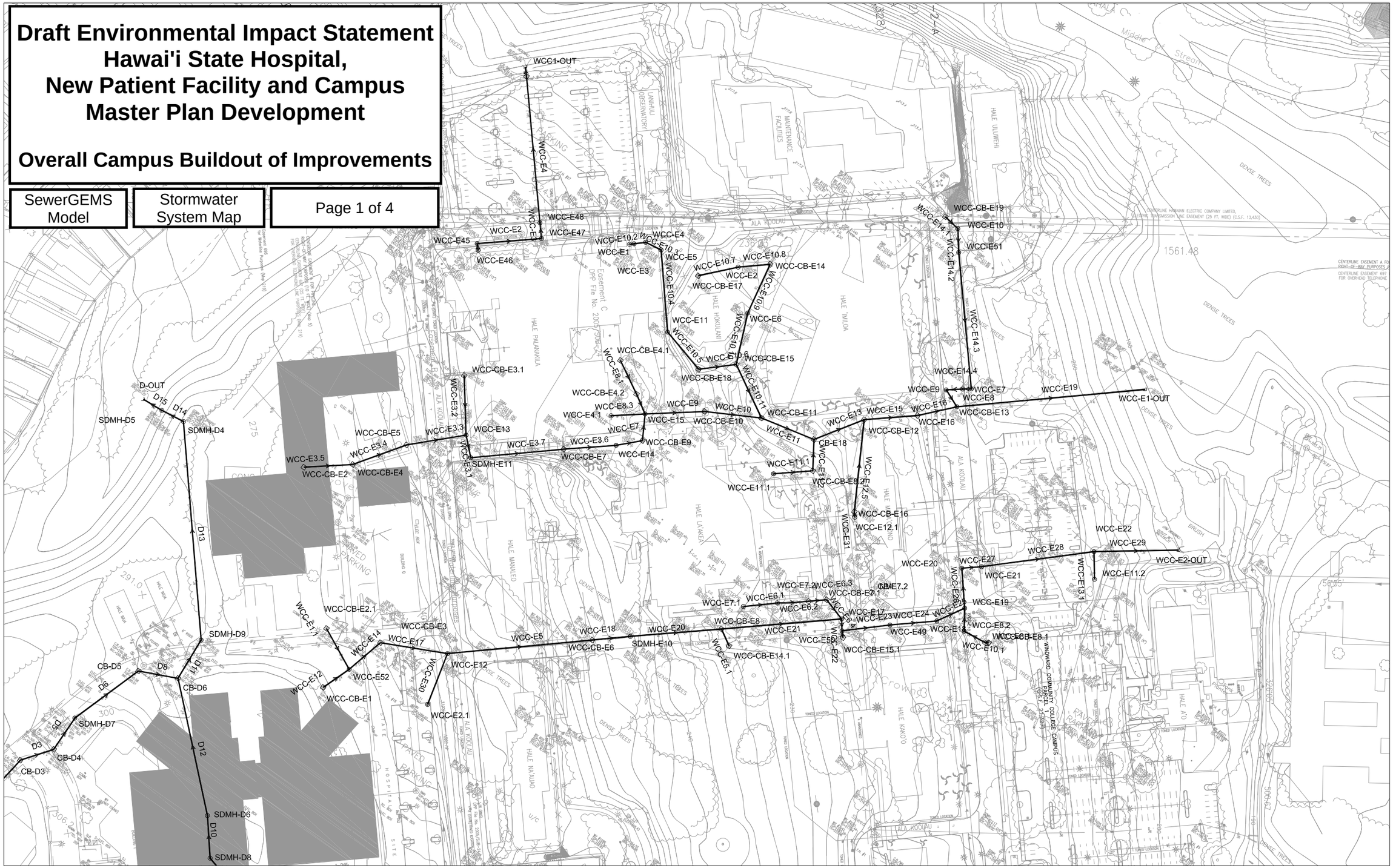

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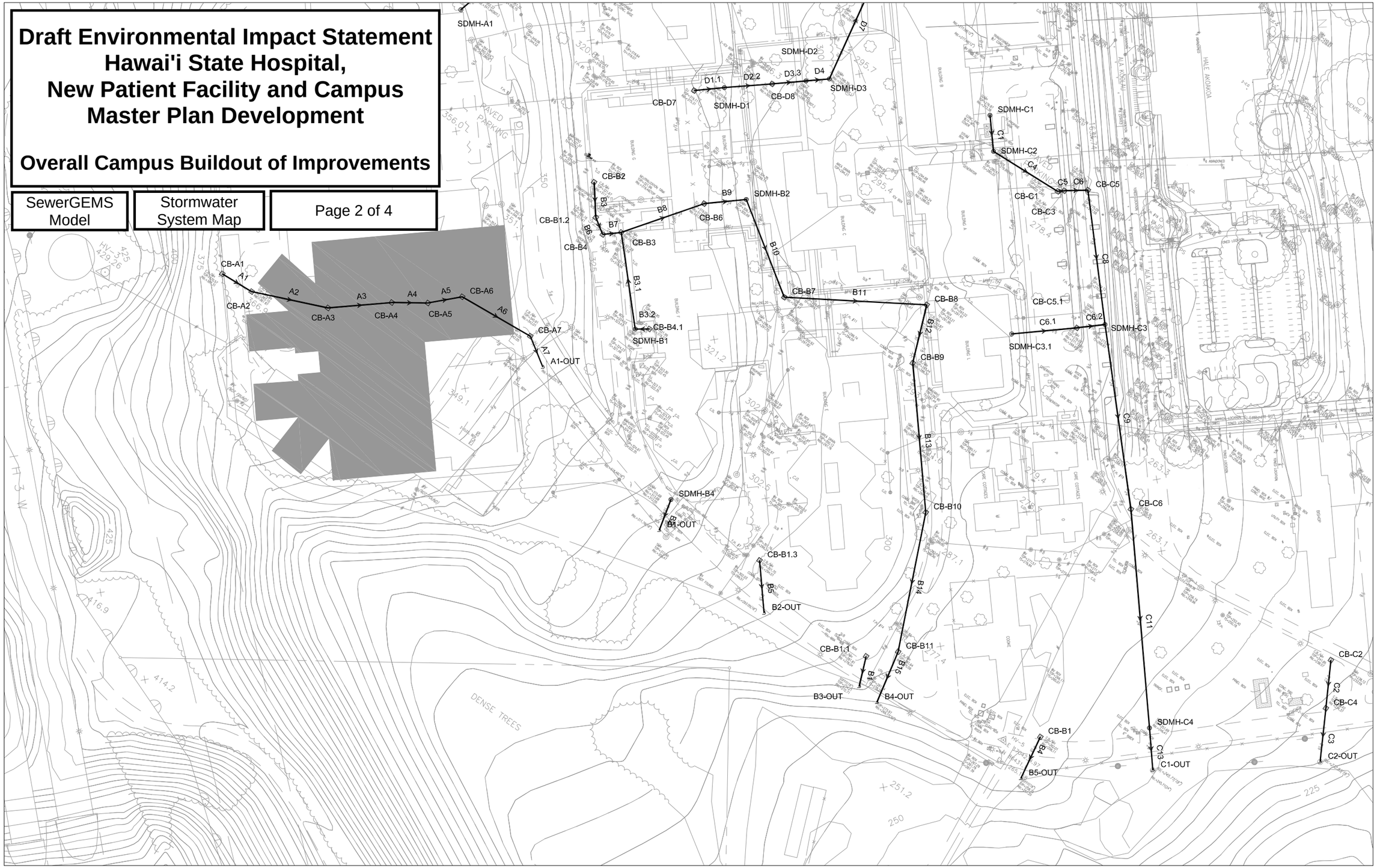

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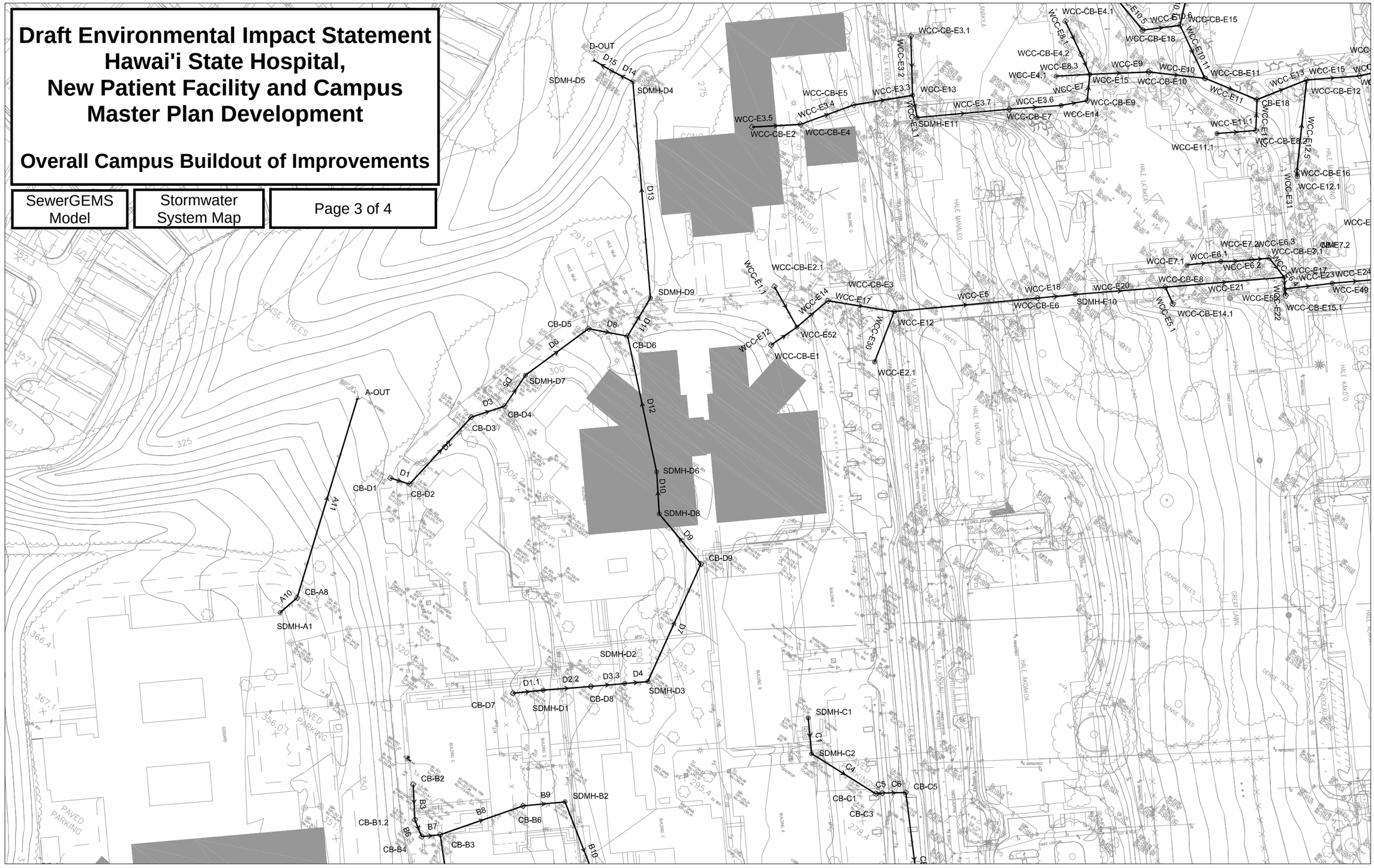

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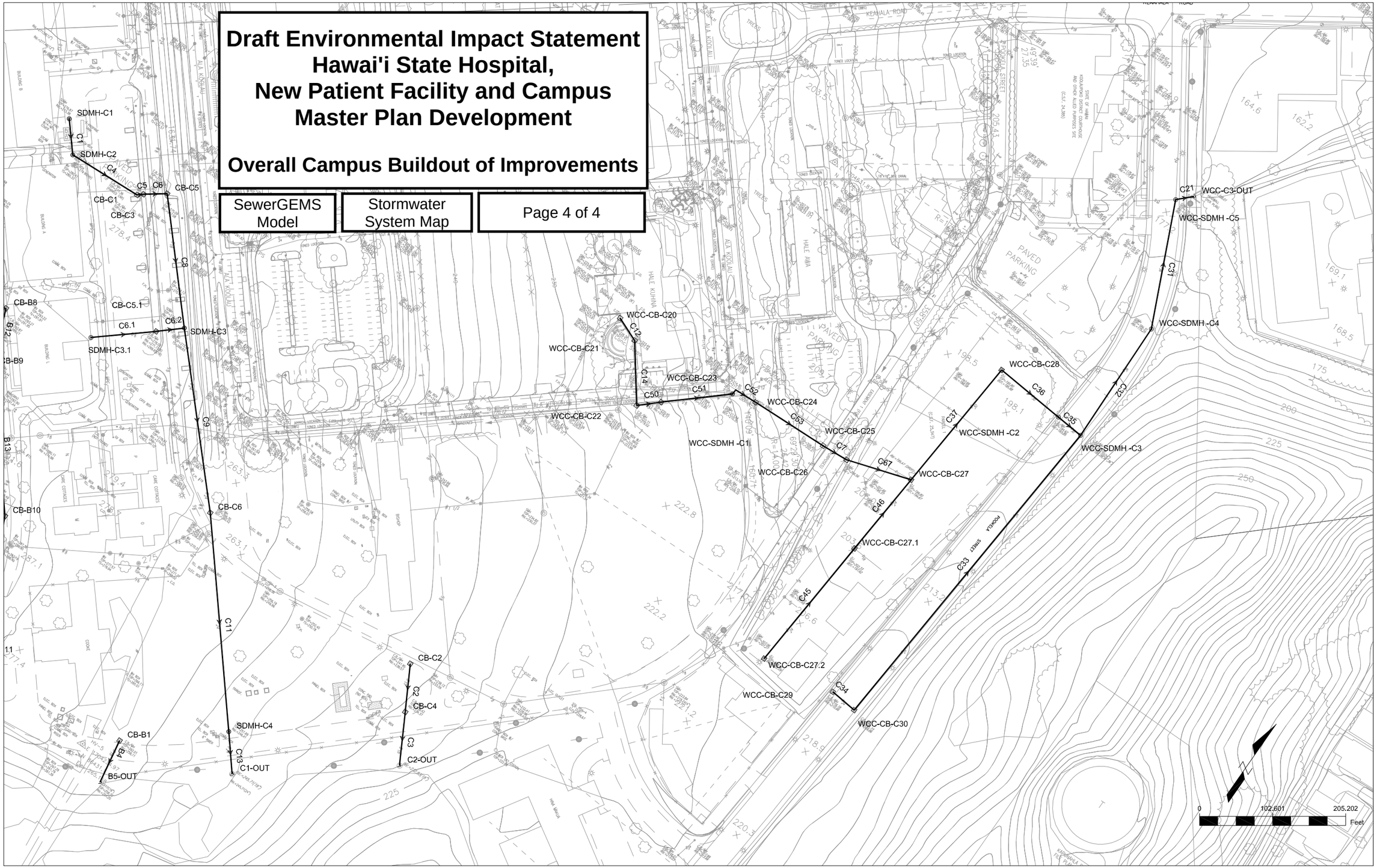

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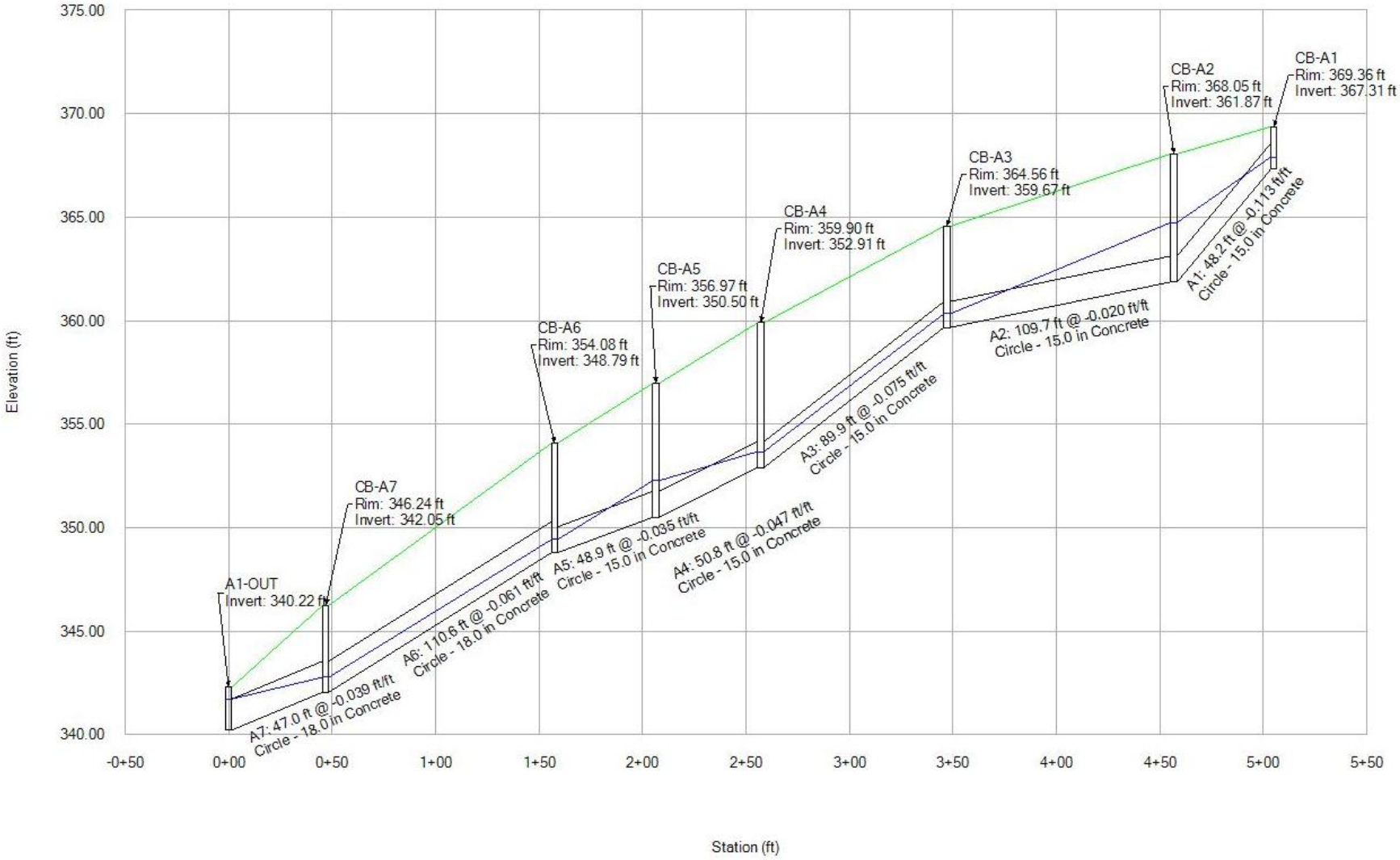

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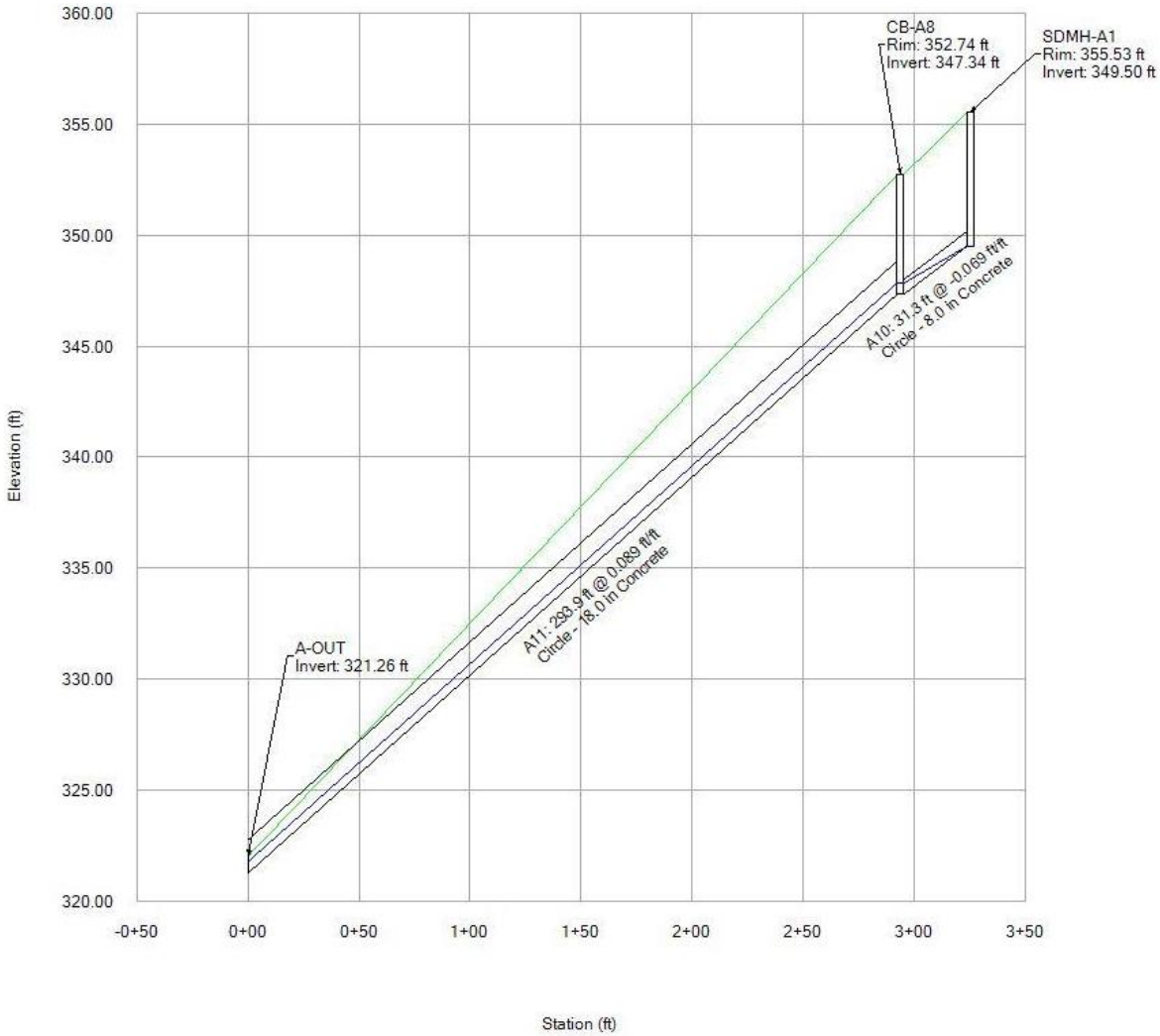

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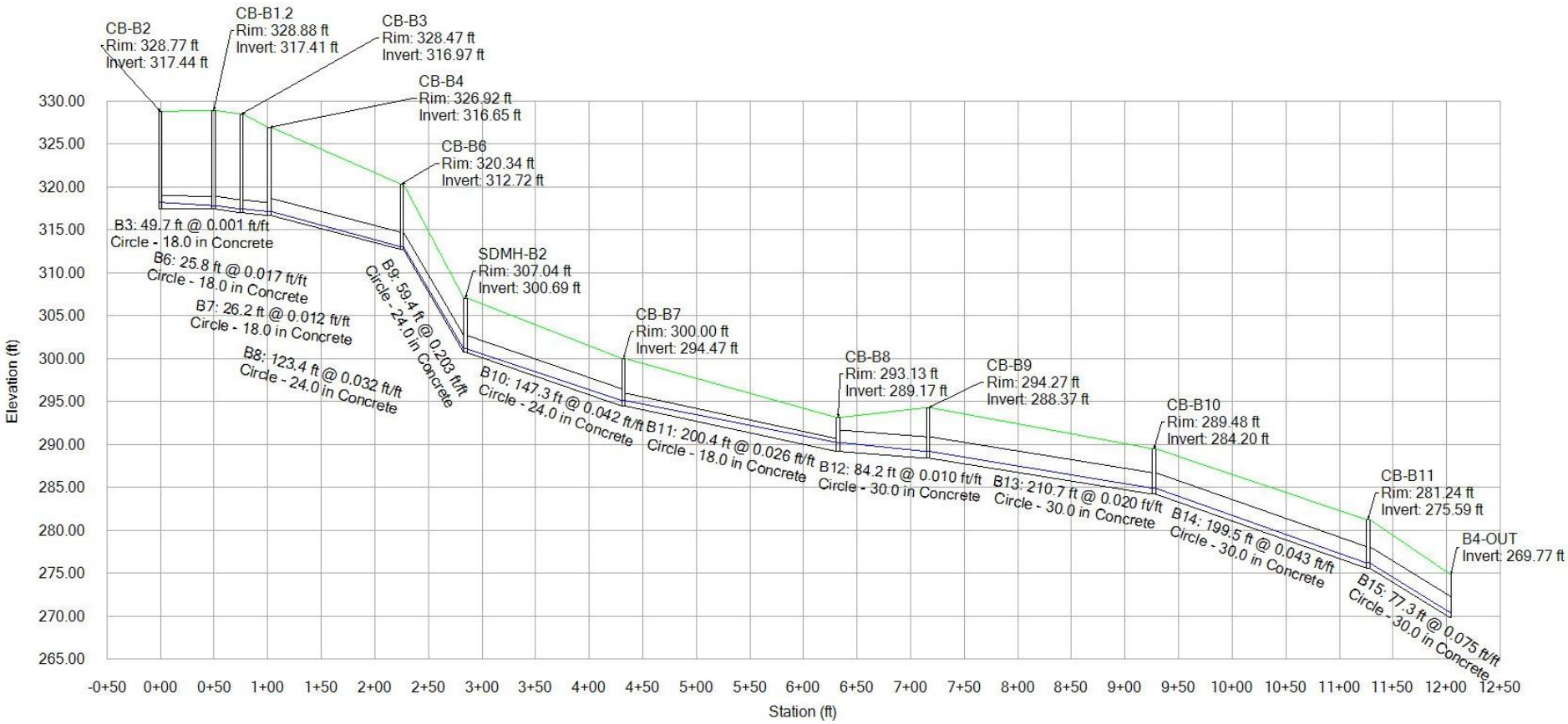

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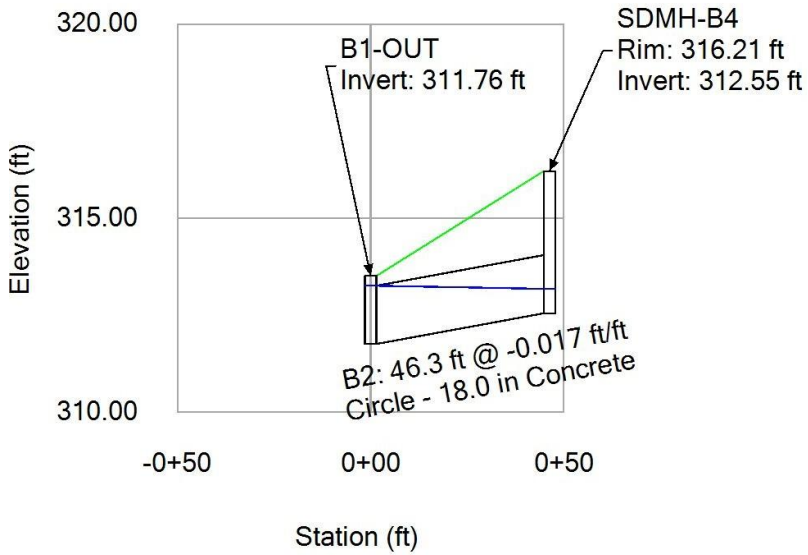

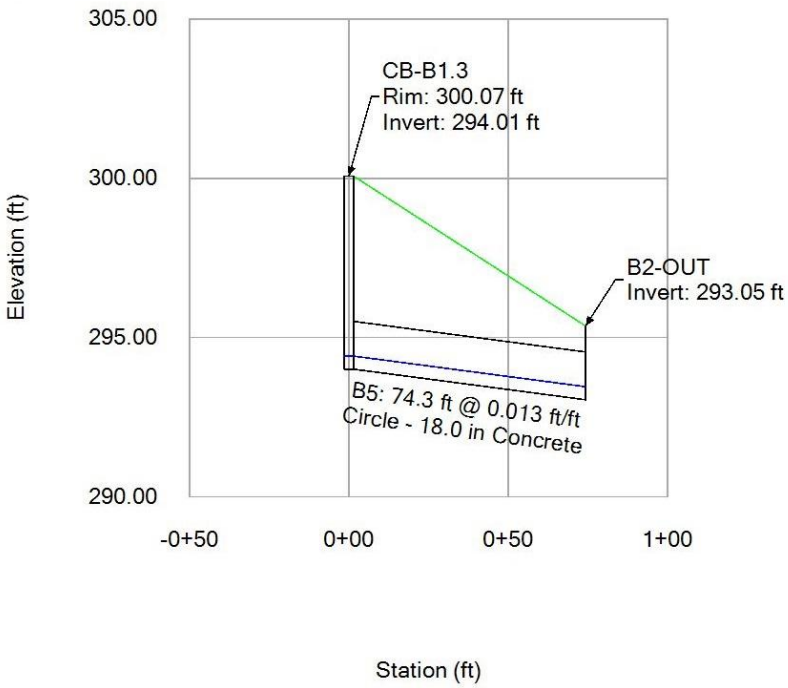

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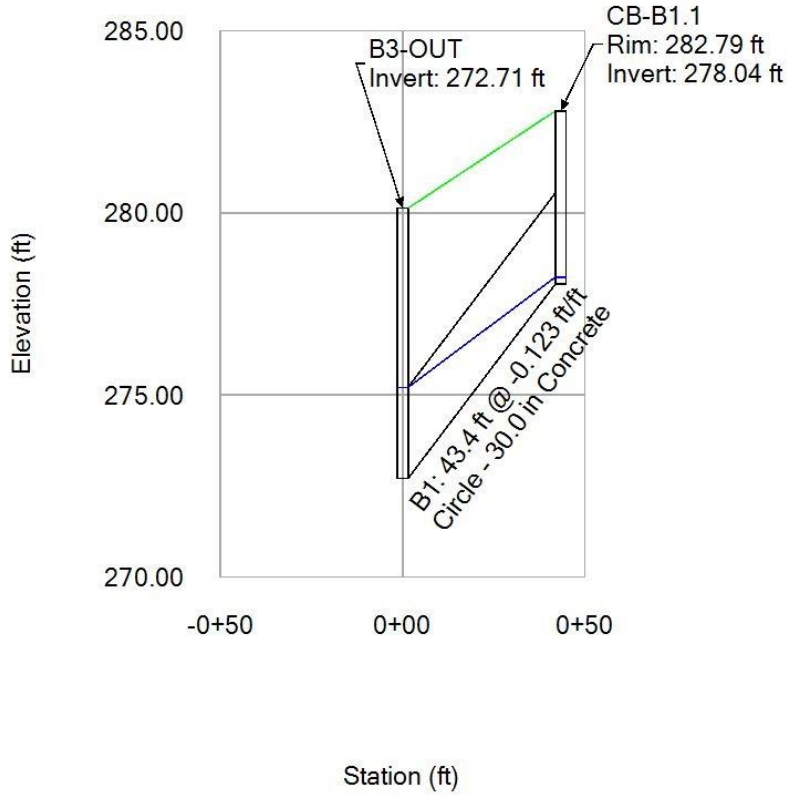

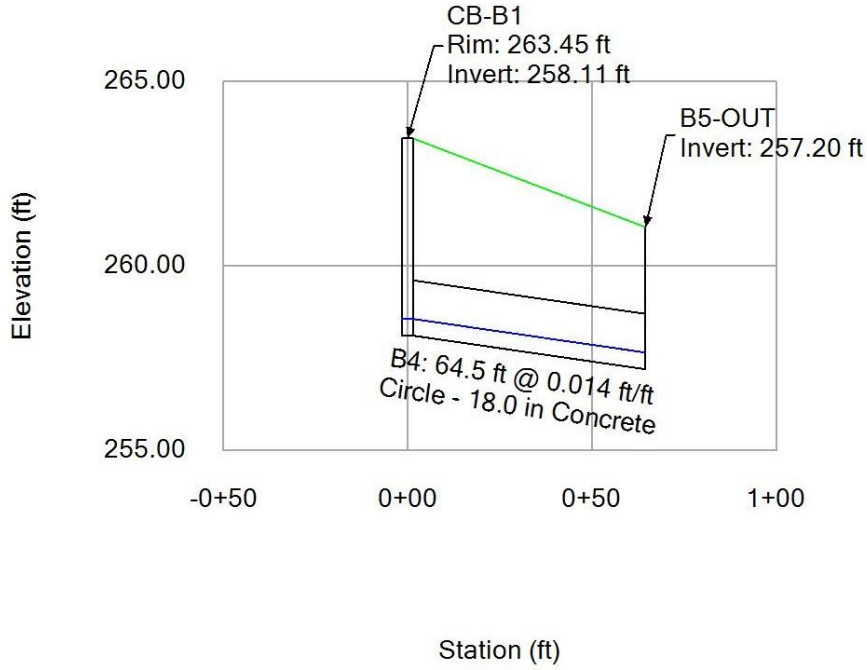

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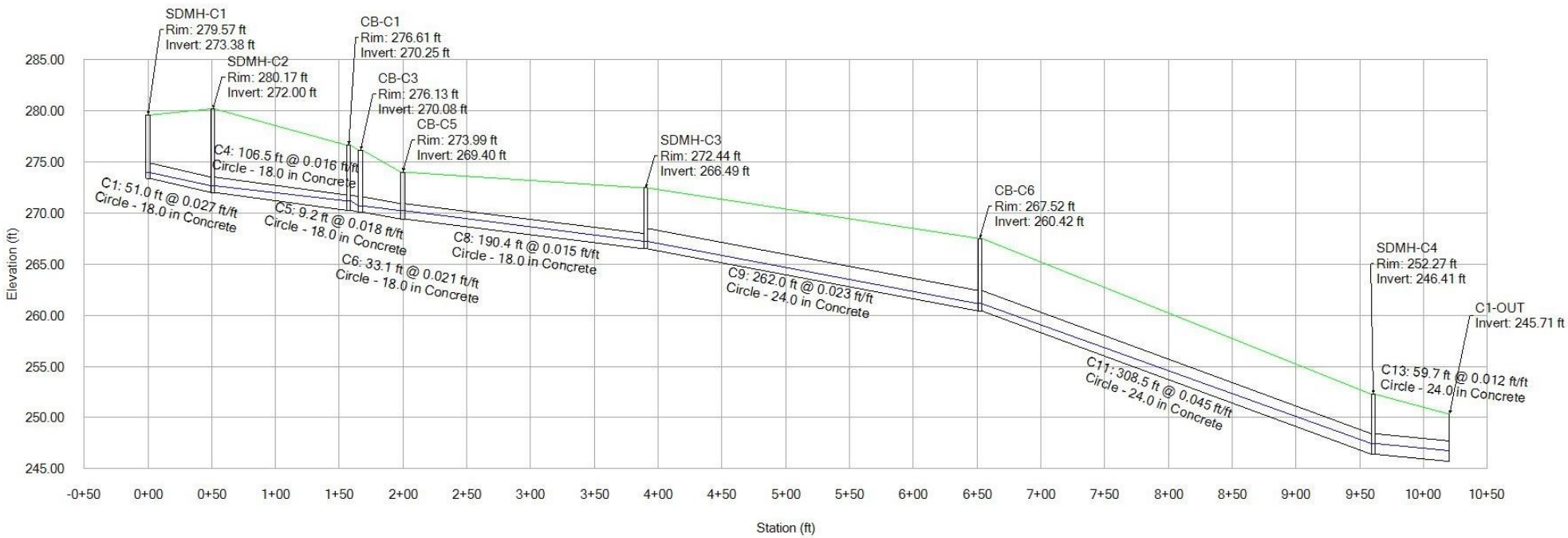

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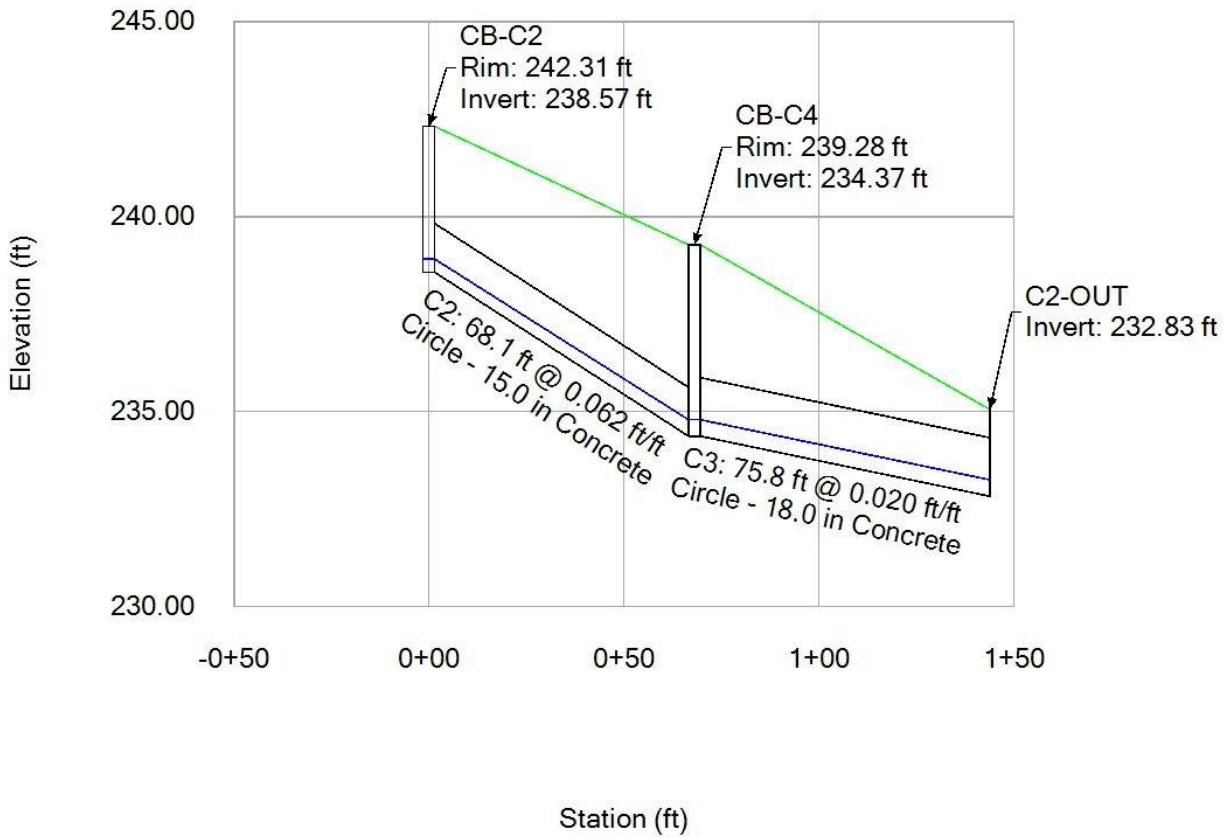

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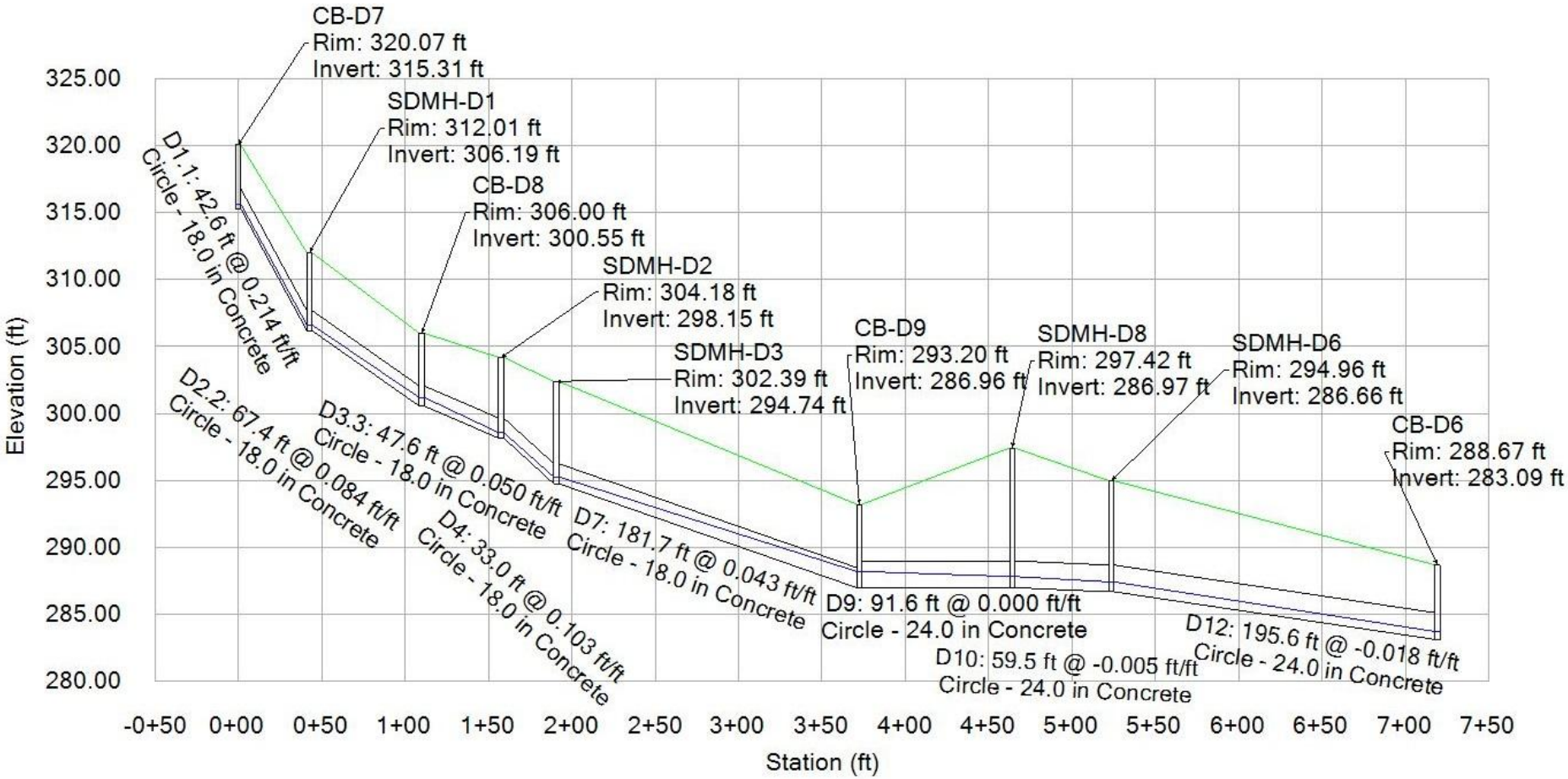

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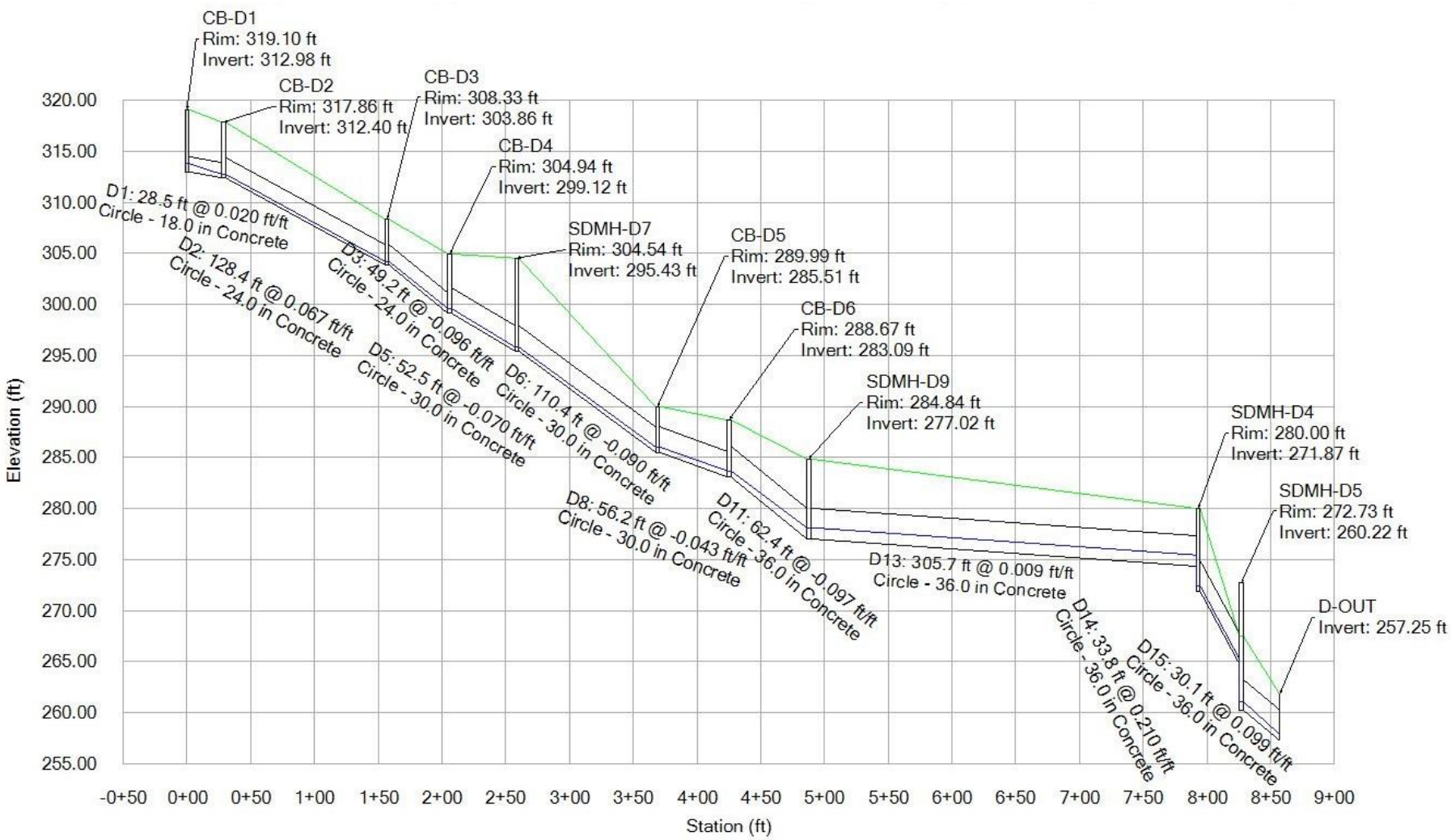

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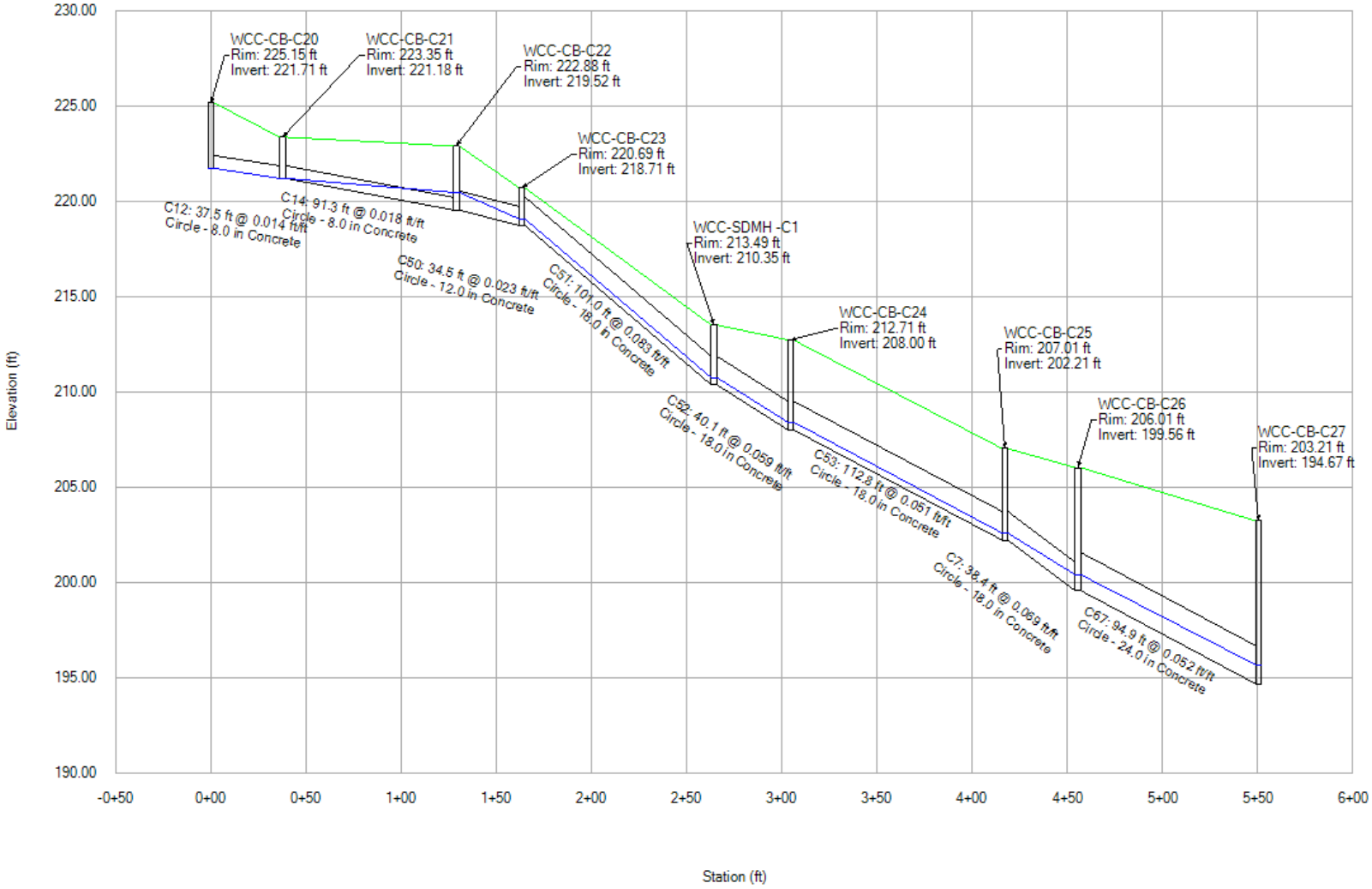

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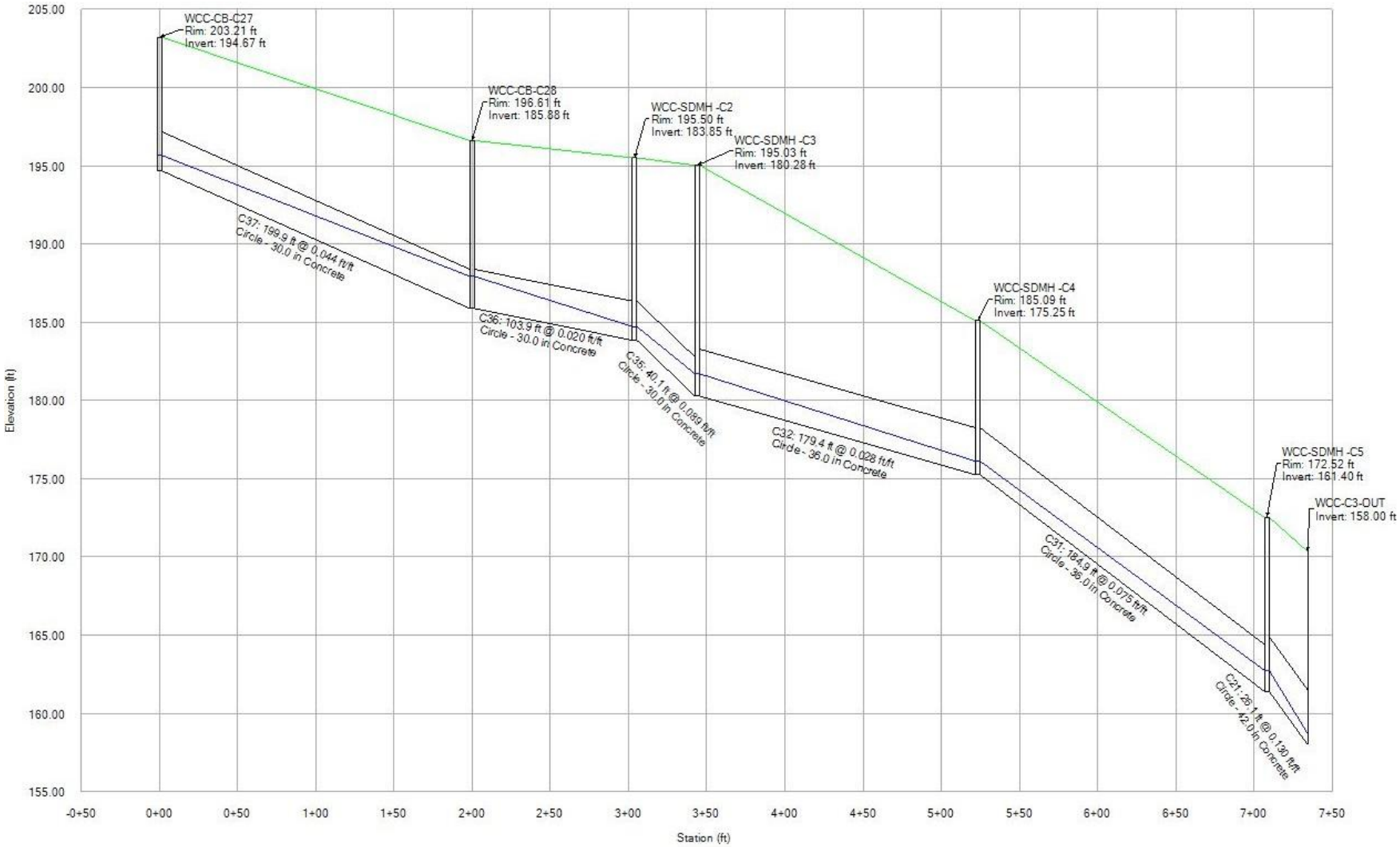

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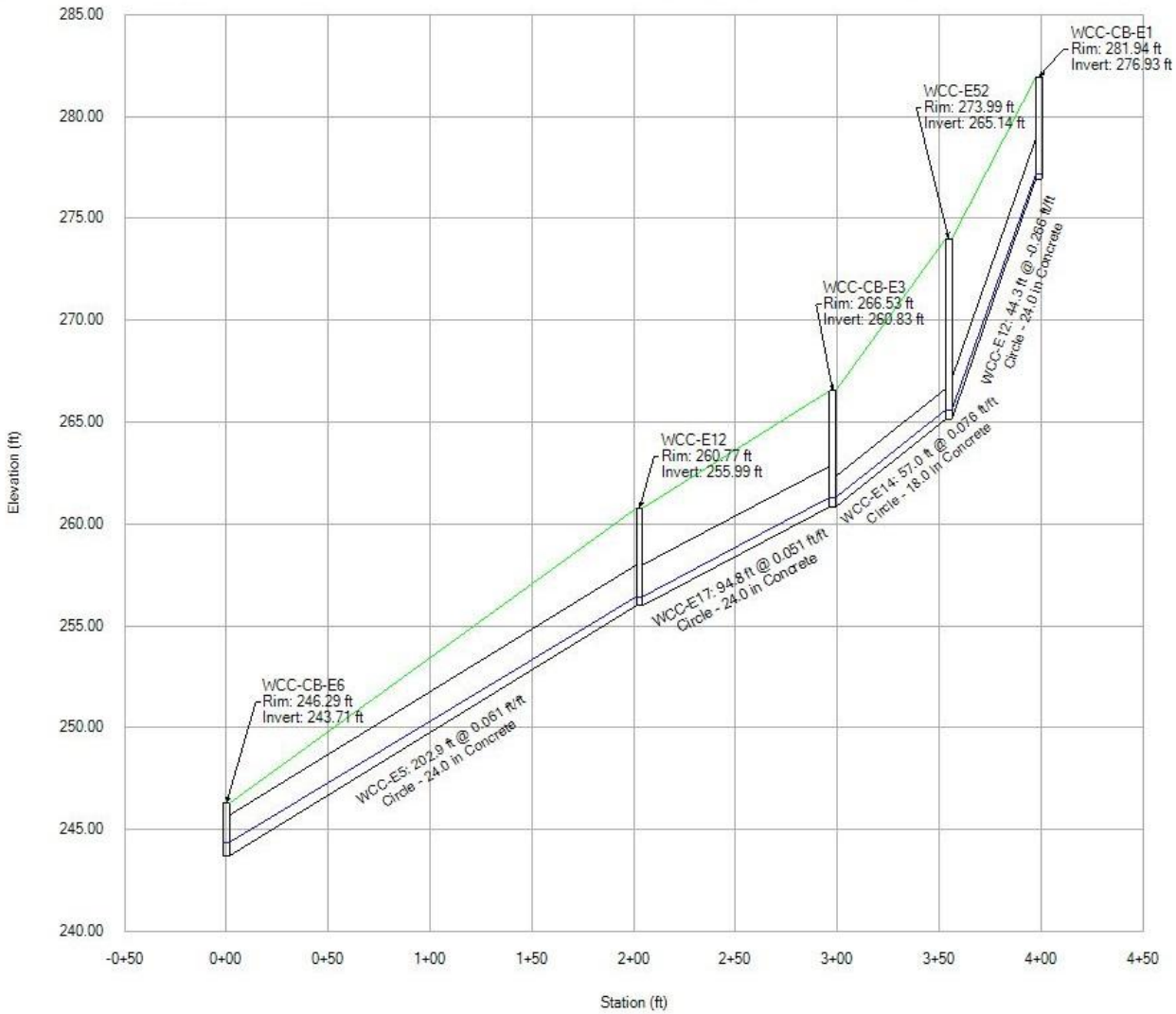

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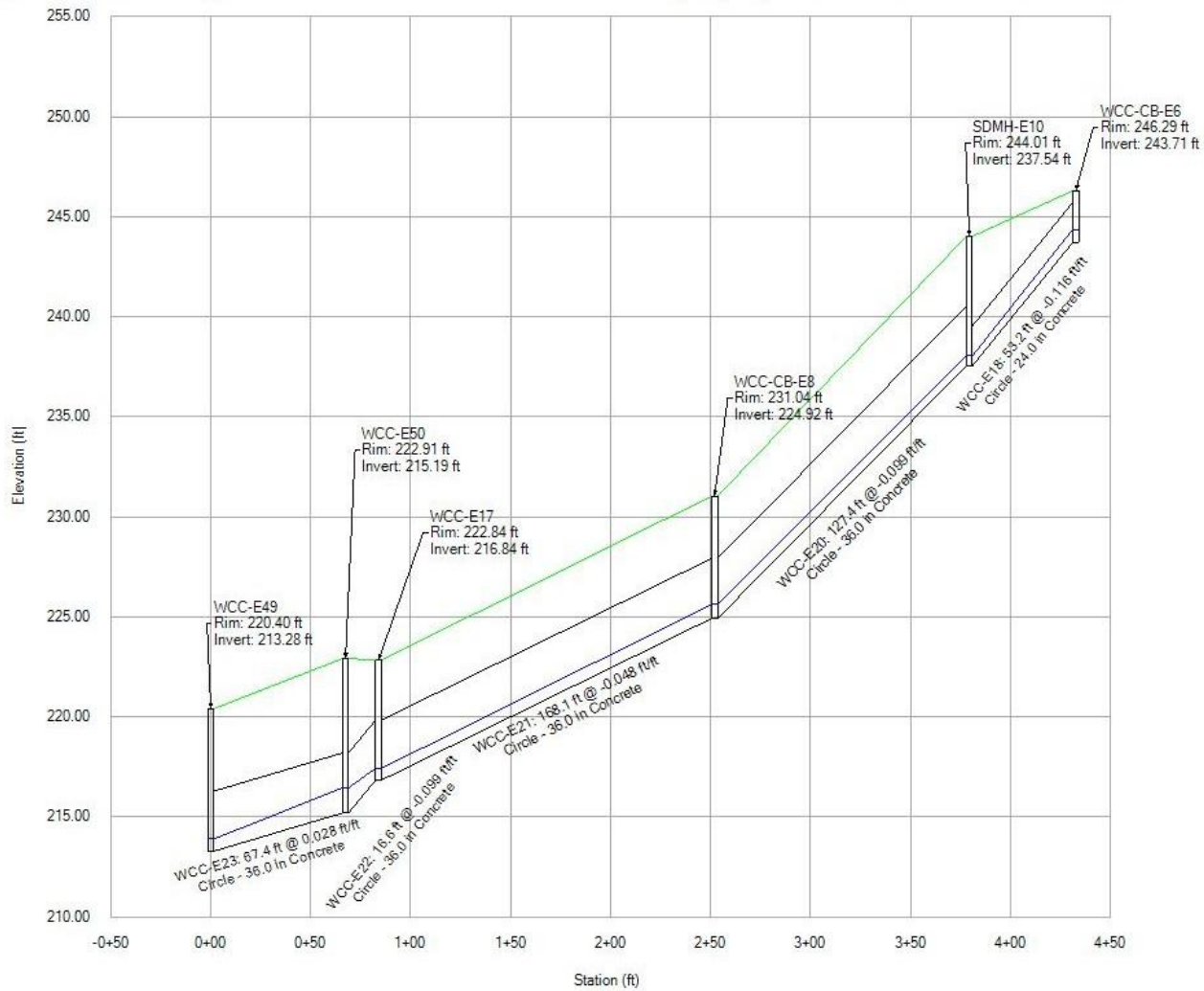

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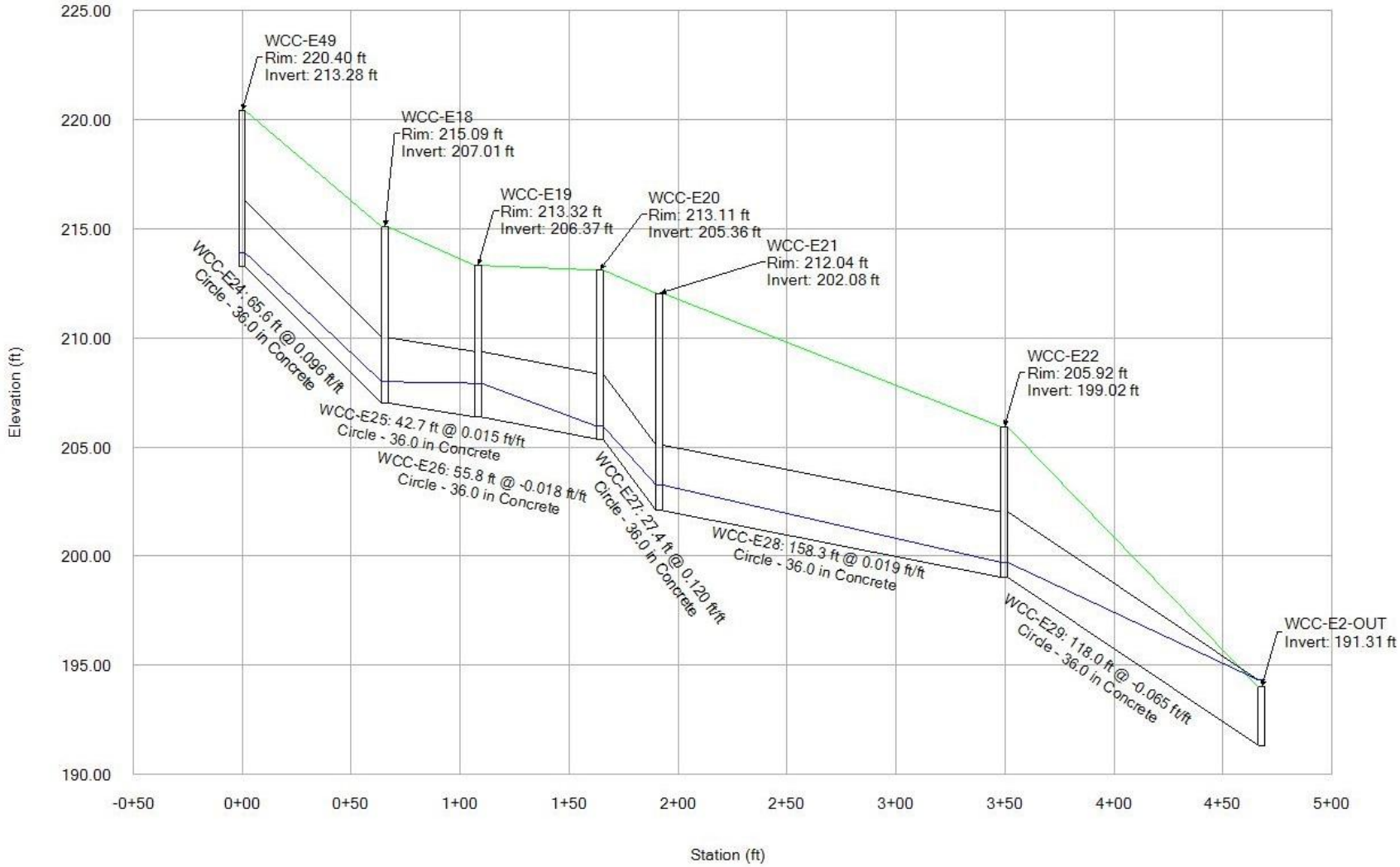

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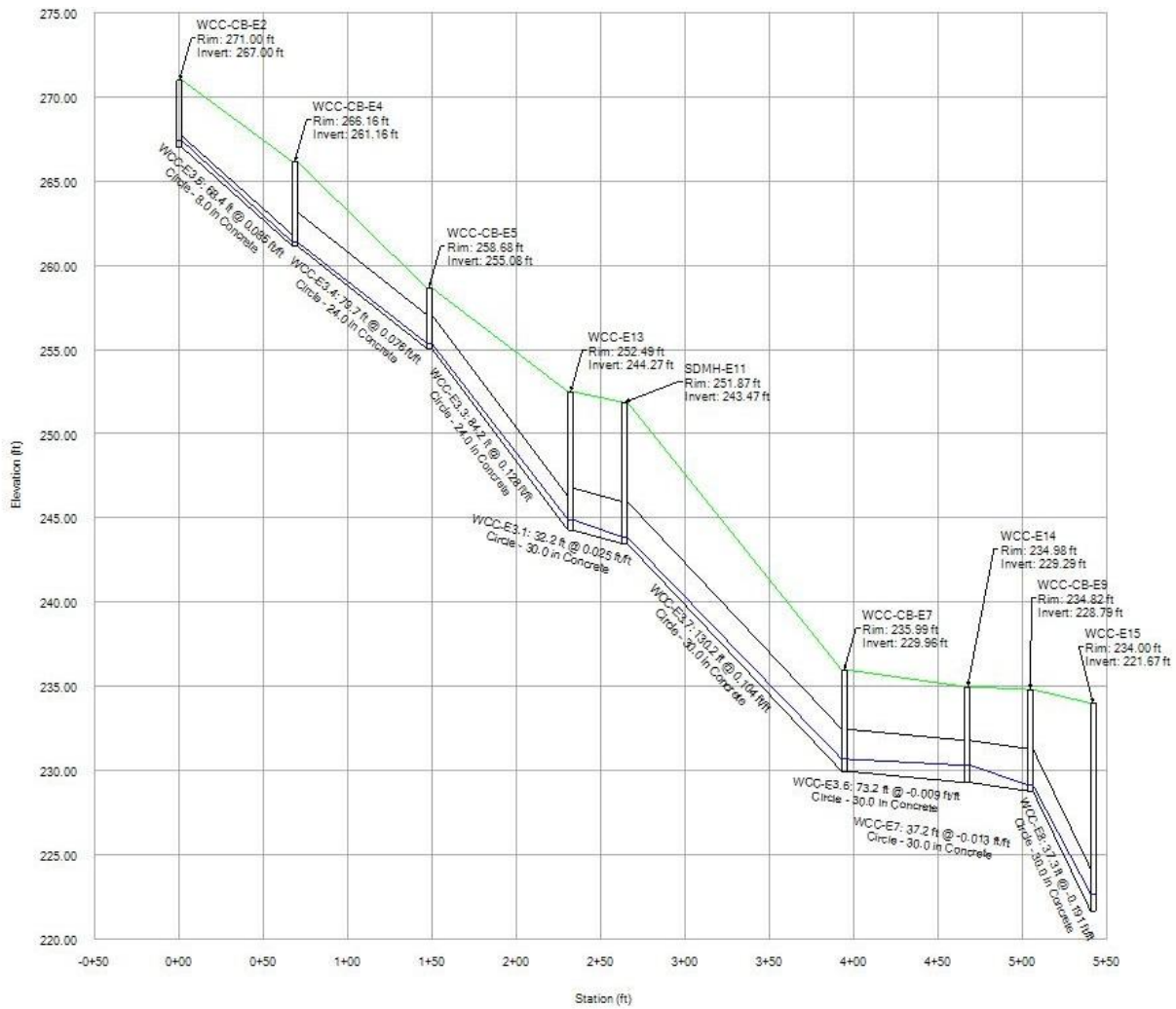

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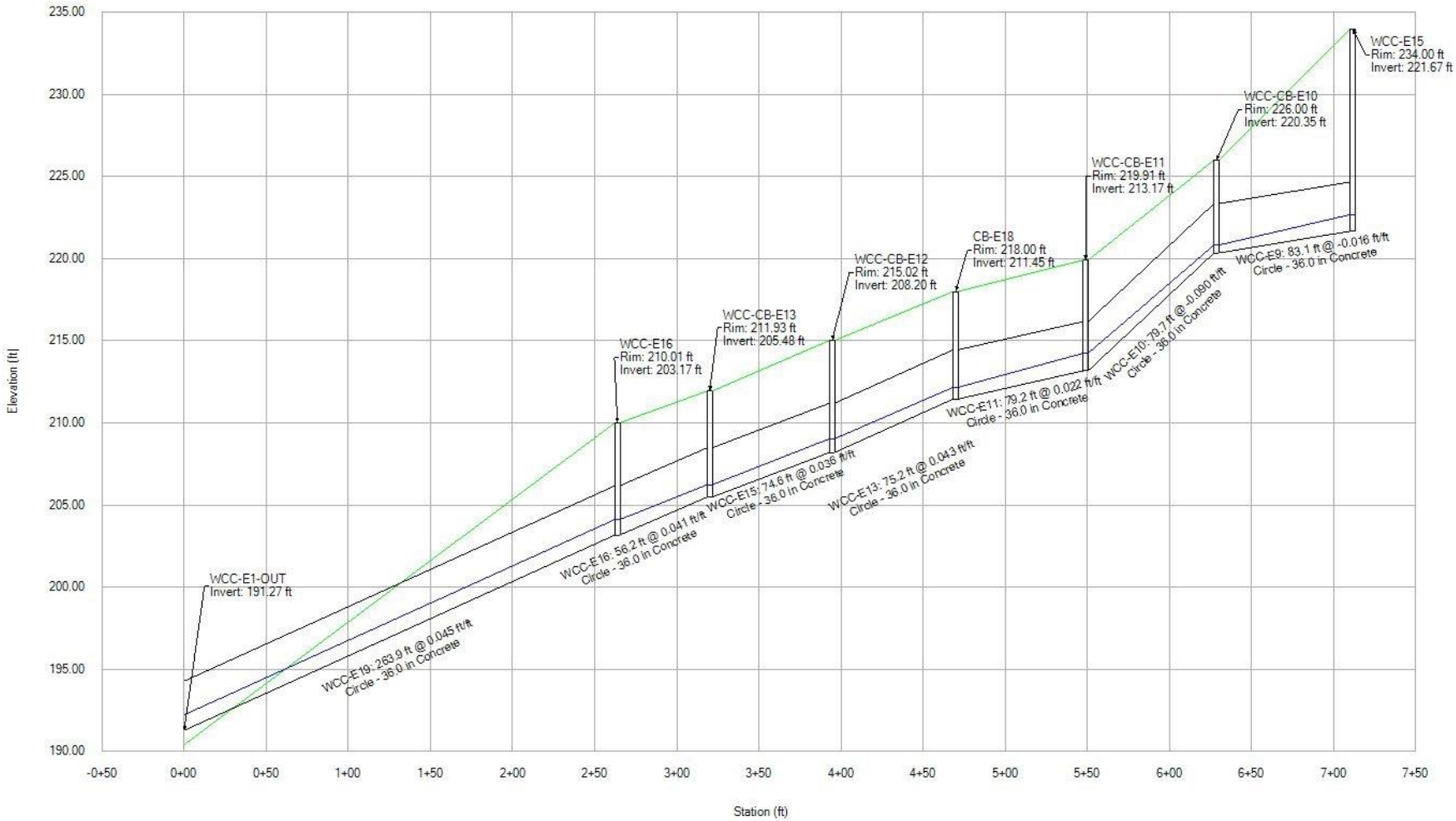

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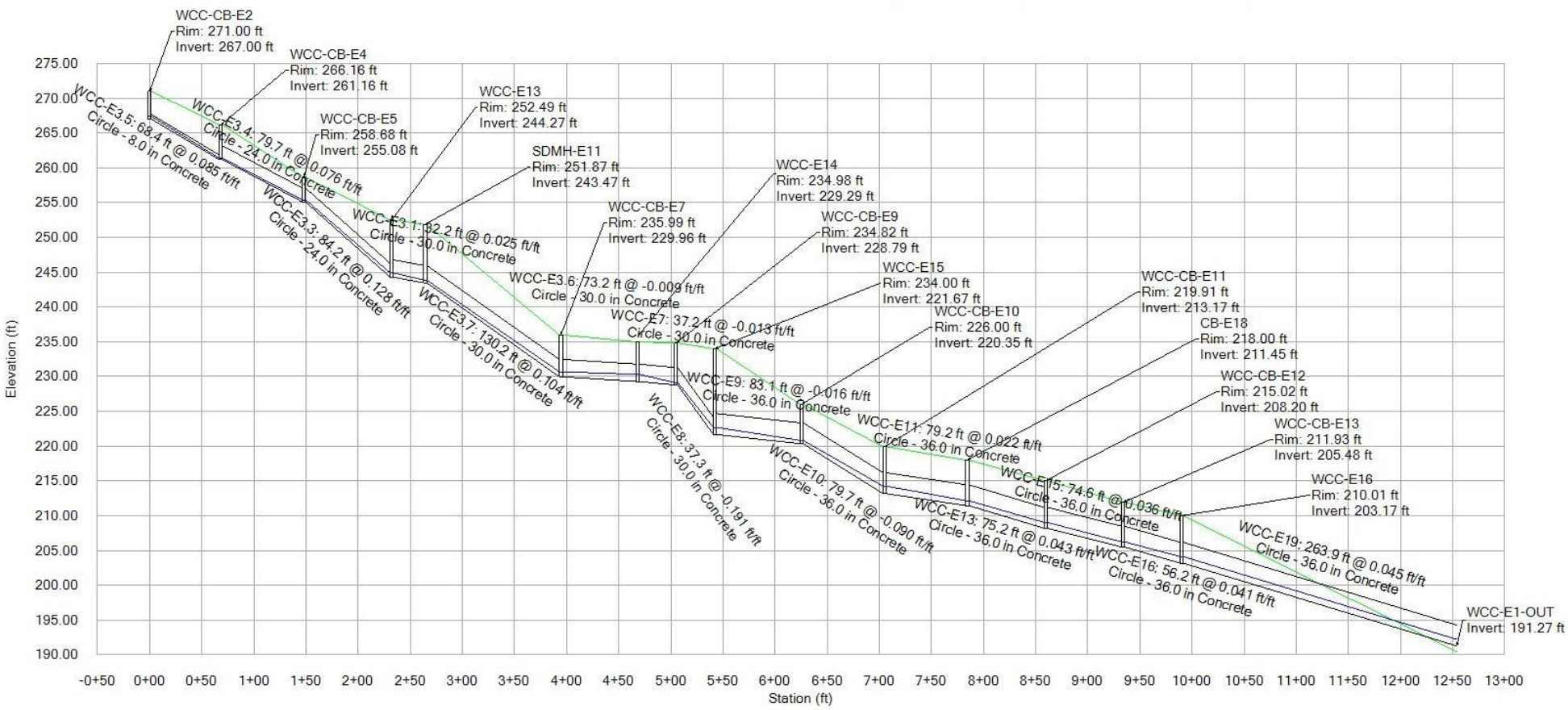

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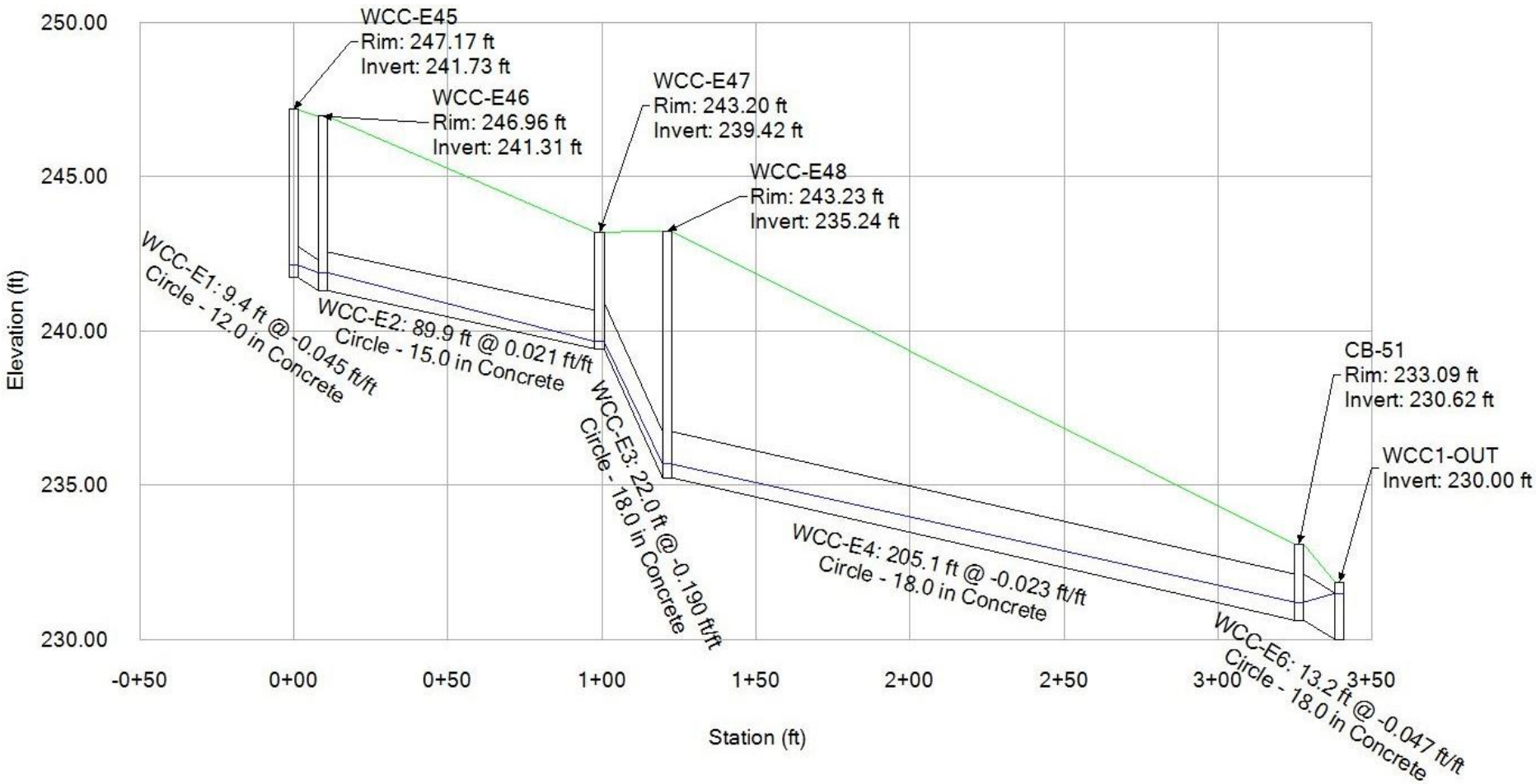

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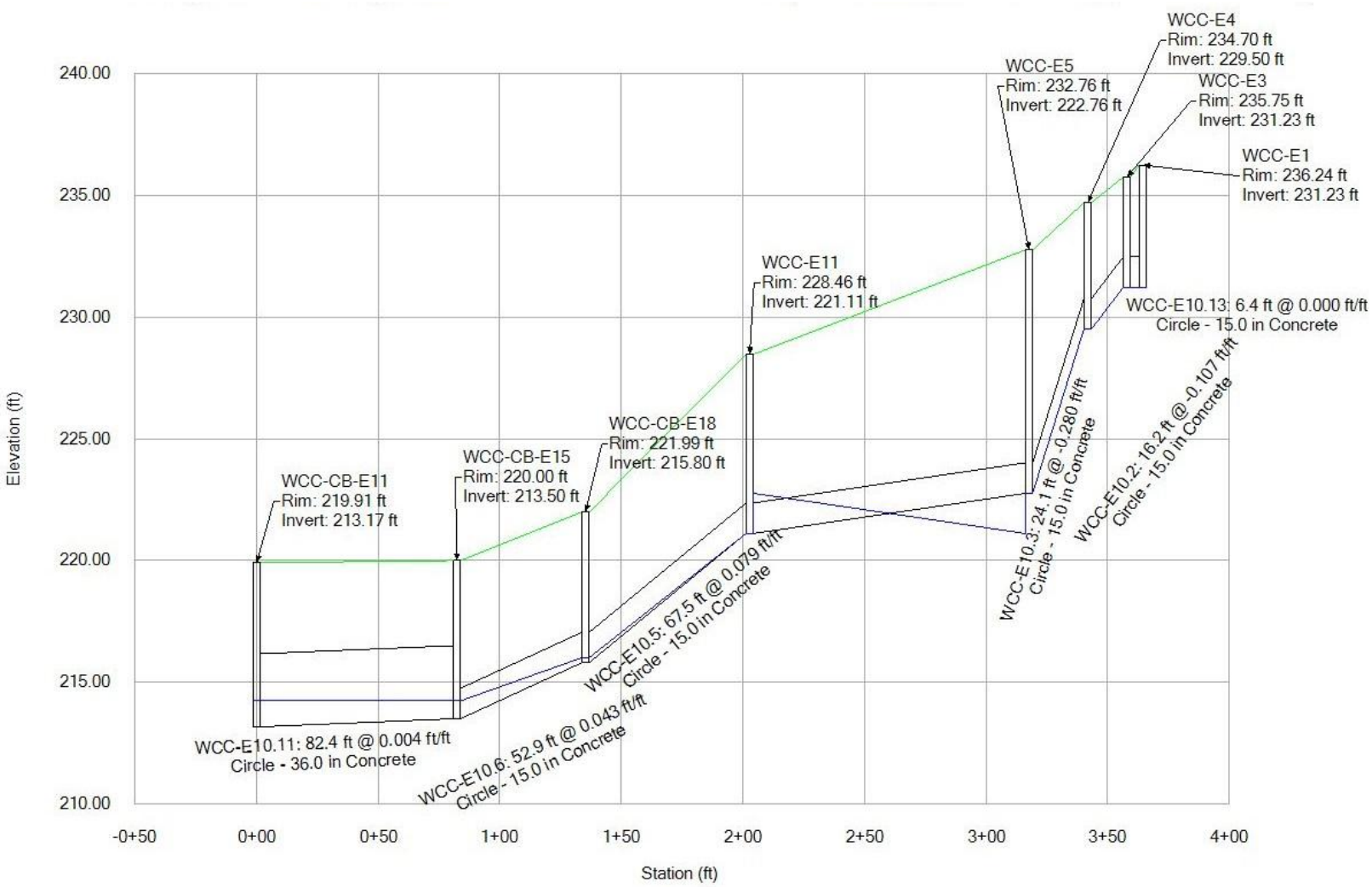

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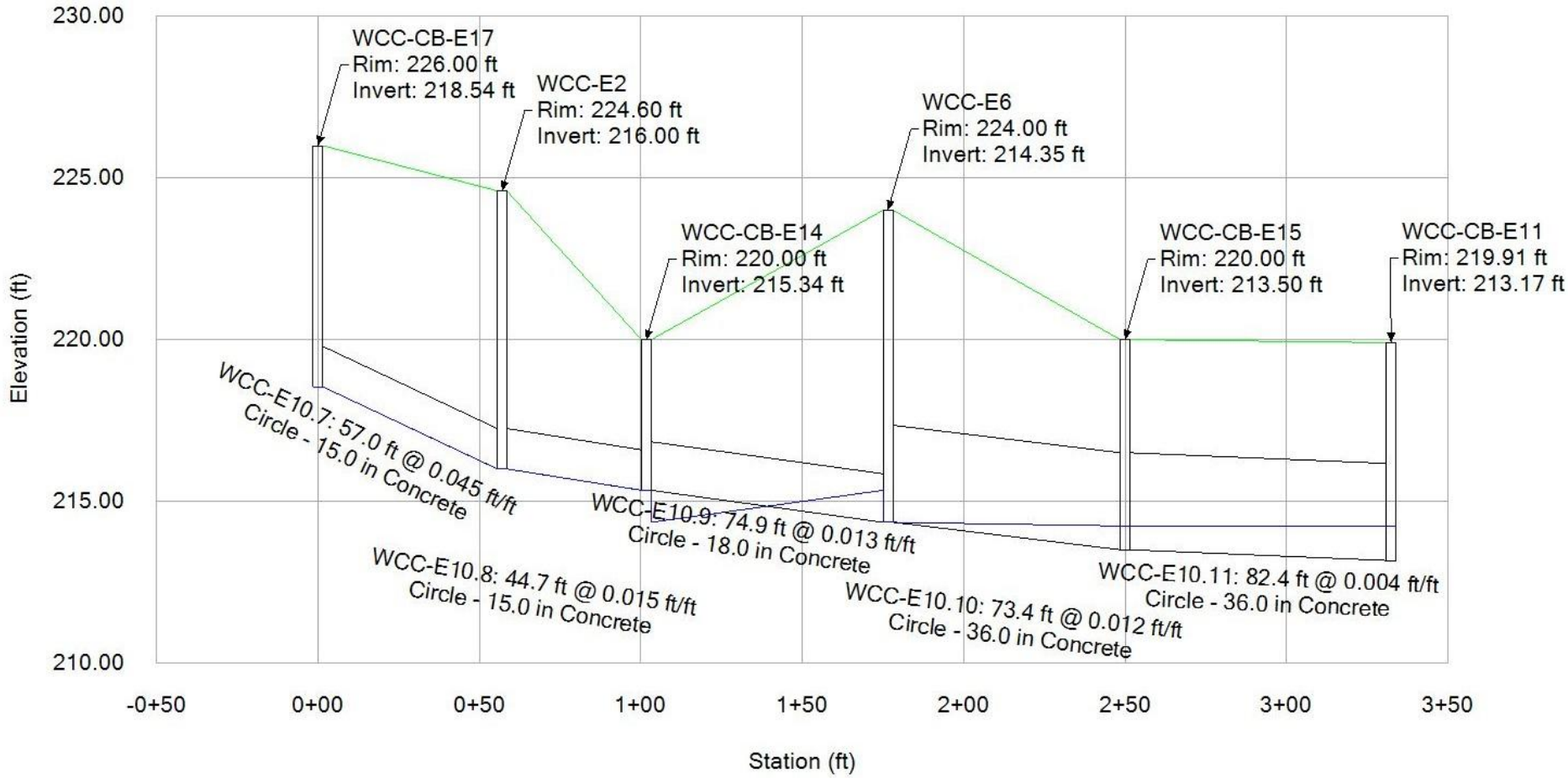

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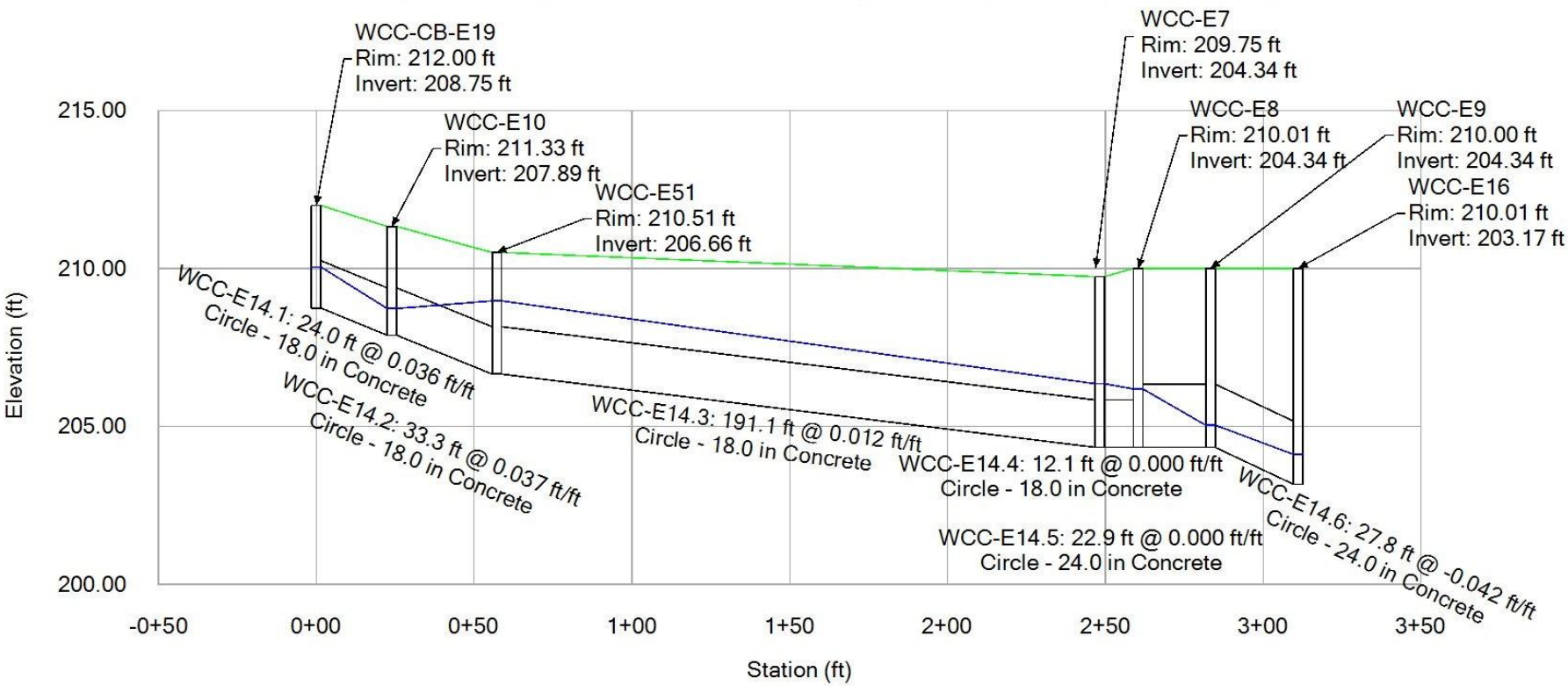

Appendix S: EPA EJSCREEN Reports

EJSCREEN ACS Summary Report

EJSCREEN Census 2000 Summary Report

EJSCREEN Census 2010 Summary Report

EJSCREEN Report for Block Group 150030105031, HAWAII, EPA Region 9

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EJSCREEN ACS Summary Report

Location: Blockgroup 150030105031
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

Summary of ACS Estimates	2008 - 2012
Population	537
Population Density (per sq. mile)	1,485
Minority Population	453
% Minority	84%
Households	0
Housing Units	216
Housing Units Built Before 1950	22
Per Capita Income	0
Land Area (sq. miles) (Source: SF1)	0.36
% Land Area	100%
Water Area (sq. miles) (Source: SF1)	0.00
% Water Area	0%

	2008 - 2012 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	537	100%	142
Population Reporting One Race	355	66%	239
White	121	23%	76
Black	9	2%	25
American Indian	0	0%	12
Asian	207	39%	98
Pacific Islander	18	3%	16
Some Other Race	0	0%	12
Population Reporting Two or More Races	182	34%	92
Total Hispanic Population	96	18%	74
Total Non-Hispanic Population	441		
White Alone	84	16%	72
Black Alone	9	2%	25
American Indian Alone	0	0%	12
Non-Hispanic Asian Alone	207	39%	98
Pacific Islander Alone	18	3%	16
Other Race Alone	0	0%	12
Two or More Races Alone	123	23%	79
Population by Sex			
Male	265	49%	103
Female	272	51%	74
Population by Age			
Age 0-4	25	5%	36
Age 0-17	49	9%	44
Age 18+	488	91%	114
Age 65+	71	13%	38

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2008 - 2012.

EJSCREEN ACS Summary Report

Location: Blockgroup 150030105031
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

	2008 - 2012 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	425	100%	128
Less than 9th Grade	33	8%	30
9th - 12th Grade, No Diploma	25	6%	27
High School Graduate	126	30%	57
Some College, No Degree	118	28%	62
Associate Degree	32	8%	32
Bachelor's Degree or more	123	29%	54
Population Age 5+ Years by Ability to Speak English			
Total	512	100%	136
Speak only English	362	71%	133
Non-English at Home[1+2+3+4]	150	29%	67
[1]Speak English "very well"	81	16%	52
[2]Speak English "well"	43	8%	40
[3]Speak English "not well"	3	1%	14
[4]Speak English "not at all"	23	4%	26
[3+4]Speak English "less than well"	26	5%	27
[2+3+4]Speak English "less than very well"	69	13%	47
Linguistically Isolated Households*			
Total	22	100%	26
Speak Spanish	0	0%	12
Speak Other Indo-European Languages	0	0%	12
Speak Asian-Pacific Island Languages	22	100%	23
Speak Other Languages	0	0%	12
Households by Household Income			
Household Income Base	208	100%	56
< $15,000	48	23%	40
$15,000 - $25,000	11	5%	20
$25,000 - $50,000	50	24%	41
$50,000 - $75,000	36	17%	29
$75,000 +	63	30%	42
Occupied Housing Units by Tenure			
Total	208	100%	56
Owner Occupied	84	40%	39
Renter Occupied	124	60%	58

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2008 - 2012.
*Linguistically Isolated Households is available at the census tract summary level and up.

EJSCREEN ACS Summary Report

Location: Blockgroup 150030105031
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

	2008 - 2012 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home**			
Total (persons age 5 and above)	512	100%	136
English	0	0%	0
Spanish	0	0%	0
French	0	0%	0
French Creole	0	0%	0
Italian	0	0%	0
Portuguese	0	0%	0
German	0	0%	0
Yiddish	0	0%	0
Other West Germanic	0	0%	0
Scandinavian	0	0%	0
Greek	0	0%	0
Russian	0	0%	0
Polish	0	0%	0
Serbo-Croatian	0	0%	0
Other Slavic	0	0%	0
Armenian	0	0%	0
Persian	0	0%	0
Gujarathi	0	0%	0
Hindi	0	0%	0
Urdu	0	0%	0
Other Indic	0	0%	0
Other Indo-European	0	0%	0
Chinese	0	0%	0
Japanese	0	0%	0
Korean	0	0%	0
Mon-Khmer, Cambodian	0	0%	0
Hmong	0	0%	0
Thai	0	0%	0
Laotian	0	0%	0
Vietnamese	0	0%	0
Other Asian	0	0%	0
Tagalog	0	0%	0
Other Pacific Island	0	0%	0
Navajo	0	0%	0
Other Native American	0	0%	0
Hungarian	0	0%	0
Arabic	0	0%	0
Hebrew	0	0%	0
African	0	0%	0
Other and non-specified	0	0%	0
Total Non-English	0	0%	0

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2008 - 2012.
**Population by Language Spoken at Home is available at the census tract summary level and up.

EJSCREEN Census 2000 Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

Summary	Census 2000
Population	859
Population Density (per sq. mile)	2,427
Minority Population	786
% Minority	91%
Households	256
Housing Units	298
Housing Units Built Before 1950	30
Land Area (sq. miles)	0.35
% Land Area	100%
Water Area (sq. miles)	0.00
% Water Area	0%

Population by Race	Number	Percent
Total	859	-------
Population Reporting One Race	521	61%
White	80	9%
Black	13	2%
American Indian	0	0%
Asian	254	30%
Pacific Islander	167	19%
Some Other Race	8	1%
Population Reporting Two or More Races	338	39%
Total Hispanic Population	118	14%

Population by Sex	Number	Percent
Male	458	53%
Female	401	47%

Population by Age	Number	Percent
Age 0-4	56	7%
Age 0-17	249	29%
Age 18+	610	71%
Age 65+	110	13%

Population 25+ by Educational Attainment	Number	Percent
Total	542	-------
Less than 9th Grade	28	5%
9th - 12th Grade, No Diploma	67	12%
High School Graduate	212	39%
Some College, No Degree	124	23%
Associate Degree	39	7%
Bachelor's Degree or more	72	13%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. **Source:** U.S. Census Bureau, Census 2000 Summary File 3.

EJSCREEN Census 2000 Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

Population Age 5+ Years by Ability to Speak English	Number	Percent
Total	818	-------
Speak only English	699	85%
Non-English at Home	119	15%
Speak English "very well"	75	9%
Speak English "well"	34	4%
Speak English "not well"	10	1%
Speak English "not at all"	0	0%
Speak English "less than well"	10	1%

Households by Household Income in 1999	Number	Percent
Household Income Base	256	-------
< $15,000	29	11%
$15,000 - $25,000	33	13%
$25,000 - $50,000	65	25%
$50,000 - $75,000	81	32%
$75,000 +	66	26%

Households by Tenure	Number	Percent
Total	256	-------
Owner Occupied	109	43%
Renter Occupied	147	57%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. **Source:** U.S. Census Bureau, Census 2000 Summary File 3.

EJSCREEN Census 2010 Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

Summary	Census 2010
Population	901
Population Density (per sq. mile)	2,492
Minority Population	783
% Minority	87%
Households	219
Housing Units	229
Land Area (sq. miles)	0.36
% Land Area	100%
Water Area (sq. miles)	0.00
% Water Area	0%

Population by Race	Number	Percent
Total	901	-------
Population Reporting One Race	594	66%
White	134	15%
Black	8	1%
American Indian	6	1%
Asian	333	37%
Pacific Islander	107	12%
Some Other Race	6	1%
Population Reporting Two or More Races	307	34%
Total Hispanic Population	98	11%
Total Non-Hispanic Population	803	89%
White Alone	118	13%
Black Alone	3	0%
American Indian Alone	4	0%
Non-Hispanic Asian Alone	325	36%
Pacific Islander Alone	102	11%
Other Race Alone	0	0%
Two or More Races Alone	251	28%

Population by Sex	Number	Percent
Male	493	55%
Female	408	45%

Population by Age	Number	Percent
Age 0-4	58	6%
Age 0-17	163	18%
Age 18+	738	82%
Age 65+	93	10%

Households by Tenure	Number	Percent
Total	219	
Owner Occupied	102	47%
Renter Occupied	117	53%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, Census 2010 Summary File 1.

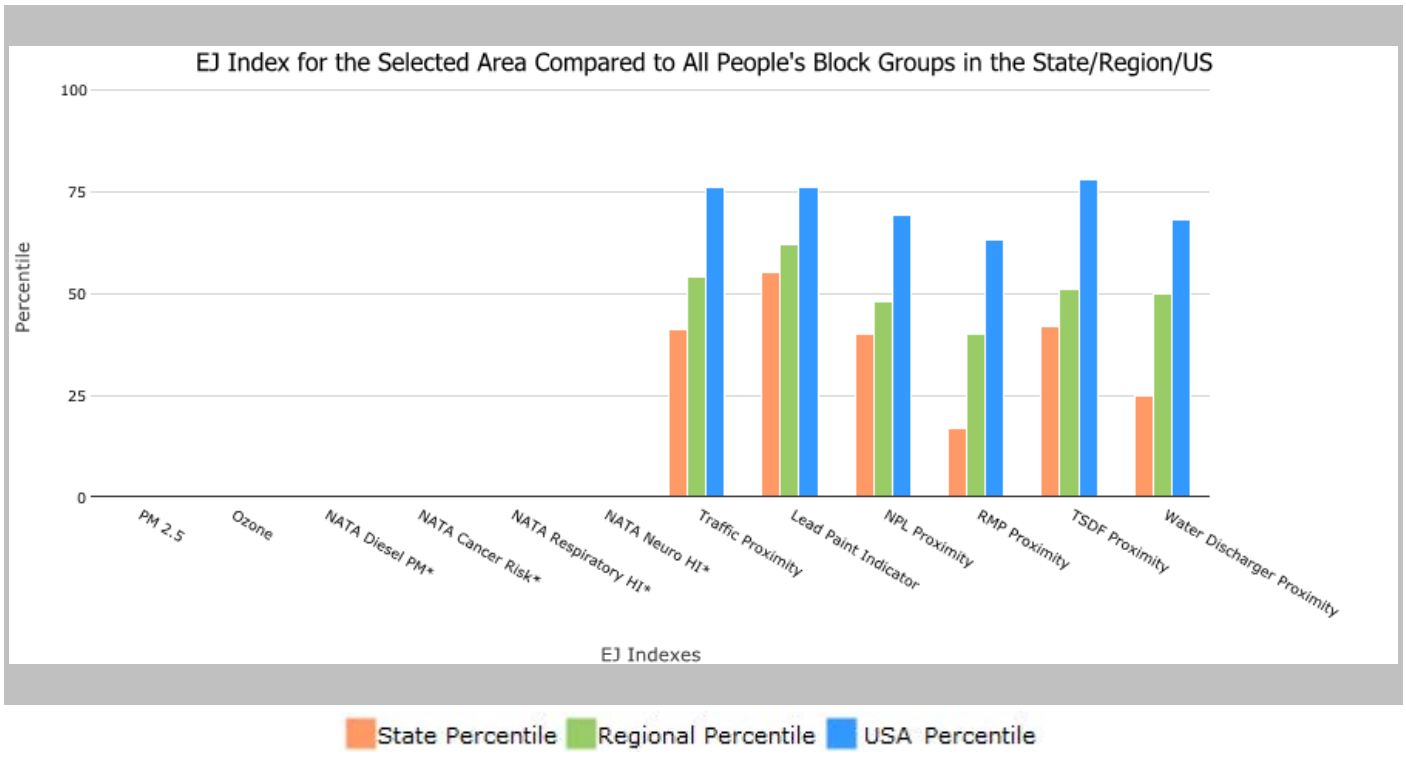
EJSCREEN Report

for Block Group 150030105031, HAWAII, EPA Region 9

Approximate Population: 537

HSH Census Block Group

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA Diesel PM*	N/A	N/A	N/A
EJ Index for NATA Air Toxics Cancer Risk*	N/A	N/A	N/A
EJ Index for NATA Respiratory Hazard Index*	N/A	N/A	N/A
EJ Index for NATA Neurological Hazard Index*	N/A	N/A	N/A
EJ Index for Traffic Proximity and Volume	41	54	76
EJ Index for Lead Paint Indicator	55	62	76
EJ Index for Proximity to NPL sites	40	48	69
EJ Index for Proximity to RMP sites	17	40	63
EJ Index for Proximity to TSDFs	42	51	78
EJ Index for Proximity to Major Direct Dischargers	25	50	68



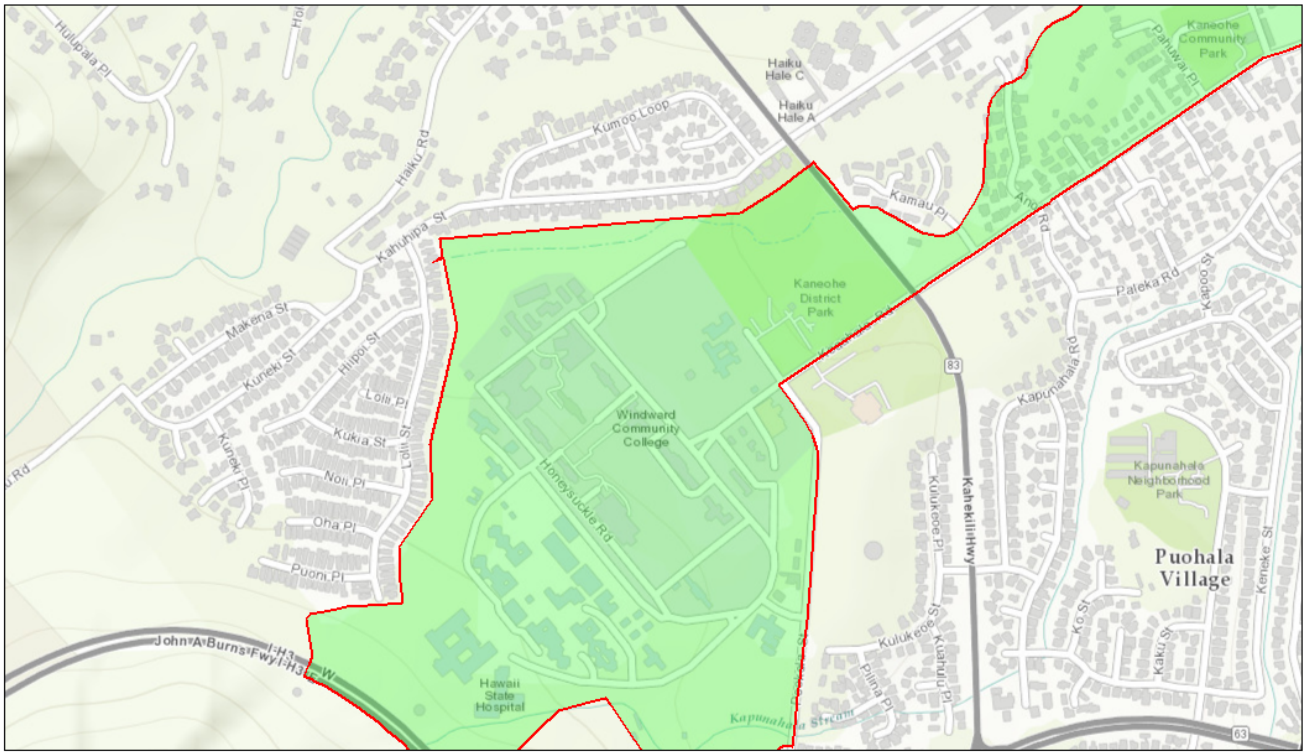
This report shows environmental, demographic, and EJ indicator values. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJSCREEN Report

for Block Group 150030105031, HAWAII, EPA Region 9

Approximate Population: 537

HSH Census Block Group



June 22, 2016

Digitized Polygon

1:9,028

0 0.075 0.15 0.3 mi

0 0.1 0.2 0.4 km

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

EJSCREEN Report

for Block Group 150030105031, HAWAII, EPA Region 9

Approximate Population: 537

HSH Census Block Group

Selected Variables	Raw Data	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m^3)	N/A	N/A	N/A	9.95	N/A	9.78	N/A
Ozone (ppb)	N/A	N/A	N/A	49.7	N/A	46.1	N/A
NATA Diesel PM (µg/m^3)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Cancer Risk (lifetime risk per million)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Respiratory Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Neurological Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Traffic Proximity and Volume (daily traffic count/distance to road)	130	280	63	190	63	110	80
Lead Paint Indicator (% Pre-1960 Housing)	0.42	0.17	85	0.25	72	0.3	69
NPL Proximity (site count/km distance)	0.05	0.092	49	0.11	44	0.096	52
RMP Proximity (facility count/km distance)	0.067	0.18	26	0.41	12	0.31	20
TSDF Proximity (facility count/km distance)	0.091	0.092	67	0.12	63	0.054	86
Water Discharger Proximity (facility count/km distance)	0.17	0.33	39	0.19	67	0.25	61
Demographic Indicators							
Demographic Index	52%	51%	53	46%	60	35%	76
Minority Population	84%	77%	55	57%	76	36%	87
Low Income Population	20%	25%	44	35%	31	34%	31
Linguistically Isolated Population	11%	6%	82	9%	65	5%	84
Population With Less Than High School Education	14%	10%	75	18%	50	14%	58
Population Under 5 years of age	5%	6%	36	7%	32	7%	35
Population over 64 years of age	13%	14%	48	12%	67	13%	58

* The National-scale Air Toxics Assessment (NATA) environmental indicators and EJ indexes, which include cancer risk, respiratory hazard, neurodevelopment hazard, and diesel particulate matter will be added into EJSCREEN during the first full public update after the soon-to-be-released 2011 dataset is made available. The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: http://www.epa.gov/ttn/atw/natamain/index.html.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

EJSCREEN Census 2010 Summary Report

Location: User-specified point center at 21.404971, -157.816087
Ring (buffer): 2-mile radius
Description: Goddard Facility

Summary	Census 2010
Population	34,421
Population Density (per sq. mile)	3,432
Minority Population	28,709
% Minority	83%
Households	10,813
Housing Units	11,203
Land Area (sq. miles)	10.03
% Land Area	93%
Water Area (sq. miles)	0.73
% Water Area	7%

Population by Race	Number	Percent
Total	34,421	-------
Population Reporting One Race	23,162	67%
White	6,220	18%
Black	182	1%
American Indian	77	0%
Asian	13,121	38%
Pacific Islander	3,321	10%
Some Other Race	241	1%
Population Reporting Two or More Races	11,259	33%
Total Hispanic Population	2,888	8%
Total Non-Hispanic Population	31,533	92%
White Alone	5,712	17%
Black Alone	164	0%
American Indian Alone	58	0%
Non-Hispanic Asian Alone	12,889	37%
Pacific Islander Alone	3,096	9%
Other Race Alone	55	0%
Two or More Races Alone	9,559	28%

Population by Sex	Number	Percent
Male	16,779	49%
Female	17,642	51%

Population by Age	Number	Percent
Age 0-4	2,015	6%
Age 0-17	7,252	21%
Age 18+	27,169	79%
Age 65+	6,080	18%

Households by Tenure	Number	Percent
Total	10,813	
Owner Occupied	7,872	73%
Renter Occupied	2,942	27%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, Census 2010 Summary File 1.

EJSCREEN Census 2010 Summary Report

Location: User-specified point center at 21.405989, -157.811474
Ring (buffer): 2-mile radius
Description: Skilled Nursing Facility

Summary	Census 2010
Population	35,978
Population Density (per sq. mile)	3,317
Minority Population	29,904
% Minority	83%
Households	11,382
Housing Units	11,789
Land Area (sq. miles)	10.85
% Land Area	92%
Water Area (sq. miles)	0.89
% Water Area	8%

Population by Race	Number	Percent
Total	35,978	-------
Population Reporting One Race	24,353	68%
White	6,611	18%
Black	190	1%
American Indian	80	0%
Asian	13,821	38%
Pacific Islander	3,407	9%
Some Other Race	245	1%
Population Reporting Two or More Races	11,625	32%
Total Hispanic Population	2,973	8%
Total Non-Hispanic Population	33,005	92%
White Alone	6,074	17%
Black Alone	172	0%
American Indian Alone	60	0%
Non-Hispanic Asian Alone	13,585	38%
Pacific Islander Alone	3,179	9%
Other Race Alone	56	0%
Two or More Races Alone	9,880	27%

Population by Sex	Number	Percent
Male	17,493	49%
Female	18,485	51%

Population by Age	Number	Percent
Age 0-4	2,077	6%
Age 0-17	7,474	21%
Age 18+	28,504	79%
Age 65+	6,564	18%

Households by Tenure	Number	Percent
Total	11,382	
Owner Occupied	8,198	72%
Renter Occupied	3,184	28%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, Census 2010 Summary File 1.

EJSCREEN Census 2010 Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

Summary	Census 2010
Population	901
Population Density (per sq. mile)	2,492
Minority Population	783
% Minority	87%
Households	219
Housing Units	229
Land Area (sq. miles)	0.36
% Land Area	100%
Water Area (sq. miles)	0.00
% Water Area	0%

Population by Race	Number	Percent
Total	901	-------
Population Reporting One Race	594	66%
White	134	15%
Black	8	1%
American Indian	6	1%
Asian	333	37%
Pacific Islander	107	12%
Some Other Race	6	1%
Population Reporting Two or More Races	307	34%
Total Hispanic Population	98	11%
Total Non-Hispanic Population	803	89%
White Alone	118	13%
Black Alone	3	0%
American Indian Alone	4	0%
Non-Hispanic Asian Alone	325	36%
Pacific Islander Alone	102	11%
Other Race Alone	0	0%
Two or More Races Alone	251	28%

Population by Sex	Number	Percent
Male	493	55%
Female	408	45%

Population by Age	Number	Percent
Age 0-4	58	6%
Age 0-17	163	18%
Age 18+	738	82%
Age 65+	93	10%

Households by Tenure	Number	Percent
Total	219	
Owner Occupied	102	47%
Renter Occupied	117	53%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, Census 2010 Summary File 1.

EJSCREEN ACS Summary Report

Location: User-specified point center at 21.404971, -157.816087
Ring (buffer): 2-mile radius
Description: Goddard Facility

Summary of ACS Estimates	2010 - 2014
Population	33,276
Population Density (per sq. mile)	3,319
Minority Population	27,394
% Minority	82%
Households	10,404
Housing Units	10,789
Housing Units Built Before 1950	425
Per Capita Income	31,103
Land Area (sq. miles) (Source: SF1)	10.03
% Land Area	100%
Water Area (sq. miles) (Source: SF1)	0.00
% Water Area	0%

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	33,276	100%	561
Population Reporting One Race	22,821	69%	1,615
White	6,386	19%	314
Black	254	1%	85
American Indian	85	0%	44
Asian	12,786	38%	447
Pacific Islander	2,839	9%	439
Some Other Race	472	1%	286
Population Reporting Two or More Races	10,455	31%	351
Total Hispanic Population	2,620	8%	334
Total Non-Hispanic Population	30,656		
White Alone	5,882	18%	314
Black Alone	254	1%	85
American Indian Alone	77	0%	44
Non-Hispanic Asian Alone	12,638	38%	449
Pacific Islander Alone	2,770	8%	438
Other Race Alone	87	0%	79
Two or More Races Alone	8,949	27%	350
Population by Sex			
Male	16,476	50%	330
Female	16,801	50%	285
Population by Age			
Age 0-4	1,850	6%	146
Age 0-17	6,280	19%	220
Age 18+	26,996	81%	364
Age 65+	6,306	19%	156

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

EJSCREEN ACS Summary Report

Location: User-specified point center at 21.404971, -157.816087
Ring (buffer): 2-mile radius
Description: Goddard Facility

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	24,063	100%	389
Less than 9th Grade	606	3%	102
9th - 12th Grade, No Diploma	971	4%	111
High School Graduate	7,367	31%	179
Some College, No Degree	7,234	30%	191
Associate Degree	2,366	10%	95
Bachelor's Degree or more	7,885	33%	183
Population Age 5+ Years by Ability to Speak English			
Total	31,426	100%	458
Speak only English	27,241	87%	390
Non-English at Home[1+2+3+4]	4,186	13%	273
[1]Speak English "very well"	2,506	8%	129
[2]Speak English "well"	1,270	4%	214
[3]Speak English "not well"	387	1%	109
[4]Speak English "not at all"	22	0%	20
[3+4]Speak English "less than well"	409	1%	109
[2+3+4]Speak English "less than very well"	1,680	5%	240
Linguistically Isolated Households*			
Total	147	100%	73
Speak Spanish	11	7%	18
Speak Other Indo-European Languages	0	0%	11
Speak Asian-Pacific Island Languages	136	93%	72
Speak Other Languages	0	0%	11
Households by Household Income			
Household Income Base	10,404	100%	111
< $15,000	436	4%	54
$15,000 - $25,000	579	6%	107
$25,000 - $50,000	1,493	14%	81
$50,000 - $75,000	1,943	19%	103
$75,000 +	5,953	57%	166
Occupied Housing Units by Tenure			
Total	10,404	100%	111
Owner Occupied	7,469	72%	136
Renter Occupied	2,935	28%	132
Employed Population Age 16+ Years			
Total	27,678	100%	417
In Labor Force	18,178	66%	314
Civilian Unemployed in Labor Force	938	3%	79
Not In Labor Force	9,500	34%	296

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

*Households in which no one 14 and over speaks English "very well" or speaks English only.

EJSCREEN ACS Summary Report

Location: User-specified point center at 21.404971, -157.816087
Ring (buffer): 2-mile radius
Description: Goddard Facility

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	31,426	100%	458
English	N/A	N/A	N/A
Spanish	N/A	N/A	N/A
French	N/A	N/A	N/A
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	N/A	N/A	N/A
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	N/A	N/A	N/A
Chinese	N/A	N/A	N/A
Japanese	N/A	N/A	N/A
Korean	N/A	N/A	N/A
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	N/A	N/A	N/A
Other Asian	N/A	N/A	N/A
Tagalog	N/A	N/A	N/A
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	N/A	N/A	N/A
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	N/A	N/A	N/A
Total Non-English	N/A	N/A	N/A

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.
*Population by Language Spoken at Home is available at the census tract summary level and up.

EJSCREEN ACS Summary Report

Location: User-specified point center at 21.405989, -157.811474
Ring (buffer): 2-mile radius
Description: Skilled Nursing Facility

Summary of ACS Estimates	2010 - 2014
Population	34,648
Population Density (per sq. mile)	3,193
Minority Population	28,285
% Minority	82%
Households	10,959
Housing Units	11,397
Housing Units Built Before 1950	450
Per Capita Income	31,742
Land Area (sq. miles) (Source: SF1)	10.85
% Land Area	100%
Water Area (sq. miles) (Source: SF1)	0.00
% Water Area	0%

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	34,648	100%	414
Population Reporting One Race	23,917	69%	1,306
White	6,878	20%	314
Black	255	1%	85
American Indian	85	0%	44
Asian	13,341	39%	334
Pacific Islander	2,885	8%	243
Some Other Race	472	1%	286
Population Reporting Two or More Races	10,731	31%	351
Total Hispanic Population	2,661	8%	334
Total Non-Hispanic Population	31,987		
White Alone	6,363	18%	314
Black Alone	255	1%	85
American Indian Alone	77	0%	44
Non-Hispanic Asian Alone	13,193	38%	334
Pacific Islander Alone	2,816	8%	243
Other Race Alone	87	0%	79
Two or More Races Alone	9,195	27%	350
Population by Sex			
Male	17,051	49%	253
Female	17,597	51%	283
Population by Age			
Age 0-4	1,881	5%	118
Age 0-17	6,439	19%	220
Age 18+	28,210	81%	364
Age 65+	6,832	20%	130

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

EJSCREEN ACS Summary Report

Location: User-specified point center at 21.405989, -157.811474
Ring (buffer): 2-mile radius
Description: Skilled Nursing Facility

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	25,216	100%	389
Less than 9th Grade	662	3%	74
9th - 12th Grade, No Diploma	984	4%	64
High School Graduate	7,614	30%	168
Some College, No Degree	7,516	30%	191
Associate Degree	2,442	10%	95
Bachelor's Degree or more	8,439	33%	183
Population Age 5+ Years by Ability to Speak English			
Total	32,767	100%	393
Speak only English	28,418	87%	390
Non-English at Home[1+2+3+4]	4,349	13%	213
[1]Speak English "very well"	2,596	8%	173
[2]Speak English "well"	1,341	4%	135
[3]Speak English "not well"	390	1%	66
[4]Speak English "not at all"	22	0%	20
[3+4]Speak English "less than well"	412	1%	68
[2+3+4]Speak English "less than very well"	1,753	5%	151
Linguistically Isolated Households*			
Total	157	100%	48
Speak Spanish	11	7%	18
Speak Other Indo-European Languages	0	0%	11
Speak Asian-Pacific Island Languages	146	93%	47
Speak Other Languages	0	0%	11
Households by Household Income			
Household Income Base	10,959	100%	111
< $15,000	491	4%	54
$15,000 - $25,000	624	6%	107
$25,000 - $50,000	1,556	14%	82
$50,000 - $75,000	2,059	19%	103
$75,000 +	6,228	57%	166
Occupied Housing Units by Tenure			
Total	10,959	100%	111
Owner Occupied	7,715	70%	136
Renter Occupied	3,244	30%	132
Employed Population Age 16+ Years			
Total	28,919	100%	383
In Labor Force	18,782	65%	314
Civilian Unemployed in Labor Force	941	3%	79
Not In Labor Force	10,136	35%	296

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

*Households in which no one 14 and over speaks English "very well" or speaks English only.

EJSCREEN ACS Summary Report

Location: User-specified point center at 21.405989, -157.811474
Ring (buffer): 2-mile radius
Description: Skilled Nursing Facility

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	32,767	100%	393
English	N/A	N/A	N/A
Spanish	N/A	N/A	N/A
French	N/A	N/A	N/A
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	N/A	N/A	N/A
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	N/A	N/A	N/A
Chinese	N/A	N/A	N/A
Japanese	N/A	N/A	N/A
Korean	N/A	N/A	N/A
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	N/A	N/A	N/A
Other Asian	N/A	N/A	N/A
Tagalog	N/A	N/A	N/A
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	N/A	N/A	N/A
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	N/A	N/A	N/A
Total Non-English	N/A	N/A	N/A

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.
*Population by Language Spoken at Home is available at the census tract summary level and up.

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

Summary of ACS Estimates	2010 - 2014
Population	637
Population Density (per sq. mile)	1,760
Minority Population	521
% Minority	82%
Households	239
Housing Units	262
Housing Units Built Before 1950	49
Per Capita Income	22,795
Land Area (sq. miles) (Source: SF1)	0.36
% Land Area	99%
Water Area (sq. miles) (Source: SF1)	0.00
% Water Area	1%

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	637	100%	132
Population Reporting One Race	420	66%	288
White	160	25%	70
Black	49	8%	49
American Indian	0	0%	11
Asian	140	22%	98
Pacific Islander	67	11%	49
Some Other Race	4	1%	11
Population Reporting Two or More Races	217	34%	86
Total Hispanic Population	106	17%	65
Total Non-Hispanic Population	531		
White Alone	116	18%	64
Black Alone	49	8%	49
American Indian Alone	0	0%	11
Non-Hispanic Asian Alone	140	22%	98
Pacific Islander Alone	67	11%	49
Other Race Alone	0	0%	11
Two or More Races Alone	159	25%	73
Population by Sex			
Male	309	49%	103
Female	328	51%	72
Population by Age			
Age 0-4	47	7%	35
Age 0-17	103	16%	46
Age 18+	534	84%	109
Age 65+	52	8%	33

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	477	100%	111
Less than 9th Grade	21	4%	27
9th - 12th Grade, No Diploma	34	7%	26
High School Graduate	135	28%	58
Some College, No Degree	141	30%	62
Associate Degree	42	9%	27
Bachelor's Degree or more	146	31%	65
Population Age 5+ Years by Ability to Speak English			
Total	590	100%	125
Speak only English	450	76%	117
Non-English at Home[1+2+3+4]	140	24%	65
[1]Speak English "very well"	106	18%	58
[2]Speak English "well"	25	4%	28
[3]Speak English "not well"	9	2%	23
[4]Speak English "not at all"	0	0%	11
[3+4]Speak English "less than well"	9	2%	23
[2+3+4]Speak English "less than very well"	34	6%	34
Linguistically Isolated Households*			
Total	0	0%	11
Speak Spanish	0	0%	11
Speak Other Indo-European Languages	0	0%	11
Speak Asian-Pacific Island Languages	0	0%	11
Speak Other Languages	0	0%	11
Households by Household Income			
Household Income Base	239	100%	42
< $15,000	53	22%	46
$15,000 - $25,000	17	7%	15
$25,000 - $50,000	38	16%	31
$50,000 - $75,000	57	24%	30
$75,000 +	74	31%	47
Occupied Housing Units by Tenure			
Total	239	100%	42
Owner Occupied	59	25%	38
Renter Occupied	180	75%	50
Employed Population Age 16+ Years			
Total	540	100%	119
In Labor Force	347	64%	111
Civilian Unemployed in Labor Force	39	7%	25
Not In Labor Force	193	36%	85

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

*Households in which no one 14 and over speaks English "very well" or speaks English only.

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-mile radius
Description: HSH Census Block Group

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	590	100%	125
English	N/A	N/A	N/A
Spanish	N/A	N/A	N/A
French	N/A	N/A	N/A
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	N/A	N/A	N/A
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	N/A	N/A	N/A
Chinese	N/A	N/A	N/A
Japanese	N/A	N/A	N/A
Korean	N/A	N/A	N/A
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	N/A	N/A	N/A
Other Asian	N/A	N/A	N/A
Tagalog	N/A	N/A	N/A
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	N/A	N/A	N/A
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	N/A	N/A	N/A
Total Non-English	N/A	N/A	N/A

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.
*Population by Language Spoken at Home is available at the census tract summary level and up.

EJSCREEN Report (Version 2016)

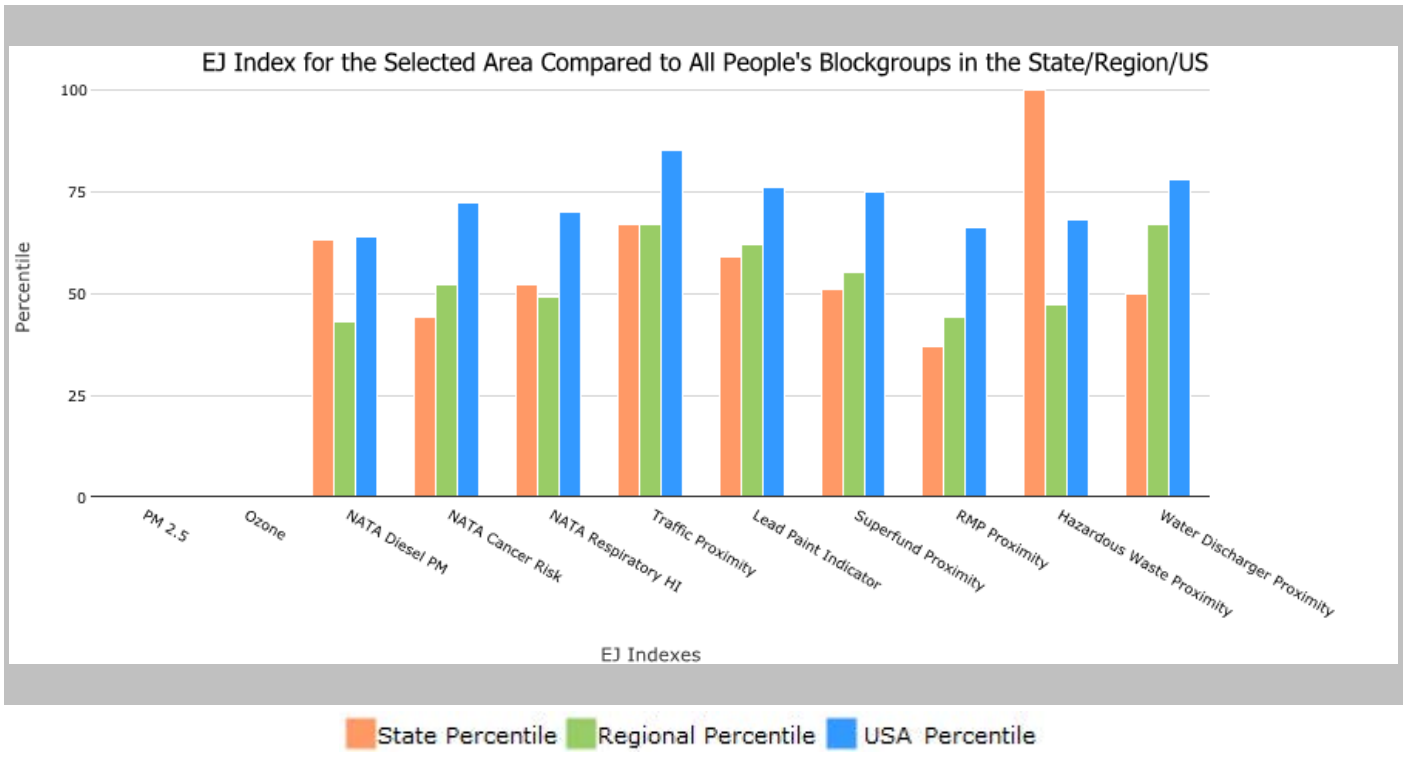
2 mile Ring Centered at 21.404971,-157.816087, HAWAII, EPA Region 9

Approximate Population: 33,276

Input Area (sq. miles): 12.56

Goddard Facility (The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA* Diesel PM	63	43	64
EJ Index for NATA* Air Toxics Cancer Risk	44	52	72
EJ Index for NATA* Respiratory Hazard Index	52	49	70
EJ Index for Traffic Proximity and Volume	67	67	85
EJ Index for Lead Paint Indicator	59	62	76
EJ Index for Proximity to NPL sites	51	55	75
EJ Index for Proximity to RMP sites	37	44	66
EJ Index for Proximity to TSDFs	100	47	68
EJ Index for Proximity to Major Direct Dischargers	50	67	78



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

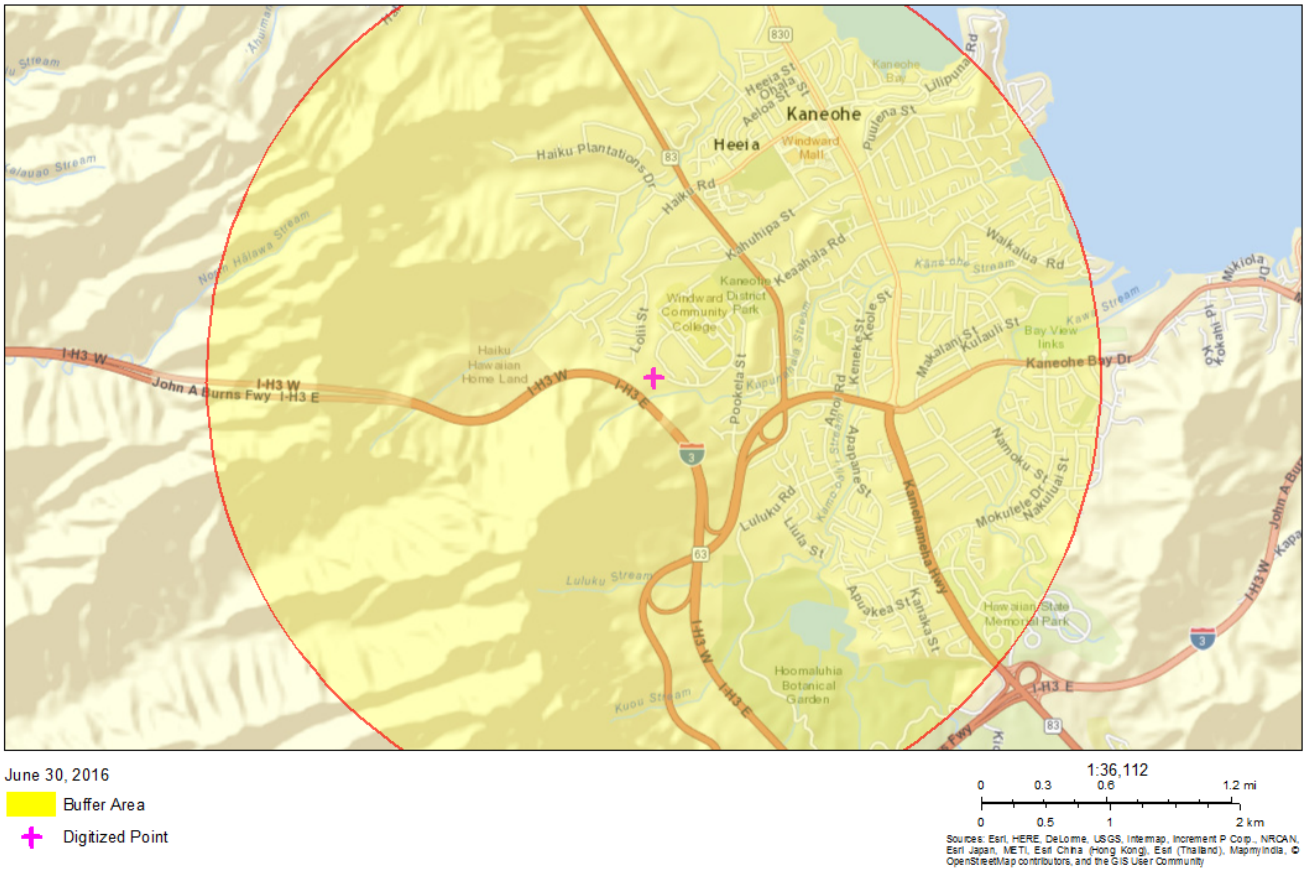
EJSCREEN Report (Version 2016)

2 mile Ring Centered at 21.404971,-157.816087, HAWAII, EPA Region 9

Approximate Population: 33,276

Input Area (sq. miles): 12.56

Goddard Facility (The study area contains 1 blockgroup(s) with zero population.)



June 30, 2016

Buffer Area

Digitized Point

Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0
National Pollutant Discharge Elimination System (NPDES)	0

EJSCREEN Report (Version 2016)

2 mile Ring Centered at 21.404971,-157.816087, HAWAII, EPA Region 9

Approximate Population: 33,276

Input Area (sq. miles): 12.56

Goddard Facility (The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m^3)	N/A	N/A	N/A	9.37	N/A	9.32	N/A
Ozone (ppb)	N/A	N/A	N/A	51	N/A	47.4	N/A
NATA* Diesel PM (µg/m^3)	0.155	0.149	72	0.978	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	36	34	69	43	<50th	40	<50th
NATA* Respiratory Hazard Index	1.1	1	70	2	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	520	990	67	1100	60	590	78
Lead Paint Indicator (% Pre-1960 Housing)	0.18	0.16	63	0.24	55	0.3	48
NPL Proximity (site count/km distance)	0.053	0.098	48	0.15	38	0.13	45
RMP Proximity (facility count/km distance)	0.071	0.19	33	0.57	11	0.43	16
TSDF Proximity (facility count/km distance)	0	0	100	0.11	19	0.072	26
Water Discharger Proximity (facility count/km distance)	0.24	0.34	55	0.2	79	0.31	69
Demographic Indicators							
Demographic Index	49%	52%	39	47%	54	36%	72
Minority Population	82%	77%	51	58%	73	37%	86
Low Income Population	15%	26%	30	36%	20	35%	21
Linguistically Isolated Population	1%	6%	32	9%	24	5%	52
Population With Less Than High School Education	7%	9%	44	17%	29	14%	33
Population Under 5 years of age	6%	6%	46	7%	42	6%	46
Population over 64 years of age	19%	15%	69	13%	82	14%	79

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

EJSCREEN Report (Version 2016)

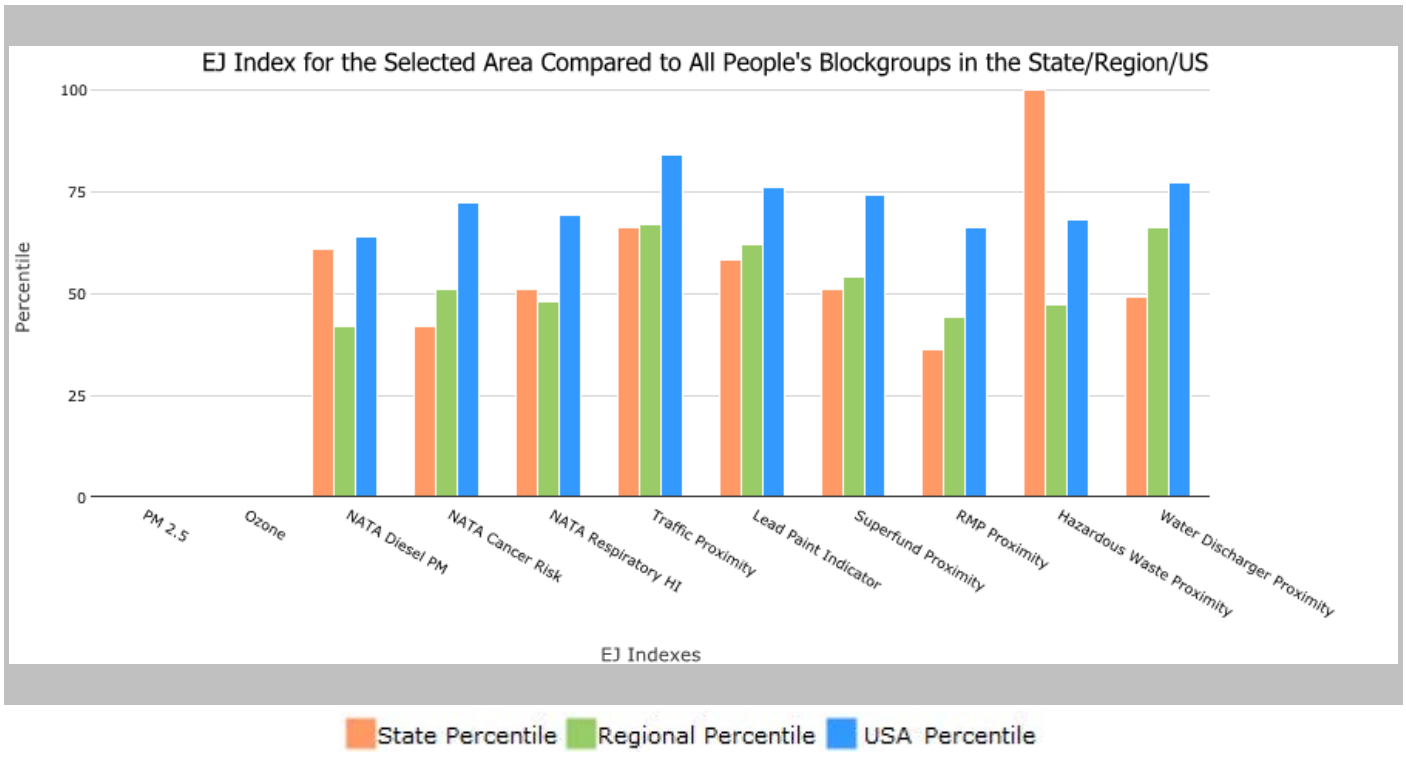
2 mile Ring Centered at 21.405989,-157.811474, HAWAII, EPA Region 9

Approximate Population: 34,648

Input Area (sq. miles): 12.56

Skilled Nursing Facility (The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA* Diesel PM	61	42	64
EJ Index for NATA* Air Toxics Cancer Risk	42	51	72
EJ Index for NATA* Respiratory Hazard Index	51	48	69
EJ Index for Traffic Proximity and Volume	66	67	84
EJ Index for Lead Paint Indicator	58	62	76
EJ Index for Proximity to NPL sites	51	54	74
EJ Index for Proximity to RMP sites	36	44	66
EJ Index for Proximity to TSDFs	100	47	68
EJ Index for Proximity to Major Direct Dischargers	49	66	77



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

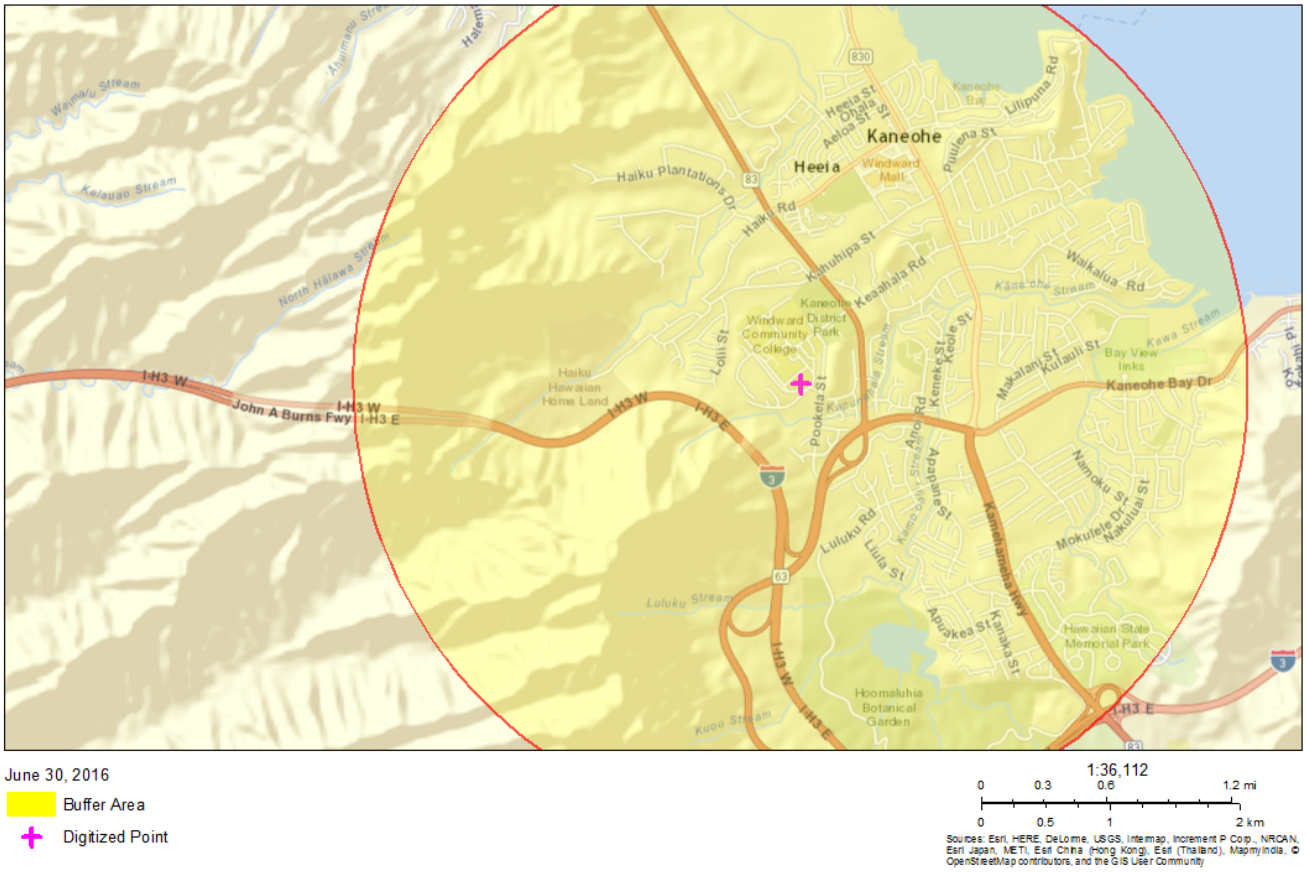
EJSCREEN Report (Version 2016)

2 mile Ring Centered at 21.405989,-157.811474, HAWAII, EPA Region 9

Approximate Population: 34,648

Input Area (sq. miles): 12.56

Skilled Nursing Facility (The study area contains 1 blockgroup(s) with zero population.)



June 30, 2016

Buffer Area

Digitized Point

1:36,112

0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0
National Pollutant Discharge Elimination System (NPDES)	0

EJSCREEN Report (Version 2016)

2 mile Ring Centered at 21.405989,-157.811474, HAWAII, EPA Region 9

Approximate Population: 34,648

Input Area (sq. miles): 12.56

Skilled Nursing Facility (The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m^3)	N/A	N/A	N/A	9.37	N/A	9.32	N/A
Ozone (ppb)	N/A	N/A	N/A	51	N/A	47.4	N/A
NATA* Diesel PM (µg/m^3)	0.154	0.149	72	0.978	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	36	34	69	43	<50th	40	<50th
NATA* Respiratory Hazard Index	1.1	1	70	2	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	500	990	67	1100	59	590	78
Lead Paint Indicator (% Pre-1960 Housing)	0.18	0.16	63	0.24	54	0.3	48
NPL Proximity (site count/km distance)	0.053	0.098	48	0.15	38	0.13	44
RMP Proximity (facility count/km distance)	0.071	0.19	33	0.57	11	0.43	16
TSDF Proximity (facility count/km distance)	0	0	100	0.11	19	0.072	26
Water Discharger Proximity (facility count/km distance)	0.24	0.34	56	0.2	80	0.31	69
Demographic Indicators							
Demographic Index	48%	52%	38	47%	53	36%	72
Minority Population	82%	77%	49	58%	72	37%	85
Low Income Population	15%	26%	30	36%	20	35%	20
Linguistically Isolated Population	1%	6%	33	9%	24	5%	52
Population With Less Than High School Education	7%	9%	44	17%	29	14%	33
Population Under 5 years of age	5%	6%	44	7%	41	6%	44
Population over 64 years of age	20%	15%	74	13%	84	14%	81

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

For additional information, see: www.epa.gov/environmentaljustice

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EJSCREEN Report (Version 2016)

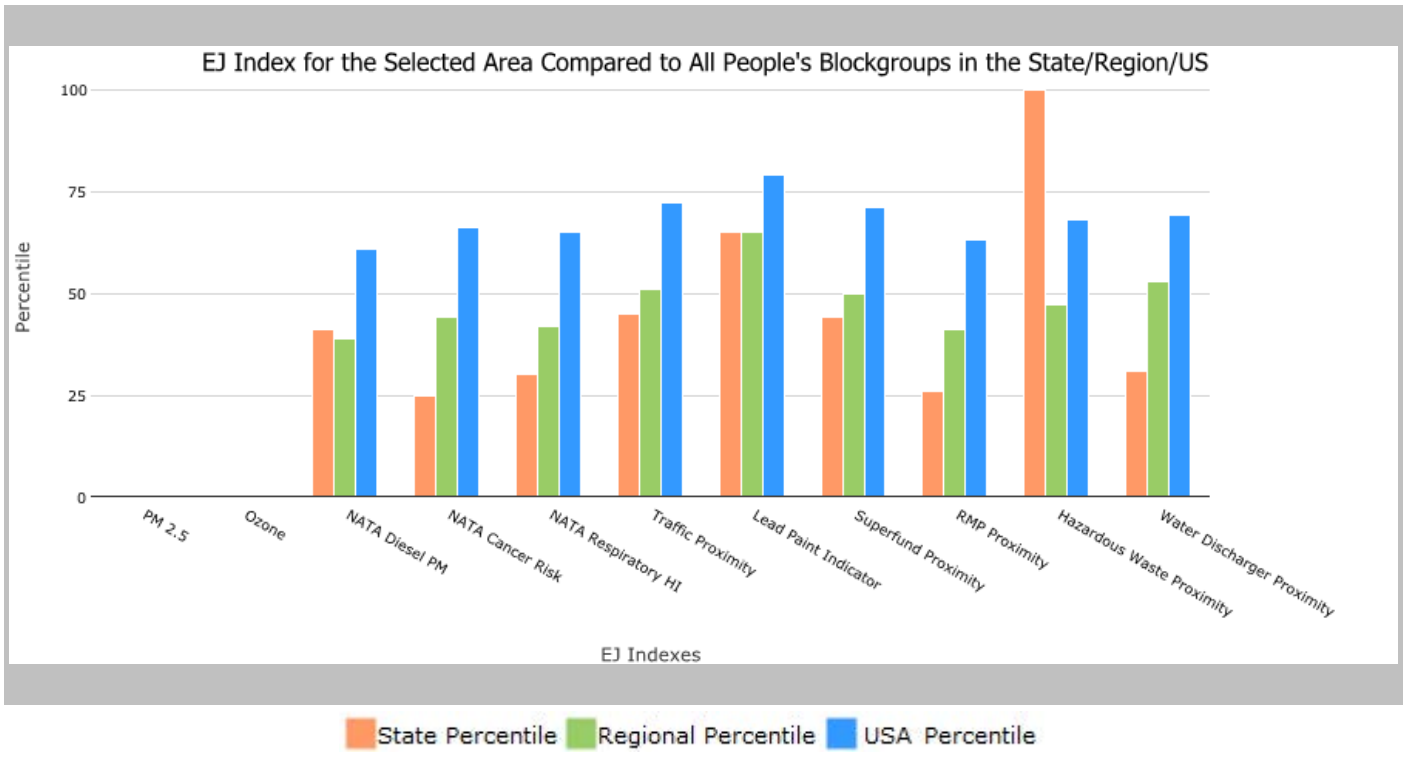
Blockgroup: 150030105031, HAWAII, EPA Region 9

Approximate Population: 637

Input Area (sq. miles): 0.36

HSH Census Block Group

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA* Diesel PM	41	39	61
EJ Index for NATA* Air Toxics Cancer Risk	25	44	66
EJ Index for NATA* Respiratory Hazard Index	30	42	65
EJ Index for Traffic Proximity and Volume	45	51	72
EJ Index for Lead Paint Indicator	65	65	79
EJ Index for Proximity to NPL sites	44	50	71
EJ Index for Proximity to RMP sites	26	41	63
EJ Index for Proximity to TSDFs	100	47	68
EJ Index for Proximity to Major Direct Dischargers	31	53	69



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJSCREEN Report (Version 2016)

Blockgroup: 150030105031, HAWAII, EPA Region 9

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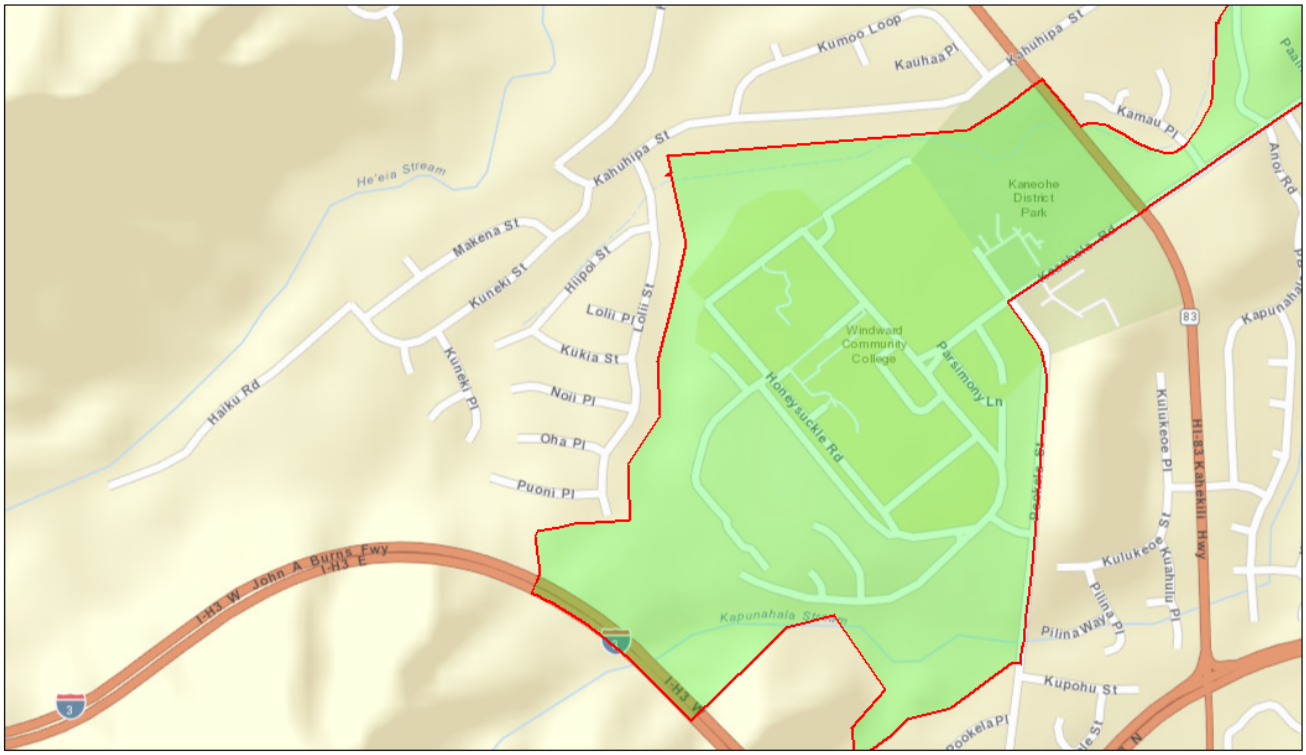

June 30, 2016

Digitized Polygon

1:9,028

0 0.075 0.15 0.3 mi

0 0.1 0.2 0.4 km

Sources: Esri, HERE, DeLorme, USGS, Intermap, Increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0
National Pollutant Discharge Elimination System (NPDES)	0

EJSCREEN Report (Version 2016)

Blockgroup: 150030105031, HAWAII, EPA Region 9

Approximate Population: 637

Input Area (sq. miles): 0.36

HSH Census Block Group

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m^3)	N/A	N/A	N/A	9.37	N/A	9.32	N/A
Ozone (ppb)	N/A	N/A	N/A	51	N/A	47.4	N/A
NATA* Diesel PM (µg/m^3)	0.131	0.149	68	0.978	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	36	34	69	43	<50th	40	<50th
NATA* Respiratory Hazard Index	1.1	1	69	2	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	150	990	49	1100	40	590	57
Lead Paint Indicator (% Pre-1960 Housing)	0.47	0.16	88	0.24	76	0.3	73
NPL Proximity (site count/km distance)	0.054	0.098	49	0.15	39	0.13	45
RMP Proximity (facility count/km distance)	0.072	0.19	33	0.57	11	0.43	17
TSDF Proximity (facility count/km distance)	0	0	100	0.11	19	0.072	26
Water Discharger Proximity (facility count/km distance)	0.18	0.34	42	0.2	68	0.31	57
Demographic Indicators							
Demographic Index	55%	52%	60	47%	62	36%	77
Minority Population	82%	77%	49	58%	72	37%	85
Low Income Population	27%	26%	59	36%	41	35%	43
Linguistically Isolated Population	0%	6%	23	9%	19	5%	44
Population With Less Than High School Education	12%	9%	70	17%	46	14%	54
Population Under 5 years of age	7%	6%	67	7%	60	6%	65
Population over 64 years of age	8%	15%	19	13%	36	14%	27

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

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